Suitability and tendencies of small-scale agricultural producers toward e-commerce: An in-depth interview study for evidence from a developing country

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Abstract

This study focuses on identifying the challenges faced by small family farmers and examining the potential of e-commerce for marketing agricultural products. It aims to observe the suitability and tendencies of small-scale agricultural producers toward e-commerce and to determine their readiness for this marketing method. Given the rising trend of e-commerce and digital marketing, this research holds significant importance for the agricultural future of a developing economy. Based on in-depth interviews with 27 farmers from 11 villages, our findings showed that small family farmers do not have infrastructure issues regarding e-commerce. However, their lack of knowledge about e-commerce, adherence to the existing system, and lack of trust in e-commerce are identified as the main obstacles to e-commerce implementation. This study contributes to the existing knowledge by offering a conceptual framework on e-commerce adoption that has five main elements regarding adaptation to e-commerce, namely (1) the obstacles they face, (2) the future of agricultural production, (3) marketing of agricultural products, (4) production problems, and (5) the nature of e-commerce.

Keywords*: Small Family Farming, E-commerce, Agricultural marketing, Conceptual framework, Developing Country.*

1. Introduction

Unfortunately, it is no longer possible to feed the world and make it sustainable using current methods for many reasons, such as growing populations, climate change, and air and water pollution. Thus, it is clear that a change is required in the world's food systems. Today, family-based agriculture constitutes 90% of the 608 million farms that perform world agriculture, and family businesses produce more than 80% of the world's food. Therefore, it can be argued that family farms are at the very center of change in food systems and constitute the most dominant agricultural model in the world (FAO, 2020). In addition, family farmers not only produce food but also fulfill environmental, social, and cultural functions, playing an influential role

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in conserving the world's biodiversity and sustaining communities and cultural heritage. These characteristics led the United Nations to declare 2019-2028 as the "Decade of Family Farming" in December 2017, providing an extraordinary opportunity for the international community to take a holistic view of family farming to realize significant transformations in current agriculture (FAO & IFAD, 2019).

According to the United Nations Decade of Family Farming (UNDFF) 2019-2028 Global Action Plan, family farming plays a key role in achieving the Sustainable Development Goals (SDGs). This is because some practices related to family farmers can serve some of the SDGs. For example, poor family farmers can move from subsistence to income generation opportunities in rural areas (SDGs 1, 10); family farmers can practice resilient and highly productive agriculture that creates income generation opportunities (SDG 2); they can provide inclusive rural services and contribute to regional development (SDGs 3, 4, 6, 7); they can enable diversified food systems that can create job opportunities in rural areas and positively impact rural–urban mobility, especially for youth (SDGs 8, 9); they can enable food systems that strengthen sustainable integration between urban and rural areas (SDG 11); and more (FAO & IFAD, 2019). In this context, the importance of small family farmers in both developing and underdeveloped countries cannot be underestimated.

In concurrence with sustainable development, family farming plays a crucial role in promoting rural development and addressing the challenges faced by rural environments and populations (Damke *et al*., 2021). Investment in small family farms is vital for improving access to financial services, strengthening market linkages, and enhancing productivity, thereby contributing to rural development (Purnawan *et al*., 2022). Empirical evidence suggests that engagement in non-farm livelihood activities can lead to more stable livelihoods for families compared to relying solely on farming for income (Asfaw *et al*., 2017). Furthermore, family farms have been a subject of interest in determining farm efficiency and productivity, with a focus on their superiority over corporate structures (Gorton & Davidova, 2004). Pluriactivity, viewed as an accepted aspect of family farming, has contributed to the integration of farm households into the general economy of both developed and developing countries (Brookfield, 2008).

As a part of the developing countries, the share of agriculture in Türkiye's GDP appears to have been declining steadily over the years, at a rate of 6.5% in 2022 (TÜİK, 2018). However, agricultural production still remains important to Türkiye, although its share is declining. The family workforce in agricultural production is 83.24%. This shows that agricultural activities in Türkiye are mostly based on family labor (Kan and Kan, 2020). Regarding world e-commerce figures, retail e-commerce sales amounted to approximately 5.2 trillion US dollars in 2021. It is estimated that this figure will increase by 56% in the coming years and reach approximately 8.1 trillion dollars by 2026 (Chevalier, 2023). In Türkiye, the e-commerce volume increased by 115.15% in 2023 compared to the previous year and reached 1.85 trillion Turkish liras (77.89 billion dollars) (Ministry of Trade, 2024). In the consumer goods category, an analysis of e-commerce data for January 2023 shows that global food expenditures totaled $244.0 billion, while in Türkiye, the figure was $411.9 million (Digital, 2023*: Turkey-DataReportal-Global Digital Insights*, n.d.).

In the context of e-commerce, there is a growing focus on evaluating the environmental implications and impact of e-commerce on various sectors, including agriculture and rural areas (Mangiaracina *et al*., 2015). Studies have indicated that e-commerce plays a significant role in increasing farmers' incomes, alleviating rural poverty, and promoting rural development (Lin, 2019). Additionally, the adoption of e-commerce has been linked to increased awareness and adoption of green farming techniques among farmers (Zhao *et al*., 2022). However, challenges exist in the adoption of e-commerce in agriculture, including delivery risks and the need for educational support to enhance farmers' understanding of new farming practices (Huda *et al*., 2022).

The role of family farms in the context of e-commerce is also evident, with evidence sug-

gesting that family farms and those located in rural areas benefit more from the adoption of digital media advertising, highlighting the potential for e-commerce to support and enhance family farming activities (Chung *et al*., 2021). Furthermore, the participation of farmers in e-commerce has been shown to influence their income levels, with various factors such as gender, farm household differentiation, and self-employment experience playing significant roles in farmers' e-commerce participation decisions and income levels (Zheng *et al*., 2023).

E-commerce is thought to have benefits such as streamlining the agricultural value chain and reducing inefficiencies in the distribution of farm produce. Gomathy *et al*. (2021) stated that e-commerce and digital marketing are a rising trend in agriculture. Smidt and Jokonya (2022) stated that digital tools in agriculture can facilitate access to commercial markets by connecting farmers and buyers, positively impacting access to information and the ability to overcome spatial barriers. Digital tools can also facilitate the flow of agricultural information, enabling small-scale farmers to better understand their costs, improve decision-making, and access better financial resources. El Bilali and Allahyari (2018) pointed out that ICTs can improve rural livelihoods and increase agricultural and market knowledge by strengthening the connectivity of small-scale farmers in developing countries.

