

Innovation Practices in Agricultural Organizations: The Case of Türkiye¹

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Abstract

In recent years, the importance of the agricultural sector has increased even more with the COVID-19 pandemic process that the whole world has faced. This process has once again shown that the most important factor in the survival of people is the minimum level of food requirement and that it is only possible to meet this requirement through the agricultural sector. Especially after the world population exceeded the 8 billion mark, it has become more and more difficult to meet the world's food demand. In this context, it is necessary to ensure efficiency and productivity in agriculture in order to increase food production. For this, agricultural innovation practices are needed. This study aims to identify the current state of innovation practices used in agricultural organizations in Türkiye. In the research, document analysis technique was used within the scope of qualitative research method. The population of the research consists of agricultural organizations in Türkiye that are engaged in innovation practices. In this context, 40 agricultural organizations that can be reached via the internet were determined as the sample of the research. The innovation practices of agricultural organizations were examined through the web pages of the organizations and the data obtained were subjected to content analysis. As a result of the research, it was determined that 45% of the innovation practices of agricultural organizations were product innovation, 32.5% were process innovation, 20% were organizational innovation, and 2.5% were marketing innovation. In addition, it was determined that 30% of agricultural organizations were engaged in agricultural innovation practices in smart agriculture, 20% in education, 20% in organic/sustainable agriculture, 14% in good agriculture, 14% in food safety, and 2% in e-commerce. As a result, it is thought that this study will guide the managers of agricultural organizations on agricultural innovation and contribute to the relevant literature.

Keywords: Innovation, Agricultural Innovation, Agricultural Sector, Agricultural Organizations.

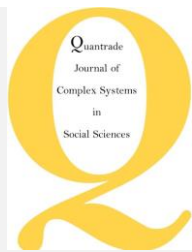
Tarımsal Örgütlerde İnovasyon Uygulamaları: Türkiye Örneği

Özet

Son yıllarda tüm dünyanın karşılaştığı COVID-19 küresel salgın süreci ile birlikte tarım sektörünün önemi daha da artmıştır. Bu süreç, insanların varlıklarını devam ettirebilmelerinde en önemli faktörün minimum düzeyde gıda gereksinimi olduğunu ve bunun ancak tarım sektörü ile karşılanmasının mümkün olabileceğini bir kez daha göstermiştir. Özellikle dünya nüfusunun 8 milyar sınırını aşmasından sonra dünyada gıda talebinin karşılanması her geçen gün daha da zorlaşmıştır. Bu bağlamda gıda üretiminin artırılması için tarımda etkinliğin ve verimliliğin sağlanması gerekmektedir. Bunun için tarımsal inovasyon uygulamalarına gereksinim duyulmaktadır. Bu araştırmada, Türkiye’de tarımsal örgütlerde kullanılan inovasyon uygulamalarının mevcut durumunun belirlenmesi amaçlanmıştır. Araştırmada nitel araştırma yöntemi kapsamında doküman analizi tekniği kullanılmıştır. Araştırmanın evrenini,

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Türkiye’de inovasyon uygulamalarında bulunan tarımsal örgütler (kurum, kuruluş ve işletmeler) oluşturmaktadır. Bu kapsamda internet üzerinden ulaşılabilen 40 tarımsal örgüt araştırmanın örnekleme olarak belirlenmiştir. Tarımsal örgütlerin gerçekleştirmiş oldukları inovasyon uygulamaları, örgütlerin web sayfaları üzerinden incelenmiş olup, ulaşılan veriler içerik analizine tabi tutulmuştur. Araştırma sonucunda tarımsal örgütlerin inovasyon uygulamalarının %45’inin ürün inovasyonu, %32,5’inin süreç inovasyonu, %20’sinin örgütsel inovasyon, %2,5’inin ise pazarlama inovasyonu türünde olduğu belirlenmiştir. Ayrıca tarımsal örgütlerin %30’unun akıllı tarım, %20’sinin eğitim, %20’sinin organik/sürdürülebilir tarım, %14’ünün iyi tarım, %14’ünün gıda güvenliği, %2’sinin ise e-ticaret konusunda tarımsal inovasyon uygulamalarında buldukları tespit edilmiştir. Sonuç olarak, bu çalışmanın tarımsal inovasyon konusunda tarımsal örgüt yöneticilerine yol göstereceği ve ilgili literatüre katkı sağlayacağı düşünülmektedir.

