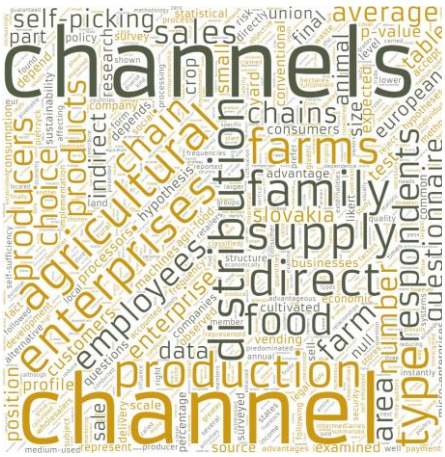
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VERTICAL LINKAGES IN AGRI-FOOD SUPPLY CHAINS: ROLES FOR PRODUCERS

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Abstract: Agricultural producers are entities that largely decide on the structure of the agri-food supply chain. Currently, the European Union is striving to shorten supply chains in agriculture, as short supply chains are ecologically, economically and socially more sustainable. The main objective of the paper is to examine the role of primary producers in the agri-food supply chains. The basic technique applied for data collection was questionnaire survey, which we carried out on family farms in Slovakia. Obtained data were statistically examined applying the statistical analysis using the Chi-square test. Based on the estimations, we could conclude that the choice of the main distribution channel depends on the size of the given company and also on the main type of production. Businesses with fewer than 10 employees prefer direct distribution channels that allow them to sell their products to final consumers. The identification of factors affecting the choice of the main distribution channel as well as a detailed analysis of the nature of dependence make it possible to formulate recommendations on what steps to take in order to increase the number of agricultural enterprises selling through short supply chains.

Keywords: family farm, agricultural production, supply chain, distribution channel

Abstrakt: Poľnohospodárski producenti sú subjektmi, ktoré do veľkej miery rozhodujú o štruktúre agropotravinárskeho dodávateľského reťazca. V súčasnosti sa Európska únia usiluje o skracovanie dodávateľských reťazcov v poľnohospodárstve, nakoľko krátke dodávateľské reťazce sú ekologicky, ekonomicky aj sociálne udržateľnejšie. Hlavným cieľom príspevku je preskúmať úlohu prvovýrobcov v agropotravinárskych dodávateľských reťazcoch. Základnou technikou zberu dát bol dotazníkový prieskum, ktorý sme realizovali na rodinných farmách na Slovensku. Získané údaje boli štatisticky preskúmané pomocou štatistickej analýzy, v rámci ktorej sme aplikovali test Chi-kvadrát. Na základe odhadov by sme mohli konštatovať, že výber hlavného distribučného kanála závisí od veľkosti daného podniku a tiež od hlavného typu produkcie. Podniky s menej ako 10 zamestnancami uprednostňujú priame distribučné kanály, ktoré im umožňujú predávať svoje výrobky konečným spotrebiteľom. Identifikácia faktorov ovplyvňujúcich výber hlavného distribučného kanála, ako aj podrobná analýza povahy závislosti umožňujú formulovať odporúčania, aké kroky treba podniknúť s cieľom zvýšiť počet poľnohospodárskych podnikov predávajúcich prostredníctvom krátkych dodávateľských reťazcov.

Kľúčové slová: rodinná farma, poľnohospodárska produkcia, dodávateľský reťazec, distribučný kanál

Highlights

- In Slovakia, the sale of agricultural production to intermediaries prevails over sales to customers.
- The choice of the main distribution channel depends on the size of the enterprise and the type of production.
- Micro enterprises use direct distribution channels more often than larger enterprises.
- Direct distribution channels are more often carried out by enterprises with predominantly animal production.

1. Introduction

The production of agricultural and food products is one of the important economic activities of the European Union (EU). The EU is one of the largest producers and exporters of agricultural and food products in the world (Pietrzyck et al., 2021). Agricultural and food production are closely linked, as

primary agricultural production enterprises sell their production to processors who produce food products from these inputs (Gouk and Seung-Yong, 2012). The member states of the European Union are striving for both production and food self-sufficiency. It is important that primary agricultural producers use appropriate distribution channels through which they pass on their products to customers (Kaufmann et al., 2022). The role of agricultural producers is crucial in the context of an optimal supply chain (De Fazio, 2016). An appropriate structure of primary production and processing enterprises is also essential for the functioning of the entire agri-food vertical of a given economy (Camanzi et al., 2018).