The rise of e-commerce offers new opportunities for small family farmers to connect directly with consumers (Tomic and Martinovic, 2014) and circumvent traditional market structures. Besides, some small family farms recognize the potential of e-commerce for improved income and market access (Kızılaslan and Unal, 2015; Rameshkumar, 2022). However, the unique characteristics of family farms, often characterized by limited resources (Sekyi, 2017), marketing difficulties (Mendonça *et al*., 2020; Ali *et al*., 2021) complex family dynamics (Savickiene and Miceikiene, 2018) and a focus on sustainable practices, raise important questions about their e-commerce adoption. Hence, there is a gap in these studies in terms of addressing the issue of e-commerce from the perspective of farmers. This study attempts to fill this gap in the literature by addressing the perspective of small family farmers on e-commerce, their tendencies in this regard, and the future of agriculture from the perspective of small family farmers. In line with this, this study is focused on the e-commerce adoption of small family farmers in a developing country and has developed a conceptual framework to understand the elements of e-commerce adoption for small family farmers.

This study contributes to the small business and e-commerce literature in three ways. The major contribution lies in the study's holistic approach to identifying key factors for e-commerce adoption for small family farmers. By identifying challenges, obstacles, and future directions, we provide important and novel evidence for small business owners, encouraging the implementation of digitalization and e-commerce strategies and practices in developing countries, particularly for family firms in agriculture. Another contribution of this study is its focus on the viewpoints of small family farmers in rural areas of a developing country. The adoption of e-commerce is likely to increase household income (Li *et al*., 2021), and the resilience of family businesses towards digitalization and the transition to e-commerce is quite low. Understanding the factors that influence a farmer's decision to participate in or forego online shopping for farm inputs is of great interest, given the growing proportion of e-commerce offerings in agricultural trade and the previously cautious behavior of farmers (Schwering, 2021). Thus, this study highlights the key facts by defining the key concepts and steps to improve small-family farmers, which will offer significant opportunities for all stakeholders. Finally, our findings can provide useful insights for policymakers to develop policies aimed at encouraging agricultural entrepreneurship in terms of e-commerce and digital marketing.

This article is organized as follows: In the first part of the study, small family farming and e-commerce are discussed in a theoretical context. Then, details on methods and analysis, as well as findings, are given. The last section draws conclusions and suggests future research.

2. Theoretical Background

2.1. *Concept, characteristics, and problems of small-family farming*

Although it is not easy to make a generally accepted definition of family farming, it is possible to say that the most important elements are the family labor force, family members make the decisions, a significant part of the income is obtained from agricultural activities, and there is no size limitation (Keskin *et al*., 2017). Family farming includes agriculture, forestry, fisheries, pastoral, and aquaculture production activities managed and operated by a family, including women and men, relying predominantly on family labor (FAO, 2014).

Farming families are a large and diverse group and are defined in different ways around the world, depending on cultural traditions and national criteria. Within this diversity, the FAO views family farming as "a set of family-based agricultural activities linked to many areas of rural development". FAO (2020) defines family farming as "a method of organizing production activities for agriculture, forestry, fisheries, pastoralism, and aquaculture managed and carried out by one family, based predominantly on family labor, including women and men."

Strengths of family farming include fast decision-making, consideration of future generations, resistance to crises, independence, high motivation, and family members helping in cases of high work intensity. Weaknesses include scarcity of capital, insufficient economies of scale, assumption of risk, inheritance difficulties, and general knowledge replacing expertise. The main problems of family farming include difficulties in obtaining resources and raw materials, aging of the population and children leaving the land, lack of and difficulties in accessing education and financial services, and little or no participation in price formation processes (Keskin *et al*., 2017). In Türkiye today, many small family farmers are forced to enter into institutional and non-institutional borrowing relationships to purchase production inputs (Keyder & Yenal, 2013; Önal & Özalp, 2018; Özuğurlu, 2011). Therefore, it is important to develop, train, and support family farms.

2.2. *Small Family Farming and E-Commerce*

Digital technologies are seen to play a significant role in facilitating commerce because of their capacity to lower transaction costs, provide better interactions between buyers and sellers, and increase business efficiency (Higón and Bonvin, 2023). Thus, digital technologies such as e-commerce may play a vital role for small family farmers to overcome the barriers they face in developing and sustaining their businesses. Technology will help farmers with various issues such as weather reports, market prices, information on new techniques, climate changes, crop suitability, etc., helping farmers to expand their agriculture in different ways (Gomathy *et al*., 2021). Applications of information technologies in agriculture have been made in farming, especially in areas such as precision agriculture and bioinformatics. However, e-commerce has been explored later because of the diversity and perishability of agricultural products, unlike industrial products (Geng *et al*., 2007).

However, it is possible to say that e-commerce has many benefits for farmers. E-commerce offers the opportunity to streamline the agricultural value chain and reduce inefficiencies in the distribution of farm produce. By weakening the large-scale control of intermediaries in the supply of agricultural products, farmers can sell their products to a range of buyers, including agribusinesses, retailers, restaurants, and end consumers. It also gives farmers access to new markets and adds transparency to the value chain. All of this leads to higher profits for farmers and reduced losses in the logistics of agricultural products due to shorter supply chains (Joiner and Okeleke, 2019). Moreover, with this method, farmers have more control over their own products, can get more accurate and instant feedback on the market, and can identify market needs more clearly.

Compared to nonfamily businesses, many family-owned businesses have recovered more quickly from the COVID-19 pandemic's shocks. A long-term perspective can help one tolerate shocks from the environment. The findings imply that when developing national financial assistance programs, the type of entrepreneurial or-

ganization and its governance must be taken into account, especially for businesses with distinct ownership and management structures (Miroshnychenko *et al*., 2024). Indeed, the impact of the COVID-19 pandemic on those engaged in family farming is significant. For example, in many countries, consumer demand for long-shelf-life food products and e-commerce has affected small family farms that do not have e-commerce applications. Lack of access to fruit, horticultural, and other perishable products during this period led to reduced demand and lower prices (Campolina *et al*., 2020). However, rather than the lack of production, this effect is caused by structural problems such as loss of income due to a lack of access to markets and inputs, a negative impact on the general economic structure, and a lack of social security. In this context, it is possible to conclude that past policies on family farming have been ineffective. A more effective family farming policy is required with these lessons learned in the new normal process. E-commerce and bringing family farmers together with digital marketing should also be included in these policies. It is possible to come across some studies on this subject around the world and in our country.