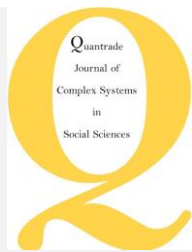
Anahtar Kelimeler: İnovasyon, Tarımsal İnovasyon, Tarım Sektörü, Tarımsal Örgütler.

1. Introduction

The latest statistics on the world population show that the world population has exceeded 8 billion (Worldometers, 2022). With the increase in population, the proliferation of cities, which are the living spaces of people, also increases the demand for food. However, making agricultural lands unfavorable day by day, erosions, forest fires, use of wrong methods in agriculture, global climate change and many other reasons make it difficult to meet the increasing demand for food by reducing production and efficiency in agriculture (Uzunlu & Zencirci, 2000).

Agriculture is not only an economic industry but also the main source of food production needed to sustain the lives of people around the world. However, today, in order to carry out agriculture, more needs to be done than is available. Due to many negative factors such as misuse of agricultural land, natural disasters, global warming and climate change, agricultural areas are shrinking and therefore innovations in agriculture are needed. Innovation is *“the realization of a new or significantly improved product or process, a new marketing method or a new organizational method in organizational practices, workplace organization or external relations.”* There are 4 types of innovation: product, process, marketing and organizational. Product innovation is the creation of a new or significantly improved product according to its existing characteristics or anticipated use. Process innovation is the development of a new or significantly improved method of production or distribution. Marketing innovation is a new marketing method or technique that involves significant changes in product design or packaging, product positioning, product promotion or pricing. Organizational innovation is the application of a new organizational method or technique in an organization's business practices, workplace organization or external relations (OECD-Eurostat, 2005). Innovation focuses on improving existing processes, methods/techniques and products or creating new ones. In agriculture, it can be said that the field of innovation is quite comprehensive. It can be seen that countries with developed industries have made significant progress in the agricultural sector through innovation. There are opportunities to increase income in agriculture through innovation practices in a wide range of areas such as organization, system, product (goods/services), production method and technology, product processing and marketing. Industrialized countries have made significant progress in the agricultural sector through innovation. Therefore, the agricultural innovation process has been institutionalized on the basis of developed countries in the last two centuries (Uyan, 2018). *“Agricultural innovation is the process by which individuals or organizations introduce new or existing products, processes or organizational forms for the first time in a given context in order to increase productivity, competitiveness, resilience to crises or environmental sustainability, and thus contribute to food security and nutrition, economic development or sustainable natural resource management”* (FAO, 2018).

When the literature is examined, it is seen that many studies have been conducted on agricultural innovation/innovation in agriculture. Avşar and Avşar (2014) concluded that agricultural organizations resort to innovation practices in order not to be negatively affected by fierce competition in the agricultural sector. Uyan (2018) stated that a number of studies should be carried out in order to achieve high profits by reducing production costs in agriculture and that innovation has an important place in these studies. Aydın et al. (2018) found that when the producers who are engaged in good agricultural activities and those who are not engaged in good agricultural activities are compared, the producers who are engaged in good agricultural activities have



