EFFECTS OF COVID CRISIS ON HUNGARIAN FOOD SUPPLY CHAINS

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Abstract

The aim of the study is to show what challenges the actors of the food supply chains faced with during 2020 in Hungary as a result of the COVID-19 pandemic and how they were able to deal with them.

This research applies a qualitative methodology and semi-structured interviews were conducted with actors in the food supply chain to sum up the observations in a case study. The authors targeted raw material producers, processors, a retailer and a logistics service provider specialized in the food sector to understand what problems have arisen at supply chain level and how they can be addressed, and what impact they have had on the actors. The authors have also identified a special-origin bullwhip effect experienced by the different food supply chain members.

The food industry plays a vital role in supplying the population and this has grown as a result of the epidemic. However, according to current assumption, some sub-sectors were not equally affected by the crisis: consumption shifted towards cheaper, basic foods, while demand for expensive and / or luxury products declined (e.g. chocolate). At the same time, the reorganization of final customers' consumption and the increasing household consumption could not offset the lost sales volume due to the closure of the Hotel, Restaurant and Catering (Horeca) sector. Overall, the Hungarian food industry has successfully overcome the effects of COVID-19, its political judgement has strengthened, and the importance of the country's ability to self-sufficiency with food has increased. In the upcoming period, domestic and European Union subsidies to support agricultural and food industry investments will also help funding this endeavour.

Key words: COVID-19, supply chain, food industry, bullwhip-effect

1. INTRODUCTION

The aim of the study is to show the impact of the 2020 COVID-19 pandemic on the food supply chain in Hungary. During the pandemic period, the importance of the food industry was demonstrated, countries realized its strategic importance, the importance of self-sufficiency was highlighted, which together led to the sector's revaluation.

Although the food industry produces products that are essential for the supply of the population, the sub-sectors have been affected in different ways and to different degrees by the pandemic. The aim of this research is to review the main food subsectors (meat, dairy, fruit and vegetable processing and bakery & pasta), focusing on processors, in some cases producers, and other actors linked to the sector, such as food retailers, logistics service providers active in the food industry. In this research, the impact of the pandemic, the challenges the actors faced with in the chain, the solutions found are explored, and whether patterns, similarities and differences can be identified between the responses.

The research question is: what effects did supply chain actors perceive on the demand and supply side as a result of the pandemic, and how did they manage to cope with it? Another important question is how did actors manage the inevitable bullwhip effect of panic buying in spring 2020? Structure of the analysis is shown in Figure 1.



Source: own edition

To answer the research questions, case study methodology is used based on semi-structured in-depth interviews and company data. Authors interviewed trade associations representing the above-mentioned sub-sectors to gain insight into the current state of play in each sector. After that, the authors then contacted the companies and interviewed their top management. Logistics service providers and retailers with an interest in the food industry were also interviewed, reinforcing the supply chain approach. In addition to the primary research, also secondary data was used, collecting data from companies' annual reports for the last three years.

In the following chapters of the paper, the authors review the role of the food industry in the world and in Hungary, and the impact of the pandemic on the food industry. A separate chapter deals with the methodology of the research and a brief introduction of the companies studied, followed by the results of the interviews and secondary data and the conclusions. The authors also mention the practical implications of the findings, the limitations of the research results and the scope for further research.

2. LITERATURE REVIEW

2.1. Role of food industry in the world

The food industry is a special industry, as it is responsible for the basic nutrient supply of mankind, producing a basic economic product. Also, according to Maslow's hierarchy of needs (Maslow, 1943), until the physiological needs of an individual are met, he or she cannot progress towards self-actualization. The largest agricultural production is typically in countries with large areas (USA, India, China), the same is true for the food industry in general, i.e. the largest food producing countries according to FAOSTAT (2021) are China, India, USA and Brazil (Boyle, 2021).

The food industry is the largest manufacturing industry in the European Union, with a value added of EUR 266 billion and nearly 5 million employees. The EU is currently the world's largest exporter of food products, with exports doubling in recent years (European Commission, 2021). According to a study by the European Commission (2021), food products produced in the EU are generally competitive and of high quality. Yet, the relative competitiveness of the products is declining, due to decreasing labour productivity and certain challenges in supply chains (transparency, lack of skilled labour, low market integration of member states, etc.).