For example, Gomathy *et al*. (2021) mentioned that although farmers play a crucial role in the agricultural life cycle, the majority of them do not make sufficient profits from their crops because of market strategies, and despite all the hard work and patience shown to grow the crops, others get the real profit because of bad market conditions. Therefore, they stated that farmers should be given the opportunity to sell their products more easily on the digital platform. Smidt and Jokonya (2022), El Bilali and Allahyari (2018), and Tomic and Martinovic (2014) stated that digitally enabled marketing can help improve internal efficiency and competitiveness in markets. Digital tools in agriculture can facilitate access to commercial markets by connecting farmers and buyers, positively impacting access to information and the ability to overcome spatial barriers. Digital tools can facilitate the flow of agricultural information, enabling small-scale farmers to better understand their costs, improve decision-making, and access better financial resources. Government laws and the deployment of cutting-edge financial technologies haven't made commercial banks any less reluctant to deny credit to small and micro-family enterprises. On the other hand, digital credit improved small and microfamily companies' financial accessibility. Furthermore, even if it did not immediately raise their profitability, more funding from digital finance was favorably correlated with the operational and business expansion of small and micro-family firms (Wu *et al*., 2023).

El Bilali and Allahyari (2018) revealed that digital tools have far-reaching effects in terms of the transition to sustainability in food systems and provide new relationships between producers and consumers based on greater equity and transparency. It is also important to align digital solutions with local conditions and create a localized digital development plan to support small-scale farmers. Smidt and Jokonya (2022) also provide practices from developing countries, noting that challenges in digital technology adoption by small-scale farmers include low levels of education, low income, cultural inertia, and lack of relevant localized content in local languages in Sudan; language, poverty, and illiteracy in Nigeria; and inadequate knowledge due to lack of infrastructure, low literacy levels, lack of appropriate information services, and lack of technical competence in Kenya. Aksu and Gurbuz (2018) also stated that basic costs, distrust due to a lack of information, and trust in the traditional method are the three main barriers to e-commerce in the livestock sector in Türkiye. Kızılaslan and Ünal (2015) stated that e-commerce is not sufficiently developed in Türkiye due to reasons such as producers' unfamiliarity with e-commerce in the agricultural sector, a lack of trained personnel in this context, and technological inadequacy. Therefore, the role of the state and institutions in supporting small family farmers is of critical importance.

Rameshkumar (2022) discussed state policies on this issue in India and stated that most industries started selling their products digitally, and young agriculturists are ready to adopt digital marketing tools to market their products globally after the Digital India Movement. However, while the concept of digital marketing reaches all business sectors, it is less so in the agricultural sector due to lack of knowledge, security con-

cerns, start-up costs, lack of digital tools, lack of infrastructure, fear of use, and farmers' lack of readiness to accept new methods. Similarly, Tomic and Martinovic (2014) also analyzed the current and potential situation in the Republic of Serbia regarding mobile technology applications in the agricultural value chain and stated that new internet-based technologies have made a significant difference in connecting people, sharing information, and negotiating prices and payments, but they need more time for people to accept e-commerce as a standard way of trading, especially on farms. Li *et al*. (2021) explained the reasons why e-commerce has not yet been determined as a standard method for farmers and the factors affecting farmers' participation in e-commerce sales platforms as internal and external factors. Internal factors include personal characteristics, family business characteristics, and psychological cognition. They indicated that farmers with higher resource endowments and e-commerce awareness are more likely to adopt e-commerce sales. Farmers' decision-making behavior is deeply embedded in the social structure of the village, with distinct community-type characteristics. Therefore, e-commerce training in the village area has a significant positive impact on the e-commerce sales behavior of both large- and small-scale farmers. Hence, it can be assumed that the enhancing effect of village-based e-commerce training on small-scale farmers is significant. Research conducted by the United Nations Development Programme (UNDP), Investing in Rural People (IFAD), and the Food and Agriculture Organization of the United Nations (FAO) with small-scale farmers in Türkiye found that the higher the level of education of the farmer, the more likely they are to sell their farm produce online. Therefore, there is a need to train farmers in the use of digital marketing tools (UNDP, 2022).

3. Materials and Methods

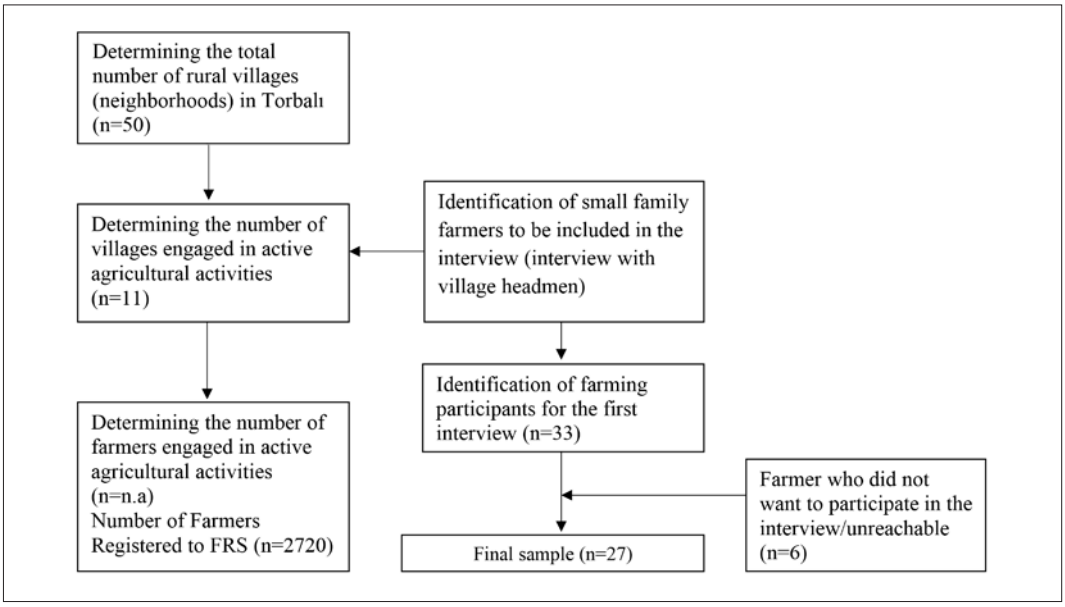
The data collection process was conducted using a semi-structured interview format that included questions on the demographic characteristics of small family farmers, methods and problems related to production, marketing, procurement, and their thoughts on e-commerce. In this context, the following questions were asked in the research:

- What types of problems do you experience during the production phase?
- How do you decide which crops to grow in the next season?
- Do you conduct market research?
- Who are the buyers of the products?
- Which inputs do you purchase? Do you have a problem with procurement of inputs?
- How do you set the price of your products?
- How are product sales collected?
- Can you predict how much you will earn?
- How are the collection, distribution, and storage of products carried out?
- Do you have the Internet?
- Do you have a social media account?
- Do you know anything about e-commerce?
- What do you think about e-commerce?
- What problems do you think you might face when you do e-commerce?
- What do you think about the future of agriculture in Türkiye?