In the article, we will focus on family farms in Slovakia, as family farms accounted for almost 95% of all farms in the European Union in 2020, but in individual member states, their ratio to other farms varies considerably (Eurostat, 2022). Family farms cover a wide range of farms, from small farms in which only family members are involved, to larger and more productive farms that have more employees but are mainly managed by family members (Lowder et al., 2016). Most family farms are small, but it is these farms that play a key role in reducing rural poverty and contributing to greater food security. The existence of small family farms promotes sustainable rural development and helps shape rural communities (Toader and Roman, 2015).

Farmers sell their produce to processors, wholesalers, retailers or directly to final consumers (Martinez et al., 2010). Farms are increasingly using short supply chains, thus reducing the number of intermediaries to a minimum level, selling products to local customers. Many family farms have the processing of agricultural primary production on their own and provide ready-made food products for sale (Aguiar et al., 2018). Although large businesses represent trendsetters in the agrifood industry, the smaller producers try to use close contact with the customer, allowing them to respond flexibly to the current market situation (Svatošová, 2017). A short supply chain enables businesses to reduce distribution costs, build stronger relationships with customers and is a greener sales solution than the conventional method. Popular short-term supply chain tools include direct sales from the yard (Horská et al., 2020).

The main objective of the research is to identify the factors that influence the choice of distribution channel of family farms in Slovakia. In the results, we will present an evaluation of a questionnaire survey conducted on family agricultural producers in Slovakia. The essence of research is primarily the search for an answer to two research questions:

- Does the choice of distribution channel of a family farm depend on the size of the enterprise?
- Does the choice of distribution channel of a family farm depend on the type of production?

Research by Martinez et al. (2010) on local food systems has shown that in the US, small farms use mostly distribution channels that allow products to be sold directly to the final consumer than medium-sized farms. By statistical analysis, we will find out whether this fact also applies to family farms in Slovakia. Next, we will examine whether the choice of distribution channel depends on whether the holding is more focused on crop or livestock production and what kind of crop it grows or what kind of animals it breeds.

2. Theoretical background

2.1 Agri-Food Supply Chain

The supply chain consists of several independent enterprises that are engaged in the production of a certain product and its delivery to final consumers. The agri-food supply chain (AFSC) consists of input producers, agricultural primary producers, food processors, distributors and final consumers of food products (Viira, 2017). It is a network of enterprises that are connected to each other using upstream and downstream links. Upstream links represent the production of inputs and products of primary agricultural production and downstream links the processing and distribution of products (Singer and Donoso, 2008).

The value chain of the agri-food vertical encompasses various activities that cover all production and distribution processes, consisting of eight stages: cultivation, harvesting, packaging, processing, transport, marketing, distribution and final consumption. Compared to other sectors, the agri-food supply chain has various specificities that also threaten it – agricultural and food products are perishable, seasonal in nature, and their quality and quantity depend on weather conditions (Mehmood et al., 2021).

