Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

Smallholder's Readiness to Adopt Platforms Linking Local Resource-Sharing in Egypt

Congduc Pham[1],Tamer Gamal Ibrahim Mansour[2]*, Hayat Lionboui[3], Zakaria Fouad Fawzy[4], Souad A. Shairra[5], Nahla A. Awad[6], Seham Mohamed Abd El Hameed El-Gamal[7]

Abstract

Digital technology in developing countries improves agriculture with knowledge and experience. Digital platforms can link local resource-sharing networks to connect agricultural sectors, especially in emergencies. Hence, this paper assessed smallholders' readiness to adopt platforms facilitating local link resource-sharing in Egypt. This was achieved by assessing the existing options for resource sharing and identifying the factors that influence this sharing, evaluating the respondents' understanding of information and communication technology (ICT) identifying their sources of information about these tools, and determining the reasons behind the respondents' use of digital platforms. A structured questionnaire was administered to 128 selected farmers from Beni Suef Governorate in Egypt. The results showed that work (65.5%) and agricultural operations (irrigation-fertilization-harvesting) (62.5%) were the most important present possibilities for sharing resources. As were their agricultural uses, ICTs and the Internet of Things (IoT) were unfamiliar to 53.88% of respondents. Using information digital platforms in agriculture was crucial for finding new markets (84.4%), increasing productivity (81.25%), and increasing profitability (78.13%). at the same time, 81.25% of respondents cited a lack of awareness about new digital application technologies as a major barrier to embracing digital platforms in agriculture. Thus, the study recommends the importance of moving forward toward establishing the RESILIENCE platform with farmers and considering their participation at every project stage

Keywords: *Smallholder, Adoption, Digital Platform, Local Resource-Sharing.*

Introduction

[1] Universite de Pau et des Pays de l'Adour, E2S UPPA, LIUPPA, EA 3000, Pau, France; congduc.pham@univ-pau.fr.

[2] Department of Agricultural Economic, Agricultural and Biological Research Institute, National Research Centre, Dokki, Giza, Egypt; tj.mansour@nrc.sci.eg. https://orcid.org/my-orcid?orcid=0000-0002-8244-0119

[3] National Institute of Agricultural Research, Department of Rural Economy and Sociology, Rabat, Morocco; lionbouihayat@gmail.com.

[4] Vegetable Research Department, Agricultural and Biological Research Institute, National Research Center, Dokki, Giza, Egypt, Email: zakaria6eg@gmail.com.

[5] Biological Control Department, PPRI, ARC, Giza12619, Egypt; s_shairra_egy@yahoo.com

[6] Fruits Breeding Department , HRI, ARC, Giza12619, Egypt; nohawad@yahoo.com

[7] Medicinal and Aromatic Plants Research Department, HRI, ARC, Giza12619, Egypt, Email: s_elgamal99@yahoo.com, https://orcid.org/0000-0002-5954-3478

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

The 2020 Sustainable Development Goals Report reveals insufficient global progress towards achieving these goals. Moreover, the COVID-19 pandemic has exacerbated issues such as hunger and poverty. Hence, empirical evidence supports the importance of vertical and horizontal agricultural expansion in support of economic development and poverty reduction (World Bank, 2008; United Nations, 2020). In this context, the agricultural sector in developing countries faces multiple challenges, such as the decrease in the number of extension agents for farmers, limited access to information, markets, and financial services, and insufficient skills and capabilities (Food and Agriculture Organization, 2017). In Egypt, the agricultural sector constitutes 11.7% of the gross domestic product. It represents 4.6% of the country's total exports, 6.5% of its imports, and provides job opportunities for about 14.5% of the workforce. According Breisinger et al. (2019), The worldwide agricultural sector is currently experiencing heightened vulnerability due to the impacts of climate change and disease outbreaks. Consequently, the primary objective of agricultural extension and advisory services is to tackle the aforementioned difficulties effectively through various endeavors (World Bank, 2015). In the initial stages of extension work, agricultural extension programs were initiated to disseminate fundamental knowledge, such as agricultural technology, to farmers and individuals residing in rural areas across developed and developing nations (Danso et al., 2018).