These interview questions were developed by the authors on the basis of the literature review. The questions were also evaluated by two academics interested in marketing and e-commerce and two agricultural engineers before being finalized. Some questions have been revised in line with the suggestions. In addition, interviewers were encouraged to be flexible in asking additional open-ended questions to the main questions. These questions and the communication between the interviewees and the interviewers served to elicit detailed responses on small family farmers' problems related to production, marketing, and input supply, as well as their views on e-commerce.

Farmers' areas of agricultural occupation, the crops they grow, and the villages in which they reside provide the diversity of the sample. In this context, because no clear information was available, the headmen of 11 villages actively engaged in agriculture were interviewed. The selection of an appropriate sample size for qualitative research, especially for in-depth interviews, is a crucial factor that affects the validity and reliability of the results. The literature (Turner-Brown *et al*., 2018; Hennink *et al*., 2016;

Figure 1 - Diagram of the sampling process.



Guest *et al*., 2020; Hennink and Kaiser, 2022; Squire *et al*., 2024) substantiates the claim that a sample size of 9 to 30 participants is typically adequate for attaining data saturation, which refers to the juncture at which no new information arises from further interviews. Accordingly, 33 farmers who may be eligible for the scope of the research were identified together with the headmen (mukhtars) using maximum diversity sampling from purposeful sampling methods. Of these farmers, 4 did not want to be interviewed, and 2 could not be reached. As a result, the sample of the study consists of 27 farmers in total.

Face-to-face in-depth interviews were conducted with 27 selected farmers as the sample. During the interviews, farmers were given general information about the research and its objectives and asked to support the research. Each interviewee was interviewed for an average of 43 min (range 30-57 min). A diagram of the sampling process is shown in Figure 1.

4. Results

The sample consists of family-farmers who are at age between 22 and 70. One of them is female and six of them have at least high school level of education. The responses of the participants to the questions asked during the interview were noted simultaneously by three researchers, and the responses of some participants who gave permission were collected as audio recordings. After all interviews were completed, researchers independently coded the interview forms according to the main topics. Finally, another researcher checked the encryption forms and frames and created the final framework in the Maxqda program. The findings from the interviews were structured according to the final coding and illustrated with the specific statements of the interviewees.

The responses provided by the participants in the research were grouped under five themes: problems in production, marketing of agricultural products, e-commerce, e-commerce barriers, and future agricultural production. Under each theme, the responses given by the farmers were framed as follows by creating codes and sub-codes.

4.1. *Production-related problems*

As some of the farmers interviewed were involved in crop production, some in livestock production, and a small number in beekeeping, the responses to these questions were treated separately. According to the statements of

farmers engaged in crop production, the biggest problems in agriculture are the increase in input prices and climate change. The high cost of inputs, especially the high prices of electricity, fertilizer, and diesel fuel, are among the problems that almost every farmer mentions. These problems are followed by a water shortage and the unavailability of labor and storage. In addition, some farmers stated that the fields are divided due to hobby gardens, which is a problem in production.

In terms of livestock breeding, the biggest problems are input costs (especially high feed prices), scarcity of pastures, climate change, and lack of labor and feed. In addition, the lack of hay in the country is among the problems mentioned. In the beekeeping sector, climate change, the use of pesticides, fraudulent practices in honey production, and the cost of transporting bees were highlighted as the main problems in honey production.

If we look at the common problems faced by all small family farmers, whether they are involved in crop production, livestock, or beekeeping, the biggest problems are input costs and climate change.

4.2. *Marketing of Agricultural Products*

In the interviews conducted with farmers in the research, the subject of marketing agricultural products was grouped under 5 codes: supply, buyers, market research, pricing, distribution, and stocking.

4.2.1. *Procurement*

Among the farmers participating in the research, those engaged in crop production purchase products such as fertilizers, pesticides, diesel fuel, seeds, and seedlings, while those engaged in animal husbandry mostly buy feed, hay, and medicines for animals, and beekeepers mostly buy sugar, hives, and protective medicines. Farmers in all branches of production stated that they provide the inputs they need mostly from the Agricultural Credit Cooperative and private enterprises. However, cotton and corn producers stated that traders provide all kinds of input (including diesel fuel and combine harvesters). The biggest problem experienced in the procurement process is stated as "high input costs." Only one vegetable farmer (P15,58,M) stated that he could not always find the seeds he wanted, and even if he did, he could not buy enough.

4.2.2. *Purchasers*

The buyers of the products produced by the small family farmers participating in the research vary according to the products produced. Fig, grape, olive oil, maize, and cotton producers mostly sell their products to enterprises or intermediaries. Vegetable producers, on the other hand, stated that although they mostly give their products to intermediaries, market vendors also come and sometimes take their products to the market. They stated that they also sell products to final consumers, albeit very rarely, through the stalls on the edges of the fields. Farmers engaged in beekeeping stated that they mostly sell their products to final consumers. However, when all farmers are considered, it is observed that the biggest buyers of small family farmers' products are intermediaries (11 people) and enterprises (8 people), and farmers prefer this system. This is because farmers sell their products wholesale to intermediaries and enterprises and receive their money in cash and in bulk. In connection with this issue, the farmers who participated in the interview were asked another question: "How do you find customers?". Almost all of the farmers' responses to this question were "we do not find customers; they find us; they come to the village for coffee; there is no problem in finding customers" (P12,50,M).