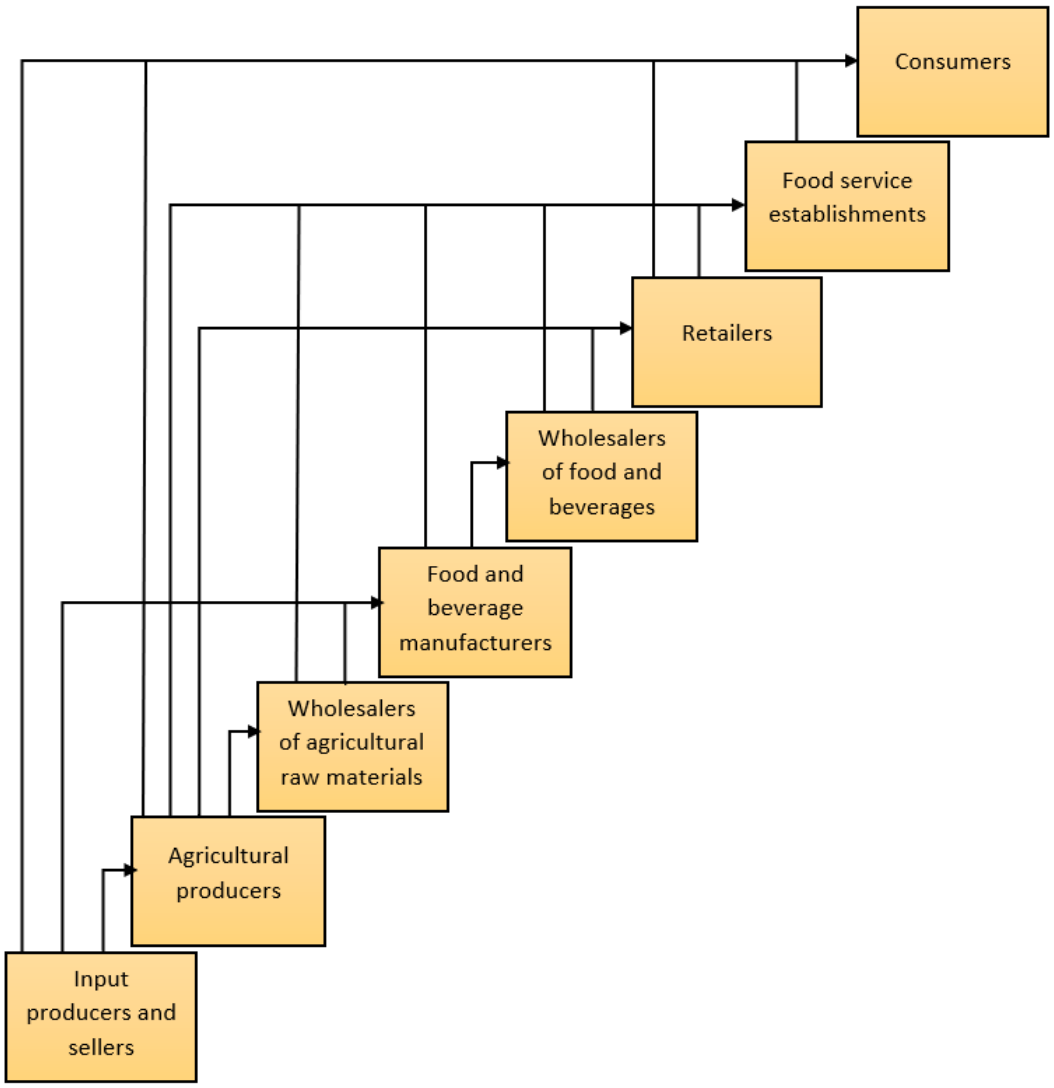


Fig 1. The agricultural and food value chain. Source: Viira, 2017

Food security is a fundamental human right, as the need for food is one of the necessary needs for people's lives (Fung et al., 2018). Currently, there is a lot of pressure to produce high-quality and safe food. Stakeholders are tasked with meeting these requirements along the agri-food supply chain (Bhat and Joudu, 2019). The agri-food sector is international in many countries; i.e., agricultural produce is supplied for processing to other countries. This exposes businesses that are part of the supply chain to the risk that the quality of their products will decrease due to longer delivery times or inappropriate storage. For this reason, strict control of the supply chain is unscrupulous (Septiani et al., 2016). Legislation within the European Union covers the entire intra-EU supply chain, as well as imported and exported agricultural and food products. Member States implement these harmonised rules and carry out checks on compliance (European Comission, 2023).

2.2 Conventional vs Short Supply Chain

A conventional supply chain is a long chain of businesses, usually globally interconnected, through which production must pass before reaching the final consumer. Going through this type of supply chain creates negative economic, environmental, and social externalities (Berti and Mulligan, 2016). Food loss and waste along the numerous stages of the agri-food supply chain contribute significantly to the overall waste generation (Cicullo et al., 2021). According to the Food and Agriculture Organization (FAO, 2014), about one third (approximately 1.3 billion tons) of all food produced worldwide is lost or thrown away. It is estimated that 24–30% of the loss will be incurred in the production phase, 20% in the post-harvest phase

and 30–35% of the total loss during consumption. Conventional supply chains are typically used by large farms, which heavily pollute the environment, especially water, soil, and air. One-sided production deforms the landscape and destroys the ecosystem (Bazzani and Canavari, 2013). Large enterprises also threaten small farms and reduce the bargaining power of processors. Social externalities include population health issues related to the lack of dietary diversity (Kalfagianni and Scordili, 2020). Although proponents of the conventional supply chain advocate the use of the economic principle of economies of scale and free trade, the level of actual economic returns is unclear, as externalities are not reflected in the price (Elghannam et al., 2017).

As there have been numerous economic, environmental, and social crises in connection with the use of the conventional agri-food chain, over the last twenty years' alternative methods to this method of food production and distribution, called short food supply chains (SFSC), have been used. The process of transforming conventional supply chains into short ones is called reterritorialization or relocation (Berti, 2020). The EU's rural development regulation (1305/2013) defines a short agri-food supply chain as a chain involving a limited number of economic operators committed to cooperating, considering local economic development and close geographical and social relations between food producers, processors, and consumers. The essence of SFSC is to shorten the distance between food production and consumption, both geographically and in the product vertical (Pietrzyck et al., 2021). We distinguished between two types of short supply chains. Direct supply chains represent direct sales of agricultural producers' products to final consumers, and indirect supply chains have only one intermediate link between production and consumption (Elghannam et al., 2017). Based on the research conducted by Hornowski et al. (2020), impulse to support the development of small farms from the point of view of local government representatives is development of farm processing and direct sales. From the point of view of marketing, we distinguished between online and offline distribution channels. Online distribution channels include sales using e-shops and social networks, and offline producer markets, direct sale shops, door-to-door shipping, and consumer groups (Ma et al., 2021).