The International Food Policy Research Institute highlights the significant role of Extension services in enhancing rural communities' well-being by promoting livelihoods, food security, productivity expansion, and agricultural development (IFPRI, 2020). However, the advisory services implemented a hierarchical methodology in which agricultural extension was administered linearly, compelling farmers or other recipients of extension services to adopt or utilize the technology that was offered to them without real participation. Evenson and Mwabu (2001) highlighted the lack of a clear methodology for evaluating extension outcomes and their impact on human capacity development, highlighting the limitations of traditional extension strategies. This hindered their ability to effectively address issues and enhance farmers' access to information, markets, and financing. According to the study conducted by Kilelu et al. (2011). Digital agricultural extension has the potential to facilitate a departure from the recurring cycle of low productivity, susceptibility, and impoverishment, particularly among small-scale farmers (Davis and Franzel, 2018).

The COVID-19 pandemic has prompted farmers, particularly in poor nations, to rely increasingly on digital agricultural advisory services due to the absence of in-person extension counseling (GSMA, 2022). Digitalization initiatives of agricultural extension services are now feasible with mobile phones, landlines, computers, and technologies based on the World Wide Web. (Aker et al., 2016) With the increasingly increasing penetration of smartphones and mobile networks in low- and middle-income countries, new opportunities have become available to tackle such challenges by implementing digital extension tools.(Fabregas et al., 2019; GSMA Intelligence, 2021) As such, digital technologies allow farmers to increase their potential through connecting them with the people who are potential customers or those who sell them their produce and even through marketing. Aker et al. (2016) added that farmers borrowed digital financial services among them loans in their efforts to expand their farming. As such, digital technologies become instrumental in enhancing the effectiveness of extension services through minimizing outreach costs and customizing information to the needs and circumstances of farmers. In their view, Rajkhowa and Qaim (2021) stress that the infusion of the EAS with digital farming tools is central to boosting information services offered to the farmers. (Ayre et al., 2019)

However, in this context, it is essential to recognize the continued significance of extension agents, as argued by Fuchs et al. (2016), who are against the notion of replacing extension agents with ICT tools. This is on the basis that information and communication technology tools should be used in conjunction with, rather than as a replacement for, traditional agricultural extension services. This justifies that Mobile phones are essential for small-scale agricultural producers to access information. Traditional extension services fail to meet the needs of the subsector because there is a comparative gap between extension officers and farmers. For instance, Uganda has a 1:2500 ratio of extension agents to farmers, which is way above the 1:400 ratio recommended by FAO in 2011.

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

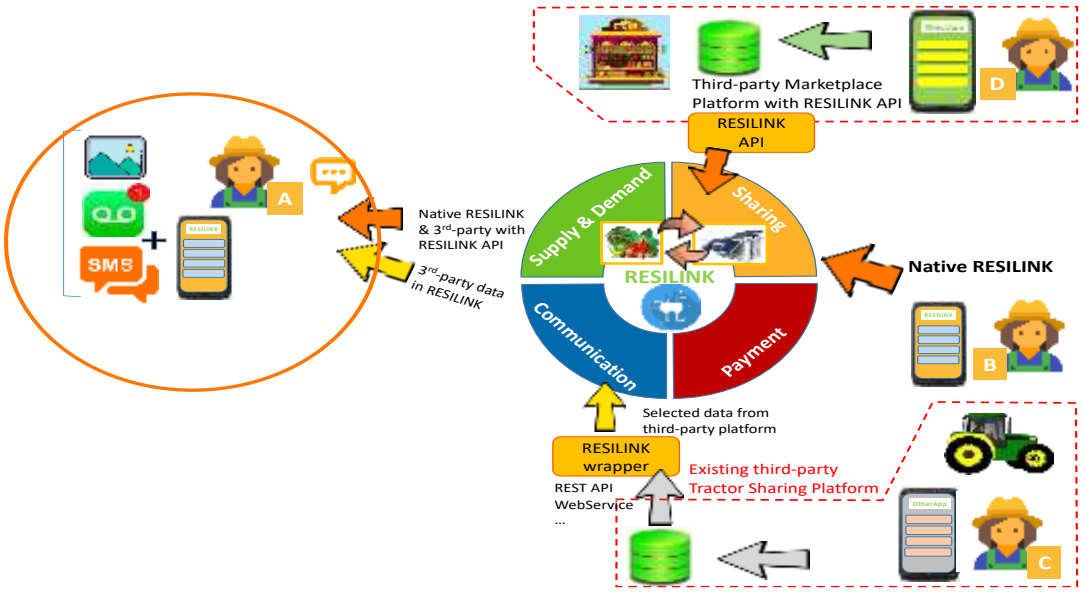
Indeed, a study by Ongachi et al., (2017), conducted in India found that an impressive number of extension workers contribute to the discharge of advisory services to farmers. However, this ratio can go up to 1:2000 in some states, making delivering such timely and quality service very difficult for those living in rural regions. (Rupavatharam et al., 2017).