2.2. Role of food industry in Hungary

The three largest manufacturing industries in Hungary are vehicle manufacturing, computer, electronic and optical products manufacturing, and food processing (HCSO, 2019a). For years, the food industry in Hungary has contributed about 2-2.2% of GDP (HCSO, 2019b). The largest sectors of the domestic food industry are meat processing, beverage production, animal feed production, other food production (sugar production, confectionery production, etc.), dairy processing and fruit and vegetable processing, which accounted for more than 77% of total food production in 2019 (HCSO, 2021). Meat processing has been the most important sector for many years, accounting for about a quarter of the total value of production. In general, food industry production has expanded in the recent years, increasing by about 18% overall to EUR 9.2 billion in 2018 compared to 2014. There has also been a steady expansion in the sub-sectors since 2014 (HCSO, 2021). The number of people employed in the food industry is also significant, accounting for around 149,500 in 2019 (IAE, 2019). The growth in export sales is remarkable, increasing by 20%

between 2014 and 2019 (IAE, 2019), with fodder production, milk processing, beverage production, meat processing and fruit and vegetable processing being the main sectors that have achieved outstanding results.

Considering the numerous sub-sectors of the entire food industry, in the current research the authors focus on the ones which produce basic foodstuff: meat processing, dairy, fruit and vegetable processing as well as pasta and bakery production.

2.3. Effect of COVID-19 pandemic on food industry

Despite the fact that the pandemic is far from over, the international literature on Covid-19 is also growing in number (Nakat and Bou-Mitri, 2021; Éliás and Jámbor, 2021; Galanakis, 2020; Rizou et al., 2020).

Studies related to the epidemic can be found in the domestic literature (e.g., the study of the food SME sector during the epidemic, Madari, 2021; the study of the exposure of the Hungarian economy, Koppány, 2020), but these works are limited in number and either do not focus specifically on the food industry or do not focus on supply chains. It is therefore an interesting question to look at the impacts of the COVID-19 on food supply chains operating specifically in the country under study.

Nakat and Bou-Mitri (2021) present a recent literature review on the impact of COVID-19 on the food industry. They analysed recommendations from both governmental and non-governmental, but specialised institutional websites, then categorised the recommendations into three basic categories and searched for studies available in the literature alongside these categories. The three basic areas of concern during an epidemic are (1) maintaining the smooth functioning of food supply chains while protecting the health of the workforce, (2) food safety and (3) meeting high consumer demands. An important conclusion is the adaptation of food supply chains to a new order which enjoys the confidence of all its actors, including the suppliers, the manufacturing company, the distributors and finally, the consumers.

Specifically in their study, Rizou et al. (2020) focus on food safety in food supply chains. They found that along the entire supply chain, actors have to face with various challenges caused by the virus concerning processing, transportation, distribution and working conditions.

Despite the fact that the authorities do not take as risk the potential spread of the virus in the different stages of food production and in its environment, the adverse effects of the pandemic on the environment, on people and on the processes are evident (Rizou et al., 2020). The authors conclude that additional checkpoints, measurements and rigorous protocols are needed at the supply chain level to avoid negative impacts (Éliás and Jámbor, 2021). In many cases, Industry 4.0 tools can help supply chain actors to find the right solution (Galanakis, 2020).

Another important question is whether the changes in food supply chains that have been forced by the epidemic will be sustained in long term (Hobbs, 2020). According to the author, both on the demand side (panic buying, changed consumer demands, changed demand structure due to the loss of Horeca) and the supply side (loss of labour, problems in transporting goods even due to closed borders), food supply chains have been hit by the epidemic. The author considers two main directions to become sustainable in the long term: the strengthening of the online food retail sector and the local food supply chains.

Overall, the authors believe that current study contributes to the literature and knowledge by examining the impact of COVID-19 on the food industry in a supply chain context. The studies reviewed show that the food industry faced the same difficulties as other manufacturing sectors (stagnation of supply sources, labour shortages), yet, due to the nature of the product, its importance increased, and most sub-sectors coped successfully with the challenges, surviving the initial panic. In the rest of the article, the supply chain actors studied, and the perceived impacts and solutions are presented.

3. METHODOLOGY

3.1. Methodology selection

During the research, case study methodology has been adopted for the study. According to Yin (2011), case study is an appropriate methodology when researchers want to understand how COVID-19 pandemic affects companies and aim to gain a better understanding on what and why firms decide and do to mitigate risk, avoid disadvantages or exploit advantages. The case studies are not intended to produce generalizable or representative results (Denzin and Lincoln, 2011), however they might help to identify good practices in the sector and benchmark in problem handling.