Short supply chains have several significant advantages:

- They contribute to rural development,
- Allow small farms to sell products at premium prices,
- Transport costs are reduced,
- Lower CO2 emissions,
- Communication between producer and consumer improves,
- Higher food quality,
- Greater transparency of the production process (Tanasa, 2014).

2.3 Agri-food Supply Chain in the Context of Common Agricultural Policy

The EU adopts a number of strategies relating to international trade in agricultural and food products. Under the common agricultural policy, it pursues three pathways to sustainability – social sustainability, environmental sustainability, and economic sustainability (Pietrzyck et al., 2021). The European Commission presented its proposal for the reform of the common agricultural policy (CAP) in 2018, presenting a new way of working to modernise and simplify the EU's agricultural policy. Implementation runs from 1 January 2023. The Corporate Sustainability Reporting Directive (CSRD) also entered into force on 5 January 2023. This new directive modernises and strengthens the rules on the social and environmental information that companies must report (European Comission, 2023).

The CAP's new performance- and results-based approach is more flexible and considers local conditions and needs, while increasing the EU's sustainability ambitions. EU Member States are to make full use of CAP instruments to support their farmers in the transition to increased sustainability in our food systems (Rega et al., 2022). The objectives of the Farm to Work Strategy include a neutral or positive impact on the environment, increasing biodiversity, increasing food security, and preventing food waste (Wesseler, 2022). The Farm to Fork strategy aims to support the reduction of dependence on long-distance transport

in order to increase the resilience of regional and local food systems. The use of short supply chains in the agri-food sector is encouraged. The ideal situation is direct sales to final consumers (Stain and Santini, 2022).

3. Methodology

3.1 About the research

During the months of January and February 2023, we conducted an online questionnaire survey with which we collected data on family farms of primary agricultural production in Slovakia. The main objective of the questionnaire was to identify the factors influencing the choice of distribution channel of family farms.

The pool of respondents represents 52 family farms that answered closed, scaling, and open-ended questions. As part of the profile questions, enterprises filled in data on their legal form and area of cultivation.

Other questions were directed to our main research problem, as our intention was to find out whether the size of the family farm and the structure of its production influenced the choice of distribution channel.

Companies were asked about the size of the enterprise according to the number of employees, and we divided the answer options into several categories:

- 1–5 employees,
- 6–9 employees,

According to European Commission Recommendation 2003/361/EC, an enterprise with an average converted number of employees between 1 and 9, whose annual turnover or annual balance sheet total did not exceed EUR 2 million, is classified as a micro-enterprise.

- 10–49 employees – if the annual turnover or annual balance sheet total did not exceed €10 million, it is classified as a small enterprise,
- 50–249 employees – if the annual turnover did not exceed EUR 50 million or the annual balance sheet total of EUR 43 million, it is classified as a medium-sized enterprise,
- 250 employees and more – a large enterprise.

The type of agricultural production and the percentage of that type in total production was the subject of another question. Two main agricultural activities of the enterprise are distinguished: crop and livestock production. We have further subdivided these activities into subgroups to obtain more accurate product data.

The last part of the questionnaire consisted of questions on distribution channels. Slovak farms use the following types of distribution channels:

Direct distribution channels:

- Direct sales from the yard,
- Company´s stores,
- Vending machines,
- Self-picking,
- E-shops.

Indirect distribution channels:

- Sale to processors,
- Sale to wholesalers,
- Sale to retailers.

We evaluated the use of individual distribution channels by respondents using a 5-step Likert scale:

- 1 – unused distribution channel at all,
- 2 – occasionally-used distribution channel,
- 3 – medium-used distribution channel,
- 4 – highly used distribution channel,
- 5 – main distribution channel.

Finally, we were interested in what advantage the respondent sees in using their preferred distribution channel.

3.2 Methods

The main method by which we obtained answers to research questions was the Chi quadrate. The chi-squared test is a nonparametric test that does not make any assumptions about the shape of the distribution. It is used when data represent ordinal or nominal scales, when a parametric assumption has been breached, or when the nature of the distribution is unknown (Onchiri, 2013). It is used to test statistical hypotheses in which independence between two groups, populations or criteria is assumed. It is also used to determine the similarity of the distribution of the studied statistical set with the normal distribution (Howell, 2011).

