



COVID-19 The Impact of the Pandemic on Farmers' Use of the Internet for Agricultural Issues

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ABSTRACT

To assess the impact of COVID-19 on farmers' use of the internet for agricultural issues. A questionnaire was used to collect data from 188 farmers in Samsun province. For the interpretation of the collected data, a Paired Sample t-test was used using Python programming language. Significant differences were found in the number of mobile gigabytes (GB) owned by farmers, the frequency of attending online agricultural training, the frequency of visiting the websites of the Ministry of Agriculture and private companies, the frequency of searching agricultural issues on the Internet, and the frequency of checking product and input prices on the Internet compared to before the COVID-19 pandemic. On the other hand, there is no significant difference in the frequency of using the Digital Agricultural Market (ditap.gov.tr) website, conducting marketing research on the internet and e-commerce compared to before the COVID-19 pandemic. The study results suggest that challenging crises such as COVID-19 can accelerate farmers' adoption of innovations. The study helps to understand the impacts of crises such as COVID-19 on the diffusion of information. Understanding these changes can be useful for policymakers and sector leaders to develop strategies to support farmers and ensure the continued success of the agricultural sector during and after the pandemic.

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KOVID-19 Salgınlarının Çiftçilerin Tarımsal Konularda İnternet Kullanımı Üzerindeki Etkisi

ÖZET

KOVID-19'un çiftçilerin tarımsal konularda internet kullanımı üzerindeki etkisini değerlendirmektir. Samsun ilindeki 188 çiftçiden veri toplamak için bir anket kullanılmıştır. Toplanan verilerin anlamlandırılması için Python programlama dili kullanılarak İlişkili Örneklem t Testi'nden yararlanılmıştır. Çiftçilerin sahip olduğu mobil gigabayt (GB) miktarı, çevrimiçi tarımsal eğitimlere katılma sıklığı, Tarım Bakanlığı ve özel şirketlerin web sitelerini ziyaret etme sıklığı, internette tarımsal konularda arama yapma sıklığı, internette ürün ve girdi fiyatlarını kontrol etme sıklıklarında KOVID-19 pandemisi öncesine göre anlamlı farklılıklar tespit edilmiştir. Öte yandan, Dijital Tarım Marketi (ditap.gov.tr) web sitesini kullanma sıklığı, internette pazarlama araştırması yapma ve e-ticaret yapma sıklıklarında KOVID-19 pandemisi öncesine göre anlamlı bir fark bulunmamaktadır. Çalışma sonuçları, COVID-19 gibi zorlu krizlerin çiftçilerin yenilikleri benimsemesini hızlandırabileceğini ortaya koymaktadır. Çalışma, KOVID-19 gibi krizlerin bilginin yayılımı üzerindeki etkilerinin anlaşılmasına yardımcı olmaktadır. Bu değişikliklerin anlaşılması, politika yapımcıların ve sektör liderlerinin çiftçileri desteklemek ve tarım sektörünün pandemi sırasında ve sonrasında başarısını sürdürmesini sağlamak için stratejiler geliştirmeleri açısından faydalı olabilir.

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INTRODUCTION

The COVID-19 pandemic has deeply affected the society in almost every aspect (Bostan et al., 2020; Lone & Ahmad, 2020; Phelps & Sperry, 2020; Talevi et al., 2020; Suryasa et al., 2021) and severely affected the agricultural sector (Arumugam & Kanagavalli, 2020; Dev, 2020; Gray, 2020; Siche, 2020; Beckman & Countryman, 2021; Demiryürek et al., 2021). While the COVID-19 pandemic has deeply shaken the agricultural sector, it has also drastically changed the social lives of farmers. It is thought that farmers' use of the Internet for agricultural issues may be among these changes.