To collect data for the case study, authors conducted semi-structured, in-depth interviews and searched for secondary data. With the help of an interview the researcher can understand the circumstances of a given phenomenon (and through the thoughts of an interviewee can understand the company itself), including the aspect of the respondent, how he/she sees the world – in this case the COVID-19 pandemic effect on the company and supply chain operations (Kvale, 1994). It is also key to consciously consider the feasibility and potential limitations of the requirements for the validity, reliability and generalizability of the research. According to Kvale a qualitative "method validity if it investigates what it aims to investigate, and to the extent to which observations reflect the phenomena of interest" (Kvale, 1994, p. 167). In this current research consequently, the qualitative interview may be a valid research method as the goal was to understand the Covid-19 caused phenomena in the Hungarian food sector. Related to the *reliability* of given source of date it can be said that is low due to the wording of a question, the subjective interpretation of the interviewer, his/her terminology and preliminary perceptions, which may influence the answer. This is the reason why the research hardly could be repeated later by others with exactly the same result (Kvale, 1996). In current research to increase reliability, the authors prepared the interview questions in advance, the same interview questions

were asked from each interviewee. The authors strove to create a list of questions, a guideline, trying to avoid usage of special terminology. It is taken into consideration that the *generalisability* of interviews is not high, since the authors only conducted a few interviews (see more details in Interview details section of the study) and the selection of respondents were not representative (however authors intended to cover most of the food industry). It is considered however a significant result since no such exploration was made either on supply chain level or in Hungary until now. The main contribution is the discovery and understanding of the problem, to gather as many opinions to the phenomena as possible, which can be researched in the future in a large sample with other types of research methods (Nagy, 2010).

3.2 Interview details

In the research, the authors asked different actors in the supply chain about the operational difficulties experienced during the COVID-19 pandemic period (2020). The authors had several goals when selecting the interviewees. On the one hand, authors deliberately wanted to target the four sub-sectors of the food industry in Hungary producing basic foodstuff, such as meat, dairy, preserved vegetable and fruit, and bakery and pasta. On the other hand, authors were curious about the different experiences of the actors in the supply chain, such as the effects on raw material production, processing and retail/distribution. Authors intended to supplement this narrow supply chain interpretation with other actors such as logistics providers specialized in food industry or trade associations. Totally 13 interviews were conducted, the details and distribution of which are shown in Table 1. The names of the interviewed companies are treated confidentially upon request and identified by code numbers.

Company	Industry	Supply chain	Position of	Date of
ID		role	interviewee	interview
FA1	Vegetable	Raw material	CEO	06/05/2021
	production and	producer,		
	processing	Processor		
FB2	Fruit production	Raw material	CEO	20/04/2021
	and processing	producer,		
		Processor		
FB3	Vegetable	Processor	Industrial	14/05/2021
	processing		Customer	
			Service	
			Manager	
TRF1	Trade association	Trade	Secretary	15/04/2021
	of fruit and	association	general and	
	vegetable		President	
	production and			
	processing.			

 Table 1. Interview details

TRS2	Trade association	Trade	President	11/05/2021
	of fruit and	association		
	vegetable			
	preserving			
TRM3	Trade association	Trade	VP	23/04/2021
	of meat processing	association		
TRC4	Trade association	Trade	Secretary	12/04/2021
	of confectionary	association	general	
	manufacturers			
PG1	Pasta manufacturer	Manufacturer/	Plant	15/12/2020
		Processor	manager	
MK1	Meat processor	Manufacturer/	Purchasing	23/04/2021
		Processor	director	
MG2	Meat processor	Manufacturer/	CEO	05/05/2021
		Processor		
DB1	Milk producer	Raw material	Plant	19/01/2021
	-	producer	manager	
LN1	Logistics service	Logistics	Sales	01/04/2021
	provider	service	manager	
	specialized in food	provider		
	logistics			
RN1	Retailer and	Retailer,	Supply	27/04/2021
	distributor of coffee	Distributor	Chain	
	products		Manager	

Source: own edition

The same interview questions were asked during the 60 minutes interviews. Because of the pandemic, all interviews were carried out on MS Teams platform. As all interviewees were top executives of a given company, they were aware of the effects COVID-19 pandemic on the business and were considered relevant sources of information. Based on the interviews, a case study can be formulated on what challenges the food supply chains faced during 2020 as a result of the virus crisis, as well as how they could handle it.