a more positive attitude towards innovation. In addition, it was determined that the reason for the acceptance of innovative activities is the increase in the producer's earnings. Özaydın and Çelik (2019) determined that R&D activities in agriculture were aimed at meeting the basic food demand in the 1960s, but today they have become more comprehensive with constantly developing technology and scientific knowledge, and they stated that increasing agricultural R&D activities will contribute to growth and development in agriculture. Kılavuz and Erdem (2019) stated that smart agricultural technology innovation application provides significant contributions to agriculture, reducing product losses in product production and keeping costs at the lowest levels during product production. Yaman et al. (2021) stated that many countries in the developing world are trying to increase productivity, efficiency and profitability by utilizing technological opportunities in agriculture, and in the future, technologies will be further developed with innovations and the agricultural sector will develop even faster. Yaman et al. (2022) argued that agricultural authorities in Türkiye should continue their efforts to increase productivity in cooperation with all stakeholders of the sector without slowing down, taking into account the structural problems of the sector, and in this process, a comprehensive agricultural innovation strategy that defines the Türk agricultural innovation system and the role of organizations, shows the current status of the process and provides a roadmap for the development of the system can be created. Dertli and Dertli (2024) examined the future of innovation and communication technology in organic agriculture. In this context, they developed a valid and reliable measurement tool to determine the relationship between metaverse communication technology and organic agricultural tourism practices.

Organizations or sectors that can successfully carry out innovation can move forward in a stronger and more dynamic way in future business processes. In this context, it can be said that agricultural innovation provides significant benefits in terms of product development and increasing production by using existing resources more effectively and efficiently. The aim of this study is to examine the innovation practices of agricultural organizations engaged in production (crop production, animal husbandry, beekeeping, fisheries, etc.), marketing and product processing activities in Türkiye. In a changing world, the active use of new technologies in addition to traditional methods/techniques has become a necessity. This study is important in terms of determining the current situation of innovation practices in Türk agriculture in a constantly developing and changing world order. As a result of the research, it is aimed to reveal which types of innovations agricultural organizations in Türkiye focus on and the benefits of these innovations. Based on the finding that agricultural innovation practices in Türkiye are not yet at a sufficient level (Özaydın & Çelik, 2019), it can be said that this study will contribute to the literature.

2. Material and Method

This study seeks to answer the question “In which type, in which areas, in which subjects and in which themes do agricultural organizations in Türkiye carry out innovation practices?” In this context, qualitative research method was used in the study. The population of the study consists of agricultural organizations (institutions, organizations and enterprises) operating in the agricultural sector in Türkiye and adopting innovation practices. Document analysis technique was used in the study. “*Document analysis is a scientific research technique that can be defined as the collection, review, questioning and analysis of various documents as the primary source of research data*” (Sak et al., 2021). In this context, innovation practices of agricultural organizations were scanned from the documents on the internet platform and 40 organizations that share data on the relevant websites and whose innovation data can be accessed were determined as the sample of the research. It is thought that not all the details of the innovation activities implemented by the agricultural organizations in the research sample or at the project stage are shared on the web. For this reason, a limited number of samples were evaluated in the research. The data obtained as a result of the research were subjected to content analysis and interpreted by presenting them in tables and figures (Esmer et al., 2019). “*Content analysis is an analysis technique that aims to provide unbiased and systematic information about a text*” (Koçak & Arun, 2006). In the content analysis of agricultural innovation practices, capital structure, size, type of innovation, field of activity, innovation subject and innovation theme criteria were taken into consideration.

3. Results

Frequency-percentage distributions and examples of agricultural organizations engaged in innovation practices according to capital ownership are given in Table 1. It is seen that 90% of the agricultural organizations have private capital and 10% have public capital. Examples of privately owned agricultural organizations are Abaloğlu, Ekofen, Banvit and Tarnet, while publicly owned agricultural organizations are Çaykur and Kastamonu University. On the other hand, it is understood that most of the agricultural organizations constituting the research sample were established by private individuals.