The Internet has long been used as a valuable and useful tool for farmers (Just & Just, 2001; Rolfe et al., 2003; Yurtlu et al., 2012; Fernando et al., 2016; Alao et al., 2021). Using the Internet, farmers can better manage the agricultural production process with decision support applications in agricultural production (Rose et al., 2016; Demir et al., 2021), learn weather forecasts in detail (Ray, 2017), access information on market prices more easily (Kızılaslan & Gönültaş, 2011), and share information faster (Yan et al., 2016). Internet use in agriculture also enables farmers to better communicate with other farmers and experts in the field.

It is a fact seen in the literature that the problems experienced by farmers in accessing the internet are not common and that they generally have access to the Internet (Just and Just, 2001; Panda et al., 2019; Derya & Demiryurek, 2020). However, the same literature review on farmers' use of the Internet for agricultural purposes shows that farmers' use of the Internet for agricultural purposes is not common enough (Smith et al., 2004; Erdal & Çallı, 2013). It is also known that with the COVID-19 pandemic, social life has been greatly restricted worldwide, and accordingly, the frequency of people's internet use has increased. (Branscombe, 2020; Pandey & Pal, 2020; Sun et al., 2020; Huang et al., 2021). It is also in the literature that farmers use digital communication tools (Erjavec et al. 2021) and the Internet more frequently for sales (Godrich et al., 2022).

In the literature searches, no study was found to examine the effects of the COVID-19 pandemic on farmers' use of the internet for agricultural issues. Therefore, this study aims to fill this gap in the literature.

The main objective of this study is to reveal the impact of COVID-19 on farmers' use of the internet for agricultural issues. In this context, the main hypothesis of the study is that the COVID-19 pandemic has a significant impact on farmers' use of the Internet

for agricultural issues. In addition, this study will also help to understand the impact of crises such as COVID-19 on the diffusion of information in rural areas.

METHODOLOGY

The main material of the study consists of primary data obtained from the survey conducted with farmers (face-to-face, online, or both) in Samsun province. In Samsun province, 188 farmers were interviewed. Districts that can reflect Samsun province were selected for the purpose. While selecting the districts for the purpose, time, personnel, budget constraints as well as the vital threat posed by the COVID-19 pandemic and the bans imposed due to COVID-19 disease were taken into consideration. In this context, the survey was completed with a total of 188 farmers, 81 (43.1%) in Bafra, 52 (27.6%) in Çarşamba, 29 (15.4%) in Tekkeköy, 15 (8%) in Alaçam, 10 (5.3%) in Terme and 1 (0.5%) in Atakum.

Statistical Analysis

To test the difference in the internet usage status of farmers before and after the COVID-19 outbreak, a Paired Sample t-test was conducted through the SPSS Program.

To determine the level of internet use of farmers before and after the COVID-19 pandemic, 13 statements were asked of farmers. Farmers were asked to answer each statement as Disagree=1, Neutral=2, or Agree=3. Farmers could score at least 1 and at most 3 points for each statement. The score for each statement was summed and a score was created for internet use in the agricultural sector. The scores were averaged and a Paired Sample t-test was applied.

Limits and Permissions

Researchers faced many travel restrictions during the data collection period, such as curfews or bans on travel by private vehicle. In addition, several bans were also imposed on farmers, the target audience for data collection, but the government was more flexible towards farmers.

As the impact of the COVID-19 pandemic intensified, the Ministry of Health required all researchers to obtain permission to study COVID-19. According to this requirement, since the thesis topic involved COVID-19, an application was submitted to the Ministry of Health and the necessary permits were obtained for all researchers.

Apart from the official bans, the lethal risks of the disease prevented farmers and researchers from meeting from time to time and shortened the duration

of the research. Despite all these limitations, the study was completed.

Findings

This section presents the results of the analysis of the data collected to answer the research questions and test the hypotheses. Analyses were conducted following the methodological approach of the study. The findings are explained and interpreted.

When the socio-demographic characteristics of the farmers participating in the study are analyzed in Table 1, it is seen that 89.9% of the farmers are male. 17.6% of farmers did not continue their education after primary school. 51.6% of farmers consider the farming profession profitable.