4.2.3. *Market Research*

One of the most important issues in marketing practices is market research. This is because it is important to know which products are most in demand on the market and what the competitive situation is in this respect. The data obtained from the research guides both the production and marketing activities of companies or professionals. Small-family farmers who participated in the survey were also asked whether they had conducted any market research while determining their

products for the next period. However, corn and cotton producers, especially those who produce depending on the trader, stated that they do not conduct any research and produce what the trader wants. Apart from this, most farmers said that conversations with farmers in coffee houses, market prices, the demands of private companies, and the government's floor and ceiling prices influenced their future planting, but that they did not carry out any specific research. However, when farmers were asked how they decide which product(s) to produce in the next period and what was the most important factor in making this decision, those who grow figs, grapes, corn, cotton, and olives did not change, but most of those who grow vegetables stated that they divide the field and grow two or three types of vegetables in summer and winter, thus dividing the risk. Other farmers stated that "we plant according to our own minds (P2,70,M)", "we plant the crops that the farmers want (P6,53,M)", "we plant according to the seedlings we find (P12,50,M)". Here, it can be seen that the farmers who grow vegetables do not do any market research and plant crops either in response to the demands or on their own.

Pricing

According to the findings, three important factors, namely, the market, the state, and the stock exchange, come to the fore in determining the prices of all farmers' products. Price determination also varies according to the products produced by the farmers. For example, in the case of grapes and cotton, the agricultural exchange has an influence on the price; in the case of grains such as wheat and barley, the state has an influence on the price; and in the case of olive oil, the price is determined by the trader or other businesses, i.e., the buyer. Of course, the quality of the commodity also affects its price. For example, the acidity of olive oil is said to determine its price. The price of figs is generally determined by intermediaries.

The majority of farmers stated that they work in cash when collecting product prices. Apart from this, there are also farmers who work on an open account (P13,66,M) and farmers who say that they have to pay on credit (P2,70,M; P17,45,M; P6,53,M).

In connection with this issue, farmers were also asked whether they could predict how much they would sell and how much profit they would make at the beginning of the period. It was observed that all farmers gave negative answers to these questions. The farmers stated that agriculture depends on the climate and that they cannot predict the yield, so they cannot determine how much they will be able to sell or how much money they will be able to earn. The statements of some farmers on the subject are as follows:

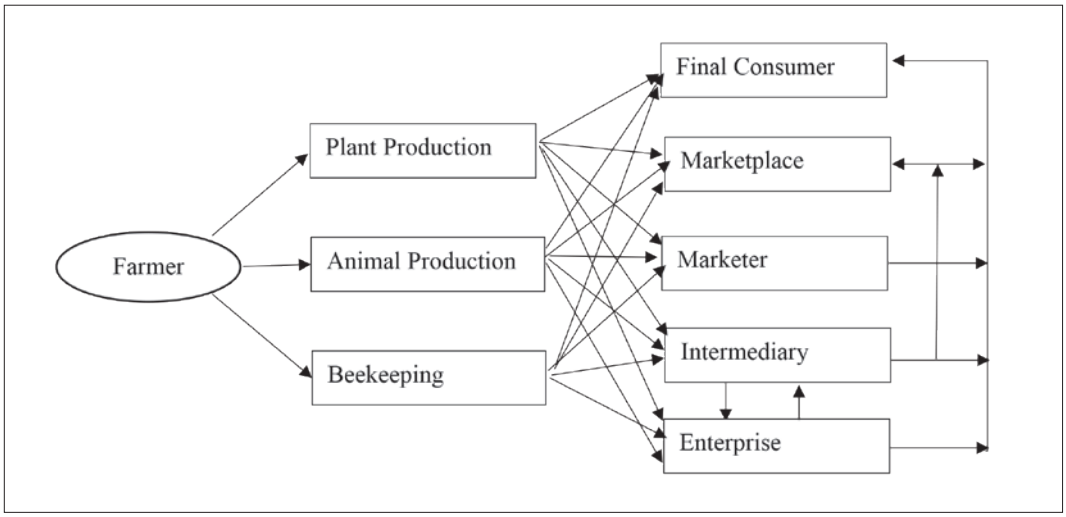
- *P6,53, M-You cannot know (predict), especially climate affects it a lot*
- *P7, 51, M-It is hard to make a prediction because we cannot predict the yield.*
- *P13,66, M-Expenses are clear, income is not.*
- *P15,58, M - You never know, last year I planted beans, I suffered a loss of 60.000 TL (approx. $4040/€3820).*
- *P16, 56, M-Climate is variable; therefore, forecasting is difficult.*

4.2.4. *Distribution and Storage*

The collection and packaging of the planted products vary according to the type of product. For example, some vegetable producers stated that the wholesalers themselves collect the products due to market law, while others said that they personally hire workers, collect and pack the products, and give them to the wholesaler or trader. Apart from this, it is observed that in maize and cotton, traders collect and store their own produce, and in olives and figs, farmers collect and store their own products.

The distribution of the products is also mostly done by intermediaries; the buyer comes to the farmer and picks up the products himself. However, beekeeping farmers distribute the products themselves, especially since their customers are final consumers. Some of the vegetable producers also stated that they do the distribution themselves as they sell their products in the market. Very few farmers engaged in animal husbandry stated that they themselves delivered the milk to the factory. In general, indirect distribution channels are preferred for agricultural products (Figure 2).

Figure 2 - Distribution chain of products.



4.3. *E-Commerce*

The use of the internet and information technologies in agricultural production is crucial. Therefore, the interviews with farmers also included questions on information technology infrastructure. The first of these questions is whether farmers have internet ownership or not. Only 3 farmers (P13,66,M; P23,67,M; P2,70,M) stated that they have no business with the internet, but their children do. The remaining 24 farmers have access to the Internet. In addition, only six of the farmers have Facebook, WhatsApp, and Instagram accounts. Considering that internet ownership is a necessity for e-commerce, farmers actually have internet infrastructure, which is the first step in technical terms.