To examine a statistical population using the Chi squared method, the statistical population must meet the following conditions:

- Data come from random selection from the population,
- The statistical file is large enough, with a minimum recommended size of 20–50 items. With a smaller number, there is a risk of occurrence of a Grade II error,
- There are no zero frequencies,
- Each data is assigned to only one category (Kowsalya, 2020).

We have determined a null hypothesis for each research question, which we will test using the Chi square, and an alternative hypothesis that we will accept in case of rejection of the null hypothesis.

H_0: The choice of distribution channel of a family farm does not depend on the size of the enterprise.

H_1: The choice of distribution channel of a family farm depends on the size of the enterprise.

H_0': The choice of distribution channel of a family farm does not depend on the type of production.

H_1': The choice of distribution channel of a family farm depends on the type of production.

Next, we established the level of significance of the α on which we will test null hypotheses. In our case, it will be α = 0.05, that is, the risk of rejection of the null hypothesis, even though it is valid, will be 5%.

Test statistics can be calculated according to the following relationship:

$$\chi_2 = \sum \frac{O - E^2}{E} \tag{1}$$

Where:

O – frequency observed and/or recorded observation,

E – expected (theoretical) frequency.

The expected frequency can be calculated as follows:

$$E = \frac{a * b}{N} \tag{2}$$

Where:

a – row total,

b – column total,

N – grand total (Turhan, 2020).

Based on the comparison of the test statistics with the p-value, we either reject the given null hypotheses and accept the alternative hypothesis, or we do not reject them. If the test statistic is greater than the p- value, we do not reject the null hypothesis, and if it is less than the p-value, we reject it (Onchiri, 2013).

4. Research Results

4.1 Profile data

In the questionnaire we sent to family farms in Slovakia, the introductory part consisted of several profile questions about the legal form of the enterprise, the area of cultivated land and whether entrepreneurship in the given holding is the only source of income for the owners. Data on the number and percentage of individual responses are summarised in Table 1.

Tab 1. Profile data of examined agricultural enterprises. Source: own study

Profile data		**Frequency**	**Percentage**
Legal form	ltd.	31	59.6
	self-employed farmer	11	21.2
	cooperative	8	15.4
	sole proprietorship	2	3.8
Area of cultivated land	0–10 ha	18	34.6
	11–50 ha	19	36.5
	51–100 ha	5	9.6
	101 and more ha	10	19.2
Entrepreneurship is the only source of income	yes	39	75.0
	no	13	25.0

The subject of our research were 52 family farms of different sizes and legal forms. Most enterprises were limited liability companies, this legal form accounted for up to 59.6% of all surveyed enterprises. Among the surveyed enterprises were self-employed farmers, agricultural cooperatives and two trades. The vast majority of farms cultivated only a small area of land, up to 50 hectares. At the same time, more than a third of the total number of respondents reported cultivated land up to only 10 hectares. This group mainly comprises enterprises whose main activity is livestock production and enterprises with a number of employees of 1–5. On the contrary, 10 respondents reported a cultivated area of over 100 hectares, mainly including agricultural cooperatives with a larger number of employees and predominantly crop production. Up to three-quarters of entrepreneurs have their business as their only source of income.

Data on the structure of agricultural output of the surveyed enterprises are shown in Figure 2.