In Egypt, the situation is not much different as the ratio is 1:2450, with about 2000 agricultural extension agents serving 4.9 million holders, according to Kurdyś-Kujawska et al. (2021) who reported that digital agricultural extension emerges as a viable and efficient solution. It enables farmers to obtain practical knowledge. In this context, Ferry et al. (2020) emphasizes the importance of digital technology in enhancing communication and information accessibility, especially during crises and emergencies. This is especially beneficial for farmers who often face resource constraints and insufficient access to extension staff. This integration enables the agricultural technical support hotlines to communicate with the farmers and reach the agro-extension with market-related information, such as the location and prices served. (Danso-Abbeam et al., 2018). To fully realize this potential, it is necessary to understand the socio-economic acceptability of mobile-based agricultural applications. This will promote more efficient, sustainable, and equitable farming. This paper thus discusses the possibilities of strengthening farmers' resilience by enabling access to resources and markets during crises through multiple platforms that link local resource sharing.

RESILINK Digital Platform

PRIMA funds RESILINK, a Research and Innovation Action (RIA). RESILINK is dedicated to strengthening smallholder farmers' resilience by enabling access to resources and markets during crises. RESILINK creates a distributed digital resource management platform for real-time territorial resource exchange and supply-demand matching. This platform generalizes local resource-sharing by connecting smallholders to new supply sources, sharing possibilities, and distribution channels. While integrating smallholders into markets and pooling resources is not new, RESILINK offers a platform-of-platforms that can integrate existing or future platforms into full dashboards/portfolios. This expands and improves the ecosystem and boosts long-term adoption.

Figure 1 illustrates the arrangement of the digital resource management platform in the middle, the mobile application on the left, and the API & software API connectors/wrappers that facilitate connections with other third-party digital platforms at the top and bottom.



Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

Figure 1. Sketches The Overall Proposed Framework with Following RESILINK Components

At the bottom of the figure, RESILINK wrapper components will enable resources from existing digital platforms – e.g., the mobile application used by user C – to be discovered and integrated into RESILINK. At the top of the figure, the open API provided by RESILINK enables the creation of novel digital sharing platforms that can seamlessly integrate with the RESILINK digital resource management platform. This integration allows these platforms to take advantage of the RESILINK community, which is accessed through the mobile application used by user D.

Statement of the Problem

The contemporary agricultural landscape in Egypt stands at a pivotal juncture with the potential integration of digital tools and platforms, crucial for enhancing the productivity and resilience of smallholder farmers." The onset of the COVID-19 pandemic has catalyzed the adoption of digitalization in agriculture, underscoring its significance in transforming agricultural practices and market accessibility. Digital tools have been shown to increase crop yields and improve information access, yet the disparity in digital readiness among socio-economic groups and the fragmented nature of digital initiatives present notable challenges (Rawlinson.2023; Zou & Cheshmehzangi, 2022).

In response, Egypt's farming community is actively preparing for a digital transformation, supported by international agencies and local startups developing cost-effective digital solutions. The Government's Sustainable Agriculture Development Strategy 2030 aims to make Egypt's agriculture sector internationally competitive and enhance domestic food security (Rawlinson, 2023; (Unlocking Digital Potential: UNDP's Support to Egypt's Digital Transformation, n.d.) Yet, the Ministry of Agriculture and Land Reclamation in Egypt faces hurdles in integrating these digital tools into the national agriculture systems, particularly due to crop specificity and the limited functionality of existing digital solutions (IFPRI, 2023).

Moreover, The Food and Agriculture Organization (FAO) is implementing digital agriculture models in Egypt to enhance the effectiveness of extension services. These efforts aim to introduce high-quality digital content for rural advisory services, focusing on improving local institutional and technical capacities (FAO, 2023). However, despite these efforts, the extent to which smallholder farmers can effectively utilize these digital tools remains uncertain. Challenges include limited capacity and investment in local IT sectors, fragmented and poorly coordinated value chains, and high levels of crop, country, and context specificity, which limit the efficacy of generic digital solutions (IFPRI, 2023).

This evolving scenario poses the question: "How can digital agriculture initiatives in Egypt be effectively tailored to the unique needs and constraints of smallholder farmers, ensuring their meaningful participation and benefit from the digital transformation in agriculture?