Farmers were asked whether they had any knowledge about e-commerce and what they thought about it, and many of them emphasized that "trust" was essential. Only two people stated that they have little knowledge about e-commerce and that they are favorable to e-commerce:

- *Agriculturalists talked about Ditap, it is a good thing. When I entered the system, I saw my own product information, and I will use it (P5,47,M).*
- *Yes, we have online sales (P26,36,M).*

One participant gave a more neutral response: "*Trust is important; if there is a safe environment, it helps. If I feel this way, I can also do it" (P5,47,M).* All the remaining participants (25 people) stated that they had no information on this subject and had a negative attitude toward it. The answers given by some of the participants in this group are as follows:

- *I don't know about such things (P2,70,M).*
- *No, I don't believe in e-commerce. They supposedly sold fields on the internet, and field prices flew (P3,60,M).*
- *I can't do it (P4,63,M).*
- *No, I think it's difficult to establish trust. When the buyer does not see the face of the goods, how will he buy them? (P6,53,M).*
- *I didn't do it, I didn't need to (P8,46,M).*
- *The other person will not see the goods; will I get my money? I have no confidence P1,51,M).*

As the answers of the participant farmers to the previous question were mostly negative, they were asked why they thought this way and what problems they might face if they engage in e-commerce. The common view of almost all 24 farmers who responded to this question is that they may experience a "trust" D problem. In addition, one of these 24 people stated, "*I don't know enough*" (*P4,63,M)* and the other one stated, "*I don't want to deal with it, this order is enough for me*" (*P9,59,M)*. Descriptive statistics with respect to respondents' responses on e-commerce are reported in Table 1.

Table 1 - Discriptive statistics on e-commerce.

Theme	*Variable*	*Response*	*n*	*percent*
Intention to do e-commerce	Internet ownership	Yes	24	88,9
		No	3	11,1
	Social media account ownership	Yes	6	22,2
		No	21	77,8
	Knowledge on e-commerce	Yes	2	7,4
		No	25	92,6
	Main problem preventing e-commerce	Lack of trust	22	91,6
		Lack of knowledge	1	4,2
		Unwillingness to deal with e-commerce	1	4,2
E-commerce barriers	Internal	Lack of trust	24	88,8
		Inertia on the part of farmers	27	100
		Unsatisfactory e-commerce income	22	81,4
		Lack of knowledge	24	88,8
		Resistance to innovation	24	88,8
	External	Lack of support from government policies	25	92,6
		Organization	20	74,1
		Internal migration	27	100

4.4. *Obstacles*

Because of the interviews with farmers in the research, it is seen that there are two types of barriers to e-commerce that can be characterized as internal and external. Farmers' lack of trust in e-commerce, inertia on the part of farmers, unsatisfactory income from e-commerce, lack of knowledge about e-commerce, and resistance to innovation can be interpreted as internal barriers to the acceptability of e-commerce as an alternative way of agricultural marketing. In addition, it can be stated that government policies, organizations, and internal migration are external barriers to e-commerce. The inadequacy of the state's e-commerce incentives in terms of government policies can be given as an example. The characteristics of farmers, such as their low level of education, high average age, etc., reduce their technological literacy, and of course, this situation makes it difficult to adopt new methods. However, with the right organization, e-commerce transactions can be carried out from a single source and by experts. However, the problem of the organization of the farmers appears to be an external obstacle here as well. In addition, the migration of young people from rural to urban areas, who are much more tech-savvy and better educated, can be seen as another barrier to e-commerce. This is because the children of most farmers who participated in the interviews migrate from rural to urban areas either to study or work in factories and are not interested in agriculture.

4.5. *Agriculture in the Future*

It is confirmed by findings that agricultural production has decreased over the years due to high input costs in agricultural production, zoning of agricultural lands, wrong pesticides or irrigation, and many problems experienced in agricultural policies in Türkiye. Moreover, as seen above in the demographic characteristics of farmers, the young population is gradually leaving agriculture. For these reasons, farmers were also asked about their thoughts on the future of agriculture and whether they would continue agricultural production in the coming years. The responses of the farmers on the subject are as follows:

- *In the future, there will be no more farming; it will be finished (P3,60,M).*

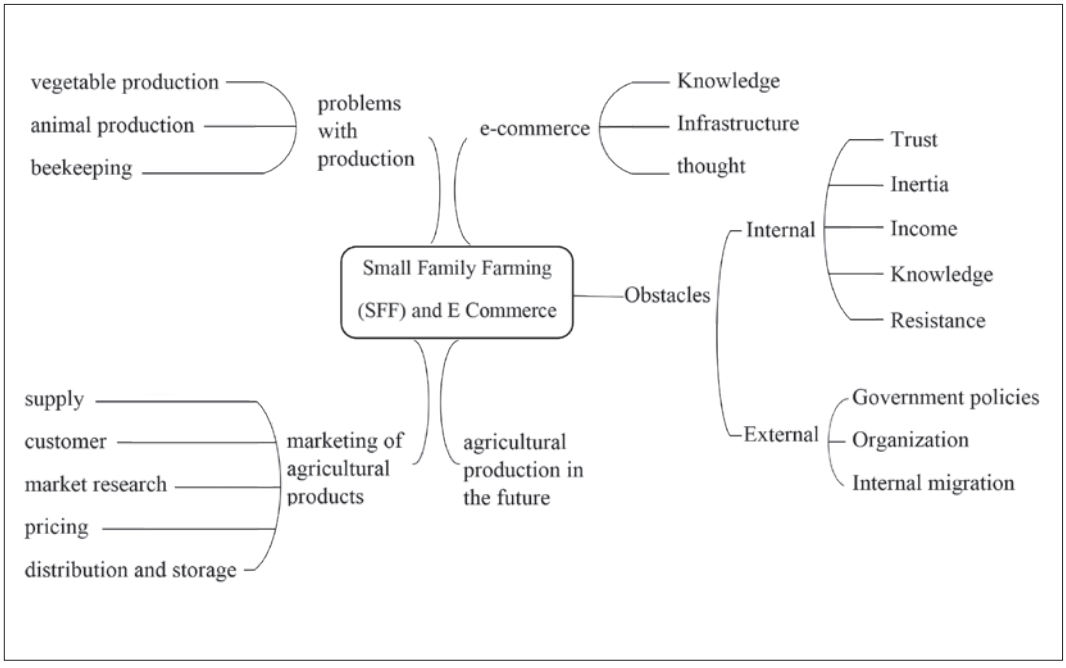
- *Children won't do farming (P5,47,M).*
- *I will quit this job when the children finish school. I will do it for 2-3 more years (P1,51,M).*
- *I will quit when I retire (P6,53,M).*

As can be seen from the answers given by the farmers, they have very negative thoughts about continuing agricultural production in the future. The most striking of these views is the view that "*In the future, farming will cease to exist*". The farmers stated that the earnings obtained from farming would not support a family, that children would not do this work due to both the earnings and the difficulty of the work, that the costs have already increased a lot due to the economic situation, and that this situation forces the farmer. They state that all of these will end agriculture in the future. This may lead to a significant food crisis in our country in the future, as well as many economic, social, and cultural problems. Only two farmers gave a positive response as "*I will do this job until I die*" (*P5,47,M; P8,46,M)*.