4. RESULTS

The aim of this research is to explore, understand and structure the effects of the COVID-19 pandemic on the food supply chain. The food supply chain is interpreted in this study as shown in Figure 2. Following the literature review and interview-based data collection, authors examine the effects of the pandemic on different types of actors in the supply chain as well as we distinguish supply and demand-side effects.



Figure 2. Interpretation of the Food supply chain in the paper

Based on interviews with the different industry members, the difficulties caused by the virus situation can be summarized as follows (Table 2). The structure of the table shows the effects experienced by the raw material producers, the processors/ manufacturers and the retailers, as well as the logistics service providers who service all the three entities mentioned before. The authors did not deal with the trade associations because their observations are similar to the company experiences. The authors also did not analyse the final customers, because that would require a separate study. The summary table also includes both the demand and the supply side effects according to Hobbs (2020).

Supply chain player	Raw material producer	Processor, Manufacturer	Retailer	Logistics service providers
Demand	 Horeca sector 	 Horeca sector 	 Panic shopping 	Demand for
side	declined, it was	declined, it was	in March, April	expensive
effects	hard to	hard to	and partly in	products
	compensate the	compensate the	May 2020	declined the %-
	volume	sales volume	Lack of	based
	Export	 Demand for 	inventory	transportation
	decreased	confectionary	Next to	cost also
		and expensive	traditional	 Cheaper
		products	sales channels,	transportation
		declined	online	methods were
		 Increased order 	shopping	preferred, even
		thanks to panic	boosted	if it is slower
		shopping	Lack of online	(except in
		 After panic, fall 	delivery	panic period)
		in demand in	capacity	
		May and June	 Increased level 	
		2020	of online	

Table 2.	Results
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		2020 Easter: was	shopping	
		- 2020 Easter. was	snopping	
		20% decline in	remained	
		demand for		
		chocolate		
		(bunny, eggs)		
Supply	 Shortage in 	 Shortage in 	 Shortage in 	 After border
side	packaging	import raw	import product	lockdown lack
effects	material supply	material supply	supply	of international
	 Increased price 	(e.g. palm oil,	During panic	drivers
	of packaging	cocoa)	period,	 Increasing air
	materials	 Shortage in 	suppliers ran	transport prices
	 Milk was not 	packaging	out of	 Increasing sea
	able to be	material supply	inventory	transport prices
	exported, it had	 Increased price 	 Bigger safety 	Lack of
	to be processed	of packaging	stock	available
	inland which	materials	 Price increase 	containers
	decreased the	 Materials flow 	is predictable	 Price increase
	purchase price	has broken	1	is predictable
	 Low level of 	because of		I I I I I I I I I I I I I I I I I I I
	production (the	border lockdown		
	previous vear's	 Low level of 		
	production is	production (the		
	remained e g	production (the		
	frozen fruits)	production is		
	nozen nuns)	romained a g		
		remaineu, e.g.		
		Calls)		
		- Kejecung		
		customer orders,		
		split up available		
		inventory		

Source: own edition

When summing up the interview experiences, companies faced a variety of challenges during the pandemic. At the same time, it was necessary to structure the many impacts in some way, and a clear way of doing this was to separate them by actor and by demand/supply side. In this way, the authors could gain a deeper insight into the impacts, but there were also additional experiences, e.g., on the labour force which are not included here, it should be analysed in an additional paper.

Some of the experiences were well known and reported in the press, but others were sector-specific or less obvious. The latter included e.g., the need to process raw milk

domestically due to the impossibility of exporting it, resulting in large quantities of the cheapest, most durable UHT milk flooding on the market.

5. DISCUSSION

The COVID-19 pandemic has posed a significant challenge for food supply chain actors. Demand became uncertain and showed large fluctuations. The wave of panic buying in spring 2020 went through the whole supply chain, but not like the classic bullwhip effect. It has been derived from the actors' experiences, they faced with a bullwhip effect of a special origin.