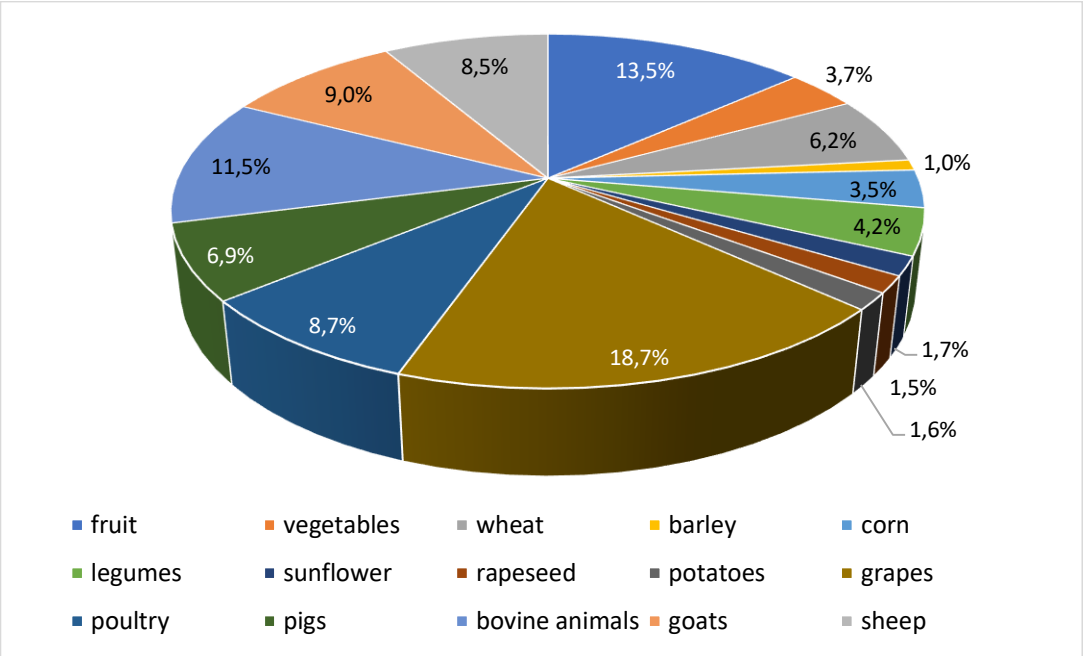


Fig 2. Production structure of examined enterprises. Source: own study

Respondents were enterprises with diverse production, including both crop and livestock farms. If we look closely at the structure of agricultural production presented in Figure 2, we find that animal production slightly predominated among the surveyed companies, accounting for 51.5% of total production. Bovine animals predominated, accounting for up to 11.5% of total production. This was followed by goats (9%), poultry (8.7%), sheep (8.5%) and pigs (6.9%). Crop production accounted for the remaining 48.5% of total production. Of these, grape cultivation accounted for the largest part (18.7%), followed by fruit (13.5%) and wheat (6.2%). Also, among the respondents were growers of legumes, corn, vegetables, sunflower, rapeseed, and barley.

4.2 Distribution channels

Since the main objective of the research relates to distribution channels, most of the questions in the questionnaire were focused on them. For each of these distribution channels, respondents indicated a number on the Likert scale referring to the frequency of its use. The arithmetic averages of their responses are shown in Table 2.

Tab 2. Average position on Likert scale of examined distribution channels. Source: own study

Distribution channel	Average position on Likert scale
direct sales from the yard	3.096
company´s stores	1.808
vending machines	1.346
self-picking	1.404
e-shop	2.308
processors	1.712
wholesalers	2.500
retailers	2.615

Of these distribution channels, on average, family farms in Slovakia most often used direct sales from the yard, which was located on the Likert scale at position 3.096, which is the position between the medium-used distribution channel and the highly used distribution channel, closer to the medium-

used distribution channel. In second place were sales to retailers. The latter was located between grades 2 and 3 on the Likert scale, closer to 3. This was followed by sales to wholesalers, his position was exactly between grades 2 and 3. On average, the distribution channels occasionally used included e-shop, company stores and processors. Self-picking and vending machines were not used by the majority of respondents as they relate to a specific type of production.

If we calculate the arithmetic mean of the above values for direct distribution channels and for indirect distribution channels, we find that the use of direct distribution channels by respondents was in position 1.992 on the Likert scale and the use of indirect distribution channels in position 2.276, thus indirect distribution channels prevailed on average, despite the fact that direct sales from the yard significantly exceeded the use of other distribution channels. The rare implementation of self-picking and vending machines in the sales process reduced the arithmetic average of using direct distribution channels.

Companies have rational reasons to use specific distribution channels. If they prefer one distribution channel over others, this main distribution channel must be advantageous to them in some way. We classified respondents' responses into several groups and summarized their absolute and relative numbers in Table 3.

Tab 3. Advantages of mainly used distribution channel. Source: own study

Advantage of mainly used distribution channel	**Frequency**	**Percentage**
selling directly to customers	14	26.9
selling in huge quantities	9	17.3
flexible production	2	3.8
simple legislation	3	5.8
short delivery times	4	7.7
receiving payments instantly	2	3.8
more personal relationships with customers	10	19.2
selling already processed production	2	3.8
economically advantageous	5	9.6
guaranteed freshness	1	1.9

As many as 26.9% of respondents considered as an advantage of their main distribution channel, selling directly to final consumers. This reply was reported by enterprises which use mainly direct distribution channels. The second most common answer, mentioned by 19.2% of respondents, were more personal relationships with customers. This advantage was claimed by enterprises selling to intermediaries since they know their regular customers. Another frequently cited advantage was sales in huge quantities. This reply was given by undertakings using indirect distribution channels since their customers are other firms, which generally purchase products in much larger quantities than final consumers. Five respondents who have their own company stores or sell directly from the yard reported being economically advantageous. These sales methods save transportation costs. Those who use direct sales from the yard also claimed simple legislation as an advantage. Receiving payments instantly appeared as an advantage for businesses using self-picking and vending machines. Finally, one respondent whose main distribution channel is self-picking, claimed the guarantee of freshness as an advantage.