The average age of the 188 farmers participating in the

study is 49.77 years. The youngest farmer is 25 years old and the oldest farmer is 75 years old. It was determined that farmers had an average of 21.62 years of agricultural experience. The farmer with the highest agricultural experience is 60 years, while there are also farmers with no experience. Looking at the land assets of the farmers participating in the research; it is seen that the average land owned by the farmers is 69.83 decares and the largest is 4000 decares. The average amount of internet used by the farmers on their smartphones is found to be 9.02 GB per month. When the internet use of farmers before and after the COVID-19 pandemic was analyzed, significant differences were observed in some transactions performed by farmers. Related findings are presented in Table 3.

Table 1. Descriptive of farmers

Çizelge. Tanımlayıcı bilgiler

Descriptive Statistics	Frequency	Percent
Gender		
Female	19	10.1
Male	169	89.9
Education Level		
Primary School	99	17.6
Middle School	15	2.7
High School	47	8.3
University	27	4.8
Finding a Farming Profession Profitable		
Finds it's Profitable	91	48.4
Not Profitable	97	51.6

Table 2. Age, experience, lands, and mobil gb of farmers

Çizelge 2. Çiftçilerin yaşı, deneyimi, arazileri ve mobil internet kullanımı

	Minimum	Maximum	Mean	Standard Deviation
Age	25	75	49.77	11.358
Agricultural Experience (years)	0	60	21.62	10.452
Land Assets in Ownership	0	4000	69.83	317.926
Amount of Mobile Internet Owned (GB)	0	35	9.02	4.966

As can be seen in Table 3, there have been differences in some transactions of farmers after the COVID-19 pandemic. According to these results, the amount of mobile GB in farmers' smartphones, the frequency of farmers' participation in online agricultural training, the frequency of farmers' banking transactions over the internet, the frequency of farmers' researching the problems they experience during agricultural production over the internet, the frequency of farmers' visiting the websites of companies and unions in the agricultural sector, the frequency of farmers' visiting the website of the Ministry of Agriculture and Forestry, the frequency of farmers' checking product and input prices over the internet increased compared to before the COVID-19 pandemic and these increases were found to be statistically significant.

The first expression which states that there is a significant difference in the amount of mobile GB in farmers' smartphones compared to before the COVID-19 pandemic, is accepted ($t=-13.521$, $p<0.001$). There is an average increase of 2.58 GB in the amount of mobile GB that farmers have on their smartphones. When the literature is examined, there are studies with similar findings (Demiryurek et al., 2021). It is seen that the internet use of farmers has increased with the COVID-19 pandemic.

It is seen that there is no significant change in the frequency with which farmers perform Digital Agricultural Market (ditap.gov.tr) transactions ($t=-1.640$, $p>0.05$). A similar result was found in a study conducted across Türkiye (Demiryurek et al., 2021).