Table 1. Agricultural organizations by capital ownership

Capital ownership	N	%	Example
Special	36	90	Abaloğlu, Ekofen, Banvit, Tarnet
Public	4	10	Çaykur, Kastamonu University
Total	40	100	

The criteria determining the size scales of agricultural organizations are as follows: Agricultural enterprises that produce on a maximum of 500 decares of land are small-scale, agricultural enterprises that produce on land between 501 and 5000 decares and have less than 250 employees are medium-scale, and enterprises that produce on 5000 decares and more are large-scale (Dernek, 2005). Frequency-percentage distributions and examples of agricultural organizations in terms of size are given in Table 2. It is seen that 45% of the agricultural organizations are large-scale, 40% are medium-scale and 15% are small-scale. Examples of large-scale agricultural organizations are Toros Tarım and Hektaş, medium-scale agricultural organizations are Dede Tarım and Petektar Tohumculuk, and small-scale agricultural organizations are İldeniz Köprülü Hydroponics and İskoç Algae.

Table 2. Agricultural organizations by size

Size	N	%	Example
Large scale	18	45	Toros Tarım, Hektaş
Medium-sized	16	40	Dede Tarım, Petektar Tohumculuk
Small scale	6	15	İldeniz Köprülü, Hydroponics, Scottish Algae
Total	40	100	

Frequency-percentage distributions and examples of the types of innovations carried out by agricultural organizations are given in Table 3. It is seen that 45% of the innovation practices of agricultural organizations are within the scope of product innovation, 32.5% process innovation, 20% organizational innovation and 2.5% marketing innovation. It is understood that Saray, Mono Tarım and Dede Tarım are engaged in product innovation, Tarnet and GSS Technology are engaged in process innovation, Sefa Sera and General Directorate of Agricultural Enterprises are engaged in organizational innovation, and Tarım Tedarik is engaged in marketing innovation.

Table 3. Types of innovation

Type of innovation	N	%	Example
Product innovation	18	45	Saray, Mono Tarım, Dede Tarım
Process innovation	13	32.5	Tarnet, GSS Technology
Organizational innovation	8	20	Sefa Sera, General Directorate of Agricultural Enterprises
Marketing innovation	1	2,5	Tarım Tedarik
Total	40	100	

Frequency-percentage distributions and examples of agricultural organizations according to their fields of activity are shown in Table 4. It is seen that 37.5% of agricultural organizations are engaged in agricultural production and product processing, 32.5% in agricultural technology, 12.5% in greenhouse agriculture, 7.5% in agricultural support and R&D, 7.5% in agricultural tools and machinery, and 2.5% in agricultural marketing. Ülker and Eti Saray are engaged in agricultural production and product processing, Tarnet and GSS Technology in agricultural technology, Netgreen and Sefa Sera in greenhouse agriculture, General Directorate of Agricultural Enterprises in agricultural support and R&D, Mono Tarım and Dede Tarım in agricultural equipment and machinery, and Tarım Tedarik in digital agriculture.

Table 4. Agricultural organizations by field of activity

Field of activity	N	%	Example
Agricultural production and product processing	15	37.5	Ülker, Eti, Saray
Agricultural technology	13	32.5	Tarnet, GSS Technology
Covered agriculture	5	12.5	Netgreen, Sefa Sera
Agricultural support and R&D	3	7.5	General Directorate of Agricultural Enterprises
Agricultural tools and machinery	3	7.5	Mono Tarım, Dede Tarım
Digital agriculture	1	2.5	Tarım Tedarik
Total	40	100	

Frequency-percentage distributions and examples of innovation topics of agricultural organizations are given in Table 5. It is seen that 30% of the innovation topics of agricultural organizations are related to smart agriculture, 20% to education, 20% to organic/sustainable agriculture, 14% to good agriculture, 14% to food safety, and 2% to e-commerce. It is understood that Netgreen and Hektaş have implemented innovation practices in smart agriculture, Kastamonu University and the Ministry of Agriculture and Forestry in education, Ülker and Önem Gıda in organic agriculture/sustainable agriculture, Toros Tarım and Scottish Algae in good agriculture, Namet and Lezita in food safety, and Tarım Tedarik in e-commerce.