4.3 The dependence of the main distribution channel on the number of employees and the main type of production

In this subchapter, we will examine the validity of the null hypotheses presented in the methodology. The observed and expected frequencies of the investigated variables assigned to the categories needed to calculate the test statistics of Chi squared are presented in Tables 4 and 5.

Table 4 is a PivotTable whose rows form the main distribution channels and the Number of Employees columns. The table contains data on expected and theoretical numbers of main distribution channels according to the number of employees. At the right and bottom of the table are the sums of uniform rows and columns, with the number in the lower right corner representing the number of subjects N. Since none of the enterprises examined belongs to groups with employees between 50 and 249 and 250 and over, these groups with zero frequencies are not listed in the PivotTable either.

Tab 4. Observed and expected frequencies of main distribution channels according to the number of employees. Source: own study

Main distribution channel		**Number of employees**			
		1 to 5	**6 to 9**	**10 to 49**	***Total***
direct	observed frequency	19	9	4	*32*
	expected frequency	12.308	8.615	11.077	
indirect	observed frequency	1	5	14	*20*
	expected frequency	7.692	5.385	6.923	
Total		*20*	*14*	*18*	*52 = N*

Among all respondents, as many as 32 chose a direct distribution channel (direct sales from the yard, company´s stores, vending machines, self-picking, e-shop) as their main channel. Only 20 companies chose an indirect distribution channel (selling to processors, wholesalers and retailers). The data contained in Table 4 show that as many as 34 respondents were micro-enterprises, as the number of employees was less than 10. For micro-enterprises, direct distribution channels predominated. This can be explained by the fact that such enterprises usually have a smaller volume of output than enterprises with a larger number of employees and thus sell it to final consumers who demand smaller quantities. Companies with 6–9 employees also use mainly direct distribution channels but they are less dominant in comparison to companies with 1–5 employees.

The remaining businesses can be classified as small businesses with 10–49 employees. Unlike micro-enterprises, indirect distribution channels are predominant. Sales through direct distribution channels are rare, with the exception of self-collection, reported by three respondents. The implementation of self-picking by enterprises that have a large area of cultivated land can be explained by the fact that at the time of the harvest season, employees do not have time to harvest the harvest and thus motivate customers to come and collect the fruits themselves. During self-picking, the customer has the advantage that he takes fresh products and he himself chooses which fruits to tear off, he does not need to buy ready-made packaging, which may also contain his non-preferred quality products.

Using the Chi squared method, we found that the size of the farm really affects the preferences of distribution channels. Applying the chi squared method, we found that The χ^2 test statistic is 0.000024, which is less than p-value = 0.05. We rejected the null hypothesis H_0: The choice of distribution channel of a family farm does not depend on the size of the enterprise. We accepted the alternative hypothesis H_1: The choice of distribution channel of a family farm depends on the size of the enterprise.

Table 5 summarises data on expected and theoretical numbers of main distribution channels according to the main production type. The main distribution channels are again summarized in rows, and the columns consist of two main types of production – plant and animal.

Tab 5. Observed and expected frequencies of main distribution channels according to the main production type. Source: own study

Main distribution channel		**Main production type**		
		Crop production	**Animal production**	***Total***
direct	observed frequency	11	21	*32*
	expected frequency	15.385	16.615	
indirect	observed frequency	14	6	*20*
	expected frequency	9.615	10.385	
Total		*25*	*27*	*52 = N*

Among the respondents, enterprises with predominantly animal production slightly predominated, with 27, while enterprises with predominantly crop production only 25. For crop producers, selling through indirect distribution channels predominated over direct distribution channels. 14 respondents mentioned that their main distribution channel is indirect and only 11 respondents claimed the opposite. However, producers of predominantly animal production did not prefer to sell through intermediaries. Instead, they mostly use direct distribution channels. The use of direct distribution channels is almost two times higher by predominantly animal producers in comparison to predominantly crop producers. Most animal producers sold their products directly from the yard. This group consisted of small farms, mainly engaged in sheep and goat farming, and small poultry farms. Moreover, vending machines are used by some milk producers. Selling through e-shop is also more frequent by mainly animal producers. Only six respondents claimed that their main distribution channel is indirect.

The $\chi 2$ test statistic was 0.012368, which is less than p-value = 0.05. We rejected the null hypothesis H_0': The choice of distribution channel of a family farm does not depend on the type of production. We accepted the alternative hypothesis H_1': The choice of distribution channel of a family farm depends on the type of production.