Table 3. Impact of covid-19 on farmers internet use

Çizelge 3. Covid-19'un çiftçilerin internet kullanımını üzerindeki etkisi

Expression	Mean ± SD Before the Pandemic	Mean ± SD After Pandemic	Mean Difference ± ss	t	p
Mobile Internet (GB)	6.44±4.17 GB	9.02±5.49 GB	-2.58±2.6	-13.521	.000*
Digital Agriculture Market (ditap.gov.tr) density of use	1.03±0.19	1.05±0.25	-0.02±0.17	-1.640	.103
The frequency with which farmers search for new markets to sell their agricultural products	1.06±0.32	1.08±0.35	-0.22±0.46	-1.345	.180
Frequency of farmers' participation in online agricultural education	1.08±0.35	1.16±0.49	-0.08±0.34	-3.204	.002*
Frequency of farmers' online banking transactions	1.79±0.88	1.88±0.92	-0.08±0.56	-2.084	.039*
Frequency of farmers researching on the internet to solve the problems they encounter during agricultural production	1.24±0.61	1.39±0.74	-0.14±0.52	-3.879	.000*
Frequency of farmers visiting the websites of companies and unions in the agriculture sector	1.25±0.51	1.48±0.71	-0.23±0.52	-6.103	.000*
Frequency of farmers' visits to the website of the Ministry of Agriculture and Forestry	1.32±0.54	1.55±0.72	-0.22±0.46	-6.573	.000*
Farmers selling agricultural products on the internet	1.07±0.31	1.12±0.39	-0.04±0.30	-1.899	.059
Frequency of farmers checking the prices of agricultural products they can sell on the internet	1.51±0.64	1.85±0.79	-0.34±0.50	-9.193	.000*
The frequency with which farmers check the prices of inputs required for agricultural production online	1.55±0.62	1.84±0.77	-0.28±0.52	-7.579	.000*
The frequency with which farmers conduct research about irrigation on the internet	1.15±0.47	1.19±0.52	-0.03±0.36	-1.404	.162
Frequency of farmers obtaining information about the marketing of agricultural products they can sell from the internet	1.14±0.45	1.19±0.51	-0.04±0.37	-1.741	.083

It is seen that farmers are slightly more likely to attend online information meetings on agricultural issues than before the COVID-19 pandemic (t=-3.204, p<0.05). However, it is seen that this significant increase is one of the least changed transactions when

the difference between the other transactions is analyzed. In a study conducted in the literature, it is stated that farmers' participation in agricultural information meetings organized online has increased, but there is still no change in the majority of them (Demiryurek et al., 2021).

Table 4. Test of main hypothesis

Çizelge 4. Ana hipotezin test edilmesi

Hypothesis	Mean ± SD Before the Pandemic	Mean ± SD After Pandemic	Mean Difference ± SD	t	p
There is a significant increase in farmers' use of the Internet for agricultural issues compared to before the COVID-19 pandemic.	15.21±4.09	16.77±5.16	1.56±2.37	-9.014	.000*

A new score was calculated from the sum of the statements in Table 3 and farmers' use of the Internet for agricultural issues was analyzed. In this case, a statistically significant increase is observed and the main hypothesis is accepted ($t=9.014$, $p<0.001$). It can be said that the COVID-19 pandemic may have had an impact on farmers' use of the internet and its use in agricultural issues.

A review of the literature shows similar results to the findings of the study. A study conducted in Slovenia found that farmers use digital communication tools more frequently (Erjavec et al., 2021). In another study conducted in Costa Rica, it was determined that farmers increased web-based sales with the effect of COVID-19 (Godrich et al., 2022).

CONCLUSIONS and RECOMMENDATIONS

The COVID-19 pandemic may have had a significant impact on farmers' use of the internet for agricultural issues. The pandemic, together with factors such as social distancing and mobility restrictions, may have led farmers to turn more to digital platforms for information access and marketing strategies. In particular, issues such as marketing of agricultural products, exchange of information on agricultural techniques, weather forecasts, and agricultural policies have become easier and faster to follow online. This may have increased the importance of the Internet as a source of information for agricultural activities in rural areas. For example, online agricultural seminars, web-based training programs, and social media groups can help farmers become more aware of agricultural issues.

The findings of this study, in addition to the studies in the literature, showing a higher behavioral intention to adopt technology when individuals are ready for technology (Lin & Hsieh, 2007; Yap et al., 2023), show that individuals can adopt technology even if they are not ready for the technology. The findings suggest that knowledge diffusion may accelerate in the agricultural sector, affected by crises.

It is a matter of curiosity what will happen to the information diffusion that accelerated in the agricultural sector as a result of the COVID-19 crisis once the effects of the COVID-19 crisis subside. It is the authors' recommendation to conduct a study on this issue.

Researchers' Contribution Rate Declaration

The authors declare that they have contributed equally to the article.

Conflict of Interest Statement

The authors declare that there is no conflict of interest between them.

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