According to the findings, a framework for e-commerce adoption for small-family farmers is created and presented in Figure 3. The framework provides a holistic approach to the concept of e-commerce adoption.

The framework consists of five components. Production problems deal with the following stages of the value chain: from producers to end users. Along with both animal production and vegetable production, regional production, such as beekeeping, rises as a problem of agricultural production. Numerous reasons contribute to small family farmers' increasing production issues. These include the growth of industrial agriculture, limitations imposed by the market, inadequate infrastructure, and more general problems, including social protection and health concerns. In addition, the availability of family labor, financial availability, and the utilization of subsidies all have an impact on the productivity of small family farms. Additionally, the current conventional agri-food systems have an impact on small farms' competitiveness. As a result, in order to develop sustainable strategies for small family farms, it is necessary to reconstruct regional and local agri-food systems. From this point of view, e-commerce can be a solution to ensure sustainability and support the development of small family farms.

Figure 3 - Conceptual Framework of Small-Family Farming and E-Commerce Adoption.



E-commerce, on its own, stands out as an important element. There are factors arising from e-commerce itself that small family businesses in agriculture face in the adoption of e-commerce and the transition to e-commerce. These include themes such as the need for appropriate infrastructure, a lack of knowledge and awareness, and negative attitudes towards e-commerce. Thus, e-commerce needs to be investigated as an important trigger and obstacle for small-family farmers. On the other hand, there are two main obstacles facing small-family farmers in e-commerce. These can be classified as internal and external barriers. Despite its effects, such as creating new sources of income and reaching new markets, internal barriers such as lack of trust and resistance and external barriers such as government policies and migration are classified as barriers to e-commerce adoption. The marketing of agricultural products is the fourth component of e-commerce adoption. Small-family farmers in developing countries have a lot to gain from the marketing of agricultural products through the use of e-commerce, including greater sales, better financial results, expanded market access, simplified value chains, and better market research. Lastly, the future of agriculture has been asserted as the final component. Although many farmers stated that they are negative about the future of agriculture, e-commerce can be a salvation for small-family farmers.

5. Discussion

This study addressed the elements of e-commerce adoption for small family farmers. The majority of people engaged in farming are elderly and have a low education rate. It causes farmers to be far away from new information technologies used in agriculture. Instead of engaging in agriculture, young people mostly work in factories in cities for the minimum wage, engage in non-agricultural jobs, or migrate to different regions for education. Our findings support the observations of Petruzzella *et al*. (2020) that there is a need for the establishment of policies and various support mechanisms to support young entrepreneurs, facilitating access to credit facilities, and expanding cooperation between entrepreneurs and researchers. This situation is also related to the findings of Keskin *et al*. (2017), Smidt and Jokonya (2022), and Rameshkumar (2022) and raises concerns about the future of agriculture in developing countries.

The rise of production problems for small family farmers is a complex issue influenced by various interconnected factors such as market constraints, infrastructure, access to credit, gender-related attitudes, climate change, and decision-making processes. Addressing these challenges requires a multifaceted approach that considers the unique circumstances and needs of small family farmers. Our findings support the fact that agricultural extensionists have been identified as having a crucial role in improving the production systems of small-scale farmers through training and advisory services (Munyakazi *et al*., 2022). It is possible to say that climate change is one of the major problems in agricultural production and that high input costs affect production. Interestingly, this situation supports the results of the study conducted by Aksu and Gürbüz (2018) on the barriers to e-commerce in animal husbandry.

Our findings show that they do not have much difficulty finding customers and that the intermediaries come to the village coffee house and reach them. Therefore, it was observed that they did not make any efforts for product promotion or advertisement. As Smidt and Jokonya (2022) point out, inertia does not detach most farmers from the existing order. This situation, in fact, indicates that the majority of them do not get enough profit from their crops, as stated in the studies of Gomathy *et al*. (2021), and that despite all the hard work and patience shown to grow the crops, the real profit is received by others. The farmer both complains about this situation and allows it. This shows that e-commerce can play a vital role for small-family farmers to enhance their vision and motivation to reach larger markets.

COVID-19 pandemic has had a strong impact on online food shopping service demand. This has increased the variety of products offered on e-commerce platforms and raised the possibility of increased sales concentration on niche products, as well as the growing consumer attraction

of online platforms (Chang & Meyerhoefer, 2020). Furthermore, it has been discovered that e-commerce adoption increases farmers' income, especially in areas with greater rates of e-commerce adoption. This suggests that small family farmers may benefit financially from e-commerce adoption (Li *et al*., 2021). Moreover, the impact of e-commerce adoption on small enterprises' performance has been emphasized, highlighting the role of e-commerce in improving the performance of small enterprises (Lestari *et al*., 2021). In line with these studies and our findings, to contribute to the literature, we have asserted that small-family farmers in developing countries need to be motivated to adapt e-commerce to their businesses faster and more widely in order to make more profit and reduce their dependence on intermediaries. This may be achieved by determining and implementing policies by both public administration and local authorities. In line with Han and Li (2020) who have emphasized the significance of supportive institutional frameworks for e-commerce adoption by highlighting the function of improved institutional mechanisms for e-commerce in lowering perceived risk and fostering adoption preparedness, our findings support the need for exact policies for the use of e-commerce. This is also consistent with the results of Miroshnychenko *et al*. (2024), who asserted that policies for financial aid can be utilized to encourage and boost family-owned businesses' adoption of resilience-fostering strategies. Furthermore, based on our findings, we agree with Wang *et al*. (2022) in highlighting the fact that it has been demonstrated that e-commerce advertising encourages farmers to use organic fertilizers, which enhances product quality and promotes sustainable agricultural development.

Contrary to the studies of Smidt and Jokonya (2022) and Rameshkumar (2022), there is no problem in Türkiye in terms of both internet access and e-commerce infrastructure. Nevertheless, similar to Chen *et al*. (2022), our findings are parallel with providing evidence in favor of government spending on rural infrastructure to promote the growth of e-commerce. However, farmers generally have a negative view of e-commerce, with the effect of age and education. Our findings have shown that there is a lack of knowledge and awareness about e-commerce adoption. Their lack of knowledge about e-commerce, their loyalty to the existing order, the ease of this habitual order for them, and their distrust of e-commerce are among the barriers to e-commerce. This situation is also found in the studies of UNDP (UNDP, 2022), Kızılaslan and Ünal (2018), Aksu and Gürbüz (2018), Keskin *et al*. (2017), Rameshkumar (2022), and Li *et al*. (2021).