5. Discussion

In the EU, agricultural producers mostly use conventional supply chains. On average, only 15% of European farms sell more than half of their production directly to customers (European Parliament, 2016). SFSCs are present throughout the EU, but there are some differences between member states as regards the dominant types. They are mostly micro or small enterprises with organic farming elements and can be considered family businesses (European Comission, 2023). Unfortunately, compared to the EU, Slovakia has a very high proportion of enterprises that manage an area of more than 100 hectares. While the average farm size in Slovakia is 80.7 ha, the EU average is only 16.6 ha. On farms with a large area, the use of direct supply chains is more challenging (Pokrivčák et al., 2022).

In Slovakia, as well as in the EU, crop production prevails over animal production. Enterprises specializing in animal production accounted for only 21.6% in the EU in 2020, while those specializing in plant production accounted for up to 58.3%. The rest represented mixed producers. Cultivation of cereals and oilseeds represented up to 15.7% of the total production (Eurostat, 2020). In Slovakia, plant producers represented 58.3% of total agricultural producers. The share of animal producers was 34.2%. Cereals and oilseeds represented up to 36.4% of the total agricultural production, which means that there is an even greater need for diversification in Slovakia than in the EU. Production self-sufficiency of meat (apart from sheep) and dairy products does not even reach 80%. It is necessary to increase the share of animal production (Pokrivčák et al., 2022).

6. Conclusions

The agri-food supply chain is specific due to its dependence on climatic conditions and also the limited durability of agricultural products. Currently, the quality of agricultural and food products is subject to increasingly high demands, and agricultural producers are exposed to constant pressure for safe and sustainable production. This is difficult to fulfil through a complicated and long network of conventional supply chains, where there is a risk of loss of quality during distribution and various externalities also arise, negatively affecting the environment, the economy, and society. An alternative to conventional supply chains are short supply chains, which eliminate most externalities thanks to the small or no number of intermediaries and the local nature of production and sales. In connection with sustainability goals and the Farm to Fork strategy, the European Union strives to shorten supply chains ideally to direct: producer – final consumer.

The main objective of the research was to identify the factors that influence the choice of distribution channel of family farms. In order to fulfil it, we conducted a questionnaire survey on 52 family agricultural enterprises in Slovakia. At the beginning of the questionnaire, there were profile questions about the legal form, the area of cultivated land and whether the given enterprise is the sole source of income for the owners. Most respondents had the legal form of a limited liability company. Two-thirds of the respondents represented enterprises with an area of cultivated land up to 50 hectares, and three-quarters of the respondents received income only from their agricultural enterprise. Among the respondents were 25 enterprises with mainly crop production and 27 enterprises with mainly animal production. The structure of cultivated crops and farmed animals was very diverse. In the main part of the questionnaire, we focused on the use of different distribution channels. We investigated the use of direct distribution channels to which belong direct sales from the yard, company´s stores, self-picking, vending machines and e-shops, and indirect distribution channels – sales to processors, wholesalers, and retailers. The most used distribution channel was direct sales from the yard, the value on the Likert scale reached 3.096. Overall, however, indirect distribution channels were used more often than main distribution channels, as two of the direct distribution channels – self-collection and vending machines are characteristic of a specific type of production. Respondents cited selling directly to customers, receiving payments instantly, short delivery times, economically advantageous sale and guaranteed freshness as advantages of direct distribution channels. According to the respondents, indirect distribution channels were advantageous in more personal relationships with customers and selling in huge quantities. As part of the identification of factors affecting the choice of the main distribution channel, we established two null hypotheses: the choice of distribution channel of the family farm does not depend on the size of the enterprise; the choice of distribution channel of a family farm does not depend on the type of production. We tested their validity using the chi-square statistical method. Since in both cases the value of the test statistic was lower than the p-value, we rejected both null hypotheses and accepted the alternative hypotheses: the choice of distribution channel of a family farm depends on the size of the enterprise; the choice of distribution channel of a family farm depends on the type of production. Looking more closely at the data on the variables, we found that micro-enterprises used direct distribution channels more often than the main distribution channel, and vice versa, enterprises with 10 or more employees used indirect distribution channels more often. Enterprises with predominantly animal production realized direct distribution channels almost two times more often than enterprises with plant production.

We recommend supporting micro-farming enterprises to a greater extent at the European and national level and, above all, motivating them to use direct sales from the yard, which supports rural development. We also recommend diversifying crop production and increasing the share of animal production in those member states that do not achieve complete production self-sufficiency in this area. Thus, it will be possible to localize production and shorten supply chains.

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