In light of the lack of studies that have addressed this problem in the Egyptian context, this study attempts to answer this question by seeking to understand the obstacles and possibilities that may arise when using digital platforms. and identify farmers' motivations for participating in such platforms, as well as the constraints associated with participation. This study aims to fill this knowledge gap by addressing the following research questions:

What are the socio-economic variables of the respondents?

What are current resource-sharing alternatives and factors influencing this sharing?

What is the extent of respondent's knowledge about ICT and their sources of information about these tools

What are the respondents' motives for using digital platforms in agriculture

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

What are the respondents' most important problems during crises in the study area and their proposals to solve them?

By responding to these inquiries, the funding body determines the prerequisites essential for constructing the agricultural platform in collaboration with the producers residing in the research region.

The Study Objectives

The main objective of the following study is Assessing smallholders' readiness to adopt platforms linking local resource-sharing in Egypt.

Sub-objectives

- Evaluate the smallholders' socioeconomic factors and their readiness for platform adoption.
- Identify and assess existing local resource-sharing options for potential integration into digital platforms.
- Determine smallholders' familiarity with ICT and their information sources.
- Investigate motivations for digital platform usage and barriers to adoption.
- Identify crisis-related challenges faced by smallholders and potential solutions through local resource-sharing platforms.

The Study Significance

This study assessing smallholder farmers' readiness to adopt digital platforms for local resource-sharing in Egypt is highly significant for the following reasons:

Support Digital Transformation in Agriculture

The study provides critical insights to guide the development of farmer-centric digital platforms that can effectively meet the needs and constraints of smallholder farmers. This will support Egypt's digital transformation in agriculture, a key priority under the 2030 Sustainable Agriculture Development Strategy.

Strengthens Agricultural Extension Services

Integrating digital advisory services into conventional agricultural extension systems can compensate for shortages of extension workers and improve farmers' access to information, resources, and markets, especially during crises.

Advance Preparedness and Resilience

Understanding farmer perceptions, barriers, and motivations related to digital platform adoption allows for boosting preparedness and resilience during emergencies like disease outbreaks or climate shocks. This directly serves development goals.

Contribution to Scientific Knowledge

The research enriches the limited scientific literature on the socio-economic aspects of digital agriculture in the Egyptian context. It provides a baseline for further studies on technology adoption and its impact on smallholder farmers.

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

Practical Advocacy for Stakeholders

Results provide evidence-based advocacy for policymakers, development partners, the private sector, NGOs, and farmers to advance digital solutions in agriculture and improve local resource management. This can guide investments and capacity building.

Methodology

This study uses the descriptive research strategy, one of the most popular methods for studying human and societal phenomena. It involves defining a phenomenon, identifying it, finding its causes and determinants, and drawing generalizations based on a study strategy (Mubarak, 2006).

Study Area

This research was conducted in Beni Suef Governorate, one of the leading governorates in medicinal and aromatic plant cultivation and the governorate targeted by PRIMA's project to increase smallholder resilience through multiple platforms linking local resource sharing. Beni Suef Governorate, North Upper Egypt. It is located south of Greater Cairo in the Nile Valley. Beni Suef is capital. The governorate covers 10,954 km2. Six governorates surround Beni Suef. It borders Giza Governorate, specifically Helwan, to the north Suez Governorate borders its northeast. Easternly, it borders the Red Sea Governorate. The western boundary is Fayoum Governorate (Fayoum, Beni Suef, Minya). Its focal location formed a geographical proximity factor to many governorates of Egypt, which achieved high accessibility at the level of the governorates of the republic.

Geographically, the governorate lies near Cairo and Giza. This prime location boosts governorate product marketing. Due to its unique blend of agricultural and desert traits, the province is important for growing fruits, vegetables, and aromatic flora. The governorate has 265,000 feddan of arable land, 12% of its total area. Beni Suef Governorate has 2.866784 million people, with 76.5% living in rural areas. Eight administrative districts, eight cities, 39 local government units, and 222 associated villages make up the governorate. Al Wasta, Beni Suef, Bush, Ihnasia, Biba, Samasta, Al Fashn, and New Beni Suef are governorate districts (Figure 2).

Figure 2. Beni Suef Governorate

Source: http://www.benisuef.gov.eg/Default.aspx

Differences in Farmers' Perception

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

Studying differences in farmers' perceptions is challenging due to the influence of several factors. These include the context of individual farms, how farmers perceive opportunities, personal characteristics of the farmer, the triggering phase (internal or external), dominant paradigms, and path dependencies. Generally, patterns begin with a trigger resulting from internal or external development, progressing to the strategic decision-making by the farmer (figure 4).