In the classical sense, the bullwhip effect (Forrester, 1958) refers to the increasing order fluctuations along the supply chain, starting from the final consumer (whose demand fluctuations are essentially balanced) and causing huge order shocks up the supply chain. Causes of the bullwhip effect (Lee et al. 1997) may include demand forecast updating, order batching, price fluctuation, and rationing and shortage gaming. A difference between the pandemic bullwhip effect and the classical one is that in this case there was indeed a strong increase in consumer demand for food products in the spring of 2020, specifically for basic, durable foodstuff, then, when the panic was over, demand dropped, and households started to consume the stocked food. This then spilled over and meant significantly increased order volumes back up the supply chain to raw and packaging materials suppliers. Meeting these multiplied demands caused disruption to the system.

Classical solutions to mitigate the bullwhip effect include information sharing, channel alignment, increasing operational efficiency and altering supply chain structure (Lee et al., 1997). The authors analysed the causes of and responses to the bullwhip effect caused by the pandemic situation at the level of the individual actors in the supply chain.

In response to the resulting bullwhip effect, some in the industry have sought to mitigate it quickly by increasing operational efficiency. Thus, the pasta producer (PG1) continued with a narrowed product range (producing the most demanded 4-5 types of pasta instead of the 10-15 types previously), but in high volumes to meet basic customer needs. The dairy processor (processing member of an integrated food company, DB1) has changed its packaging and launched 1.5 litre bottles instead of the previous 1 litre UHT milk. The meat processor (MG2) originally had high safety stocks, but when the pandemic broke out, these safety stocks were gradually adjusted to 4 months' stocks, allowing them to meet the increased orders without disruption.

One of the major effects of the pandemic has been to strategically revalue the food industry in the eyes of the countries' leaders. Security of supply and self-sufficiency became important. Let us see the effects, the actors experienced in the supply chain.

Supply chain-level. We haven't seen classic supply chain solutions in the Hungarian food industry, although there are a few tools to deal with the bullwhip effect: information sharing, channel alignment. Manufacturers have been at the forefront in addressing the problems. However, there has been a change in the supply chain

structure, with the rise of domestic producers, local producers, short supply chains, and there was a big shift in distribution channels towards online solutions.

Downstream. The change in the structure of the downstream supply chain was particularly striking. There was a huge increase in the number of online traders, who started selling online as traditional channels were shut down or narrowed. At the same time, the rise of online commerce has created a big challenge in terms of manpower, just think of the physical needs of warehousing and delivery processes. The uptake of online commerce has been driven in large part by companies' prior digital skills and readiness. To cope with the bullwhip effect, downstream firms have mostly responded by stockpiling, authors found only a few examples of information sharing or channel alignment.

Upstream. It was observed that manufacturers made much more effort than other actors in the supply chain to address the supply difficulties caused by the COVID-19 outbreak, even though the focal company in a food supply chain that dictates the terms is typically the retailer. Manufacturers have also been stockpiling, with economic data clearly showing that they were working with at least 20 percent higher stock levels in 2020 than a year earlier. Another tool manufacturers have used to combat the epidemic has been to shift production capacity to popular products that sell quickly, are easier to sell domestically or can be shifted from Horeca to the retail market.

As a result of ongoing research, it can be said that for all the challenges appeared in the literature (Nakat and Bou-Mitri, 2021; Rizou et al., 2020; Hobbs, 2020) the Hungarian food industry responded well. So, with the actions taken on both supply side and demand side, the food companies achieved successfully the main goal: to provide consumers with safe and sufficient food.

With a few exceptions (such as the chocolate industry), the given Hungarian food sectors have successfully overcome the barriers caused by Covid-19, with revenues by 2021 Q2 at least yielding results from previous years, or even better results.

6. CONCLUSION

In this current study, the authors examined the food supply chain through the example of Hungarian companies and summarized the supply and demand experiences of the actors during the COVID-19 pandemic in 2020. The first governmental (Hungarian and EU) steps to deal with the virus situation - curfews, border closures - have triggered effects in the food supply chain that are similar, but not fully equivalent to, the classical bullwhip effect. The classical triggers of the bullwhip effect have partly emerged (such as increased demand due to information shortages), partly new triggers have emerged (stock shortages due to panic buying, intense safety stockpiling in the supply chain) and the reaction of firms (stock sharing due to shortages) has resulted in further triggering the bullwhip effect.