Table 5. Innovation topics of agricultural organizations

Topic	N	%	Example
Smart agriculture	15	30	Netgreen, Hektaş
Education	10	20	Kastamonu University, Ministry of Agriculture and Forestry
Organic / sustainable agriculture	10	20	Ülker, Önem Gıda
Good agriculture	7	14	Toros Tarım, Scottish Algae
Food safety	7	14	Namet, Lezita
E-commerce	1	2	Tarım Tedarik
Total	50	100	

The themes of innovation practices that agricultural organizations concentrate on are shown in the word cloud in Figure 1.



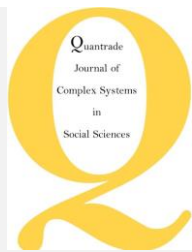
Figure 1. Innovation word cloud of agricultural organizations

When the word cloud in Figure 1 is examined, it is seen that the innovation practices that agricultural organizations concentrate on are harvest machine, tomato tree, Agriculture 4.0, autonomous tractor, thermal greenhouse, Ecobox, satellite tracking system, calf nursery, Tilapia fish, farm management system, gene bank, hand seeder, smart village and fish factory.

4. Discussion, Conclusion and Recommendations

In a constantly developing and growing world, innovations need to be made in every field in order to meet many needs of people, especially food. However, it is seen that innovation studies in agriculture in Türkiye are not yet at the desired level (Özaydın & Çelik, 2019). In this context, the study examined the innovation practices of 40 agricultural organizations in Türkiye and made some conclusions:

- It was determined that most of the agricultural organizations engaged in innovation practices were private capital organizations. This result shows that organizations with public capital do not give enough importance to agricultural innovation.
- It has been determined that most of the agricultural organizations are large and medium-sized organizations. It can be said that this situation is due to the fact that small-scale organizations are not interested in innovation due to the costliness of innovation activities.
- It has been observed that a significant portion of agricultural innovations are product and process innovations. This result shows that since the focus in Türk agriculture is mostly on product production and production processes, innovations are realized accordingly. In addition, it was determined that a significant portion of agricultural innovations were realized in the field of agricultural production-product processing and agricultural technology. It can be said that these two results support each other.
- It has been observed that agricultural organizations mostly implement innovations in the fields of smart agriculture, education and organic/sustainable agriculture, respectively. It can be said that this result is due to the increase in smart agriculture and organic agriculture practices in recent years.
- It has been determined that agricultural organizations have implemented innovation practices in various themes such as autonomous tractor, tomato tree, satellite tracking system, harvest machine, smart village, Ecobox, Agriculture 4.0, thermal greenhouse, hand seeder, fish factory, gene bank, Tilapia fish, calf nursery, farm management system. This result shows that the range of agricultural innovation in Türkiye is gradually expanding. In this direction, it is seen that there is an increasing interest in metaverse within the scope of digital agriculture (Dertli & Dertli, 2023).



Innovation has been an important part of human life in every sense. Especially in agriculture, which has an important place in meeting the food needs of people, innovations are needed to increase productivity and efficiency and reduce costs. In this context, it has become a necessity to develop different methods for the best use and management of agricultural areas in Türkiye and to make innovations to meet the food needs. Therefore, it is seen that agricultural innovation practices have been increasing in recent years with the COVID-19 global pandemic process. Agricultural innovation is important for the better transfer of agriculture to future generations and the sustainability of agriculture. Realization of agricultural innovations is costly. For this reason, it can be said that small-scale agricultural organizations generally do not look favorably on innovation activities since they are established as a source of livelihood. However, large-scale organizations see agricultural innovations as beneficial in terms of market competition, which they have to maintain in the long term, even if it is costly. Agricultural innovations provide great benefits to producers in terms of information storage, time savings and labor. In Türkiye, agricultural innovations both reduce the costs of agricultural organizations and contribute to their struggle to survive in the market. As a result, it is thought that this study will guide agricultural organization managers on agricultural innovation and contribute to the related literature. In future studies, it is recommended to conduct a research aiming to examine the perspectives of internal and external stakeholders towards innovation practices in agriculture in Türkiye.

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