Our findings are consistent with the findings of relevant studies that have shown that the adoption of e-commerce by small and medium enterprises (SMEs) in developing countries has become increasingly important (Rahayu and Day, 2015). Furthermore, the perceived e-readiness factors in e-commerce adoption have been identified as crucial in developing countries, emphasizing the importance of readiness for e-commerce adoption (Molla and Licker, 2005). Thus, e-commerce is one of the most efficient ways of achieving sustainable development for small-family farmers in developing countries. In line with our findings, Su *et al*. (2021) also found that, in rural China, the adoption of e-commerce has been found to impact farmers' participation in the digital financial market, indicating the broader influence of e-commerce adoption on financial inclusion in rural areas.

6. Conclusion

Although family farming has been extensively studied in previous research, prior literature has scantly addressed the adoption of e-commerce by small family farmers. According to our findings, it is clear that it will not be possible to solve marketing problems without solving the basic problems related to agricultural production. On the other hand, it is possible to infer that the farmers do not want to break away from the existing order due to the fact that one of the biggest problems in the value chain of agricultural production is the high number of intermediaries between producers and consumers. Intermediaries lead to higher prices for agricultural products for the final consumer. The farmer, who does the actual work, has the lowest profit share in this chain, and such a long distribution channel

leads to product waste. However, it is seen that the farmers who participated in the interview, although they complained about this situation, were also satisfied with selling the products in cash and wholesale. The fact that the farmers have an elderly population and a low level of education perhaps creates an incentive to protect the existing order and creates anxiety about innovations. Unfortunately, all this will put our country's future agricultural production in trouble. It is necessary to find a solution to the structural problems in production and marketing. Certainly, the solution to these problems will not be possible without conscious state policy and support.

7. Implications, limitations, and further research

Small family farmers need to be supported for their survival and future; new methods need to be taught; and they need to gain a structure that can keep up with new technologies and systems. Explaining e-commerce to small family farmers in the field research and explaining that this method can be an alternative way in agricultural marketing can be considered a practical contribution of the study. Most of the farmers who participated in the interview stated that production has become increasingly difficult from year to year; therefore, they will not continue production, they cannot make a living with the income obtained from agricultural production, and their children will not do this work. Therefore, the view that "in the future, there will be no more farming" is the most common among farmers. This statement and thought are perhaps the most important focus of the research that has not appeared in the literature. In addition, the framework is a theoretical contribution of this research to the literature.

The research also has some suggestions for institutions and organizations such as the state, local governments, NGOs, and universities in practice in terms of e-commerce as an alternative to current agricultural marketing practices for small family farmers and the future of Turkish agriculture. The state and relevant institutions should provide sufficient incentives for agriculture to be an income-generating endeavor with the right policies and direct young people to agriculture. This is because the aging population will not be able to do this job in the future, and young people will not want to do this job in the existing order. Government regulations should prioritize the establishment of collaborations between farmers and e-commerce platforms as well as mobile applications to develop sustainable sales and marketing strategies that enhance income generation. In particular, with the support of local-level associations such as chambers of commerce, commodity exchanges, artisans' associations and agricultural cooperatives, trade entry mechanisms can be established and made available to family farmers who need them. Moreover, while the importance of agricultural activities is increasing due to the world's growing nutritional needs, Türkiye, despite its great agricultural potential, will suffer a huge loss of income. Therefore, the future of Turkish agriculture lies with young farmers. In order to attract young farmers, policies that improve the institutional framework for entrepreneurship by making it easier for startups to access support, funding and expertise, may be installed. With the joint initiative of the public sector and universities, programs can be developed to inform young farmers about innovation. As Petruzzella *et al*. (2020) state, the implementation of innovative pedagogical methodologies, particularly those that emphasize open innovation and design thinking, is paramount in nurturing young farmers' entrepreneurial aspirations and cultivating their aptitude for innovation.

In terms of e-commerce, the characteristics of young people, such as their predisposition to technology, being open to innovations, and being educated, can enable them to develop themselves more easily in this field. Young people who see state support with the right policies at their backs will have the chance to find markets more easily and directly at home and abroad, thanks to e-commerce. It will contribute to the employment of the young population in developing countries, regional development, and supporting sustainable development goals. Therefore, the government can increase production and marketing incentives for young

farmers. Policies can be developed to ensure the supply of inputs such as fertilizer, diesel, and seed to young farmers at affordable costs. Universities can include e-commerce courses in the curricula of agriculture-related professions such as agricultural engineering and train young people in the marketing of agricultural products through e-commerce as well as their production. Initiatives to incorporate e-commerce into agriculture must also address the socio-economic inequalities intensified by the digital divide. Improving rural digital literacy and offering extensive e-commerce training programs will be essential for facilitating equitable participation. Policies must focus on developing inclusive educational content that provides practical tools and resources for farmers, enabling them to succeed in a progressively digital marketplace.

Local governments and district agricultural directorates can organize various events with the local community for the online purchase of agricultural products produced only in their region at certain times of the year. The repetition of such practices at certain times of the year can serve both the sale of regional agricultural products and sustainability. Moreover, when all the problems of small family farmers are taken into account, it becomes clear how important it is to organize. This requires practices by state and local governments to facilitate organizing. In conclusion, a comprehensive government strategy focused on developing supporting infrastructure, increasing digital literacy and expanding economic accessibility can significantly increase the participation of small family farmers in e-commerce. Emphasizing these areas can improve economic resilience and sustainable agricultural practices, thereby advancing food security and rural life.

The biggest limitation of this study is that it was conducted during and immediately after the COVID-19 pandemic. Therefore, interviews with farmers who could not fully recover from the pandemic were very difficult. In addition, the long distances between villages created problems in terms of both cost and time.

Since the research was conducted only in the Torbalı district of İzmir, it is not possible to generalize the results obtained to Türkiye. Therefore, in future studies, more regions active in agriculture in Türkiye should be included in the study. In addition, more accurate results can be obtained with a mixed data collection method using both quantitative and qualitative studies.

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