Because of the special circumstances under which the bullwhip effect has been created, conventional treatments either did not work or there was not enough time to apply them. What has been conspicuously absent among the methods of application is intensive information sharing between actors across the supply chain and a drive to find a common solution to the problem spanning over company boundaries. Rather, we saw individual solutions, a lack of supply chain level commitment and approach. This is something where actors need to improve, raise awareness and take into account interdependencies. Stockpiling alone is not an ideal, albeit necessary, solution. The question is how long this can continue, how long owners will be willing to finance the increased stock levels, and when - if ever normal levels will return.

Among the actions taken to deal with this special-origin bullwhip effect, the authors found relatively few classical methods, but firms have invented ones themselves and tried to deal with the situation. The authors have seen solutions such as finding new markets for accumulated stocks (frozen fruit), or even re-packaging them to a new market (frozen fruit and vegetables, meat), introducing a new product type due to the availability of packaging material (milk) or even producing the product for which there is a greatest demand (pasta) in order to supply the market.

Overall, the COVID-19 situation has produced a bullwhip effect of special origin, the solution to which, in addition to the use of classical toolbox, can be found in increasing inventory level, the shifting of stocks between markets, the adjustment of the product portfolio and the optimisation of production scheduling. The added value of the study is therefore that it complements the theory of the bullwhip effect with novel tools for dealing with the COVID situation, which of course deserve further empirical investigation and modelling.

In addition to complementing the theory of the bullwhip effect, the results of the study are the very wide range of problems and possible solutions revealed through the interviews. The authors pointed out that although the importance of the food industry was highlighted during the critical period, not all sub-sectors fared well. There was a fall in demand for products - in particular, expensive, luxury goods sold less -, and sales volumes were below expectations even after the recovery in late 2020. Although, in value terms - thanks to price rises - companies had a reasonable year, with some companies actually soaring (MK1, MG2, PG1).

During the pandemic, there was a clear increase in the image and prestige of the food industry. According to the actors, this improved judgement is also reflected in the fact, the tender system, which had been rather ill-conceived, has been improved in accordance with the actors' favour. The development funds available for this and next year has increased significantly compared to previous periods and the opinions of the sector have been sought on the desirable directions for development. The food industry also hopes that food companies will have proved their indispensability and competence in supplying the population, and that this will make the sector attractive for skilled labour.

From the research results, it can be observed that the use of the traditional tools to mitigate the bullwhip effect (such as information sharing, supply chain level coordination) was negligible in the food companies studied. When looking at

solutions along the supply chain, it was more the production companies (and not the retailer companies which are supposed to be the focal companies of the chain) that tried to provide solutions, leading the way in developing quick and efficient solutions. In the future, it will be worthwhile to focus on a wider use of the traditional toolbox to handle the bullwhip effect, and on thinking more on supply chain level solutions. Likewise, to address the tensions caused by the shortage of packaging materials, a corresponding procurement strategy and the use of multiple sourcing could be a good example for the food industry. The ability to react quickly to specific situations (i.e. to meet increased consumer demand) has been facilitated by focusing on the products with the highest demand, and this could be a model to follow in the future for food production companies.

Regarding the practical implications, it is important to mention paperless operations, work organisation processes and the opportunities offered by digitalisation, automatization and robotisation. It is worth organising work processes (including back-office activities) in such a way that the highest level of paperlessness can be achieved. Those companies that have responded quickly in digitalization overcome obstacles more easily and they should continue to do so, to evolve. In the main processes, it is important to continue with the automation and robotisation that has already been started, as it is proven that companies that have taken this path have been able to carry out the reorganisations and transformations caused by COVID-19 and have been able to adapt more quickly and more easily. It is important to note, however, that the closure of borders and travel restrictions have unfortunately put a halt to such developments. Foreign experts were not allowed to come to the country, nor were trips abroad to find best practices. Although the epidemic is far from over, it now requires an effort on the part of companies to make up for the development plans of recent months and to continue the path they have begun.

The current research has limitations. As this is qualitative, exploratory research, the results are not generalisable. Neither the number of interviews nor the sample is representative. The aim of the future research is to increase the validity based on the diversity of the sectors targeted, the variety of actors in the supply chain and the number of interviews.

The research will be continued. The authors will seek out additional interviewees (retail, logistics, dairy, confectionery) and ask them about their similar experiences. The authors are also collecting their annual reports and would like to complete this analysis using their 2019 and 2020 sales, stock and profit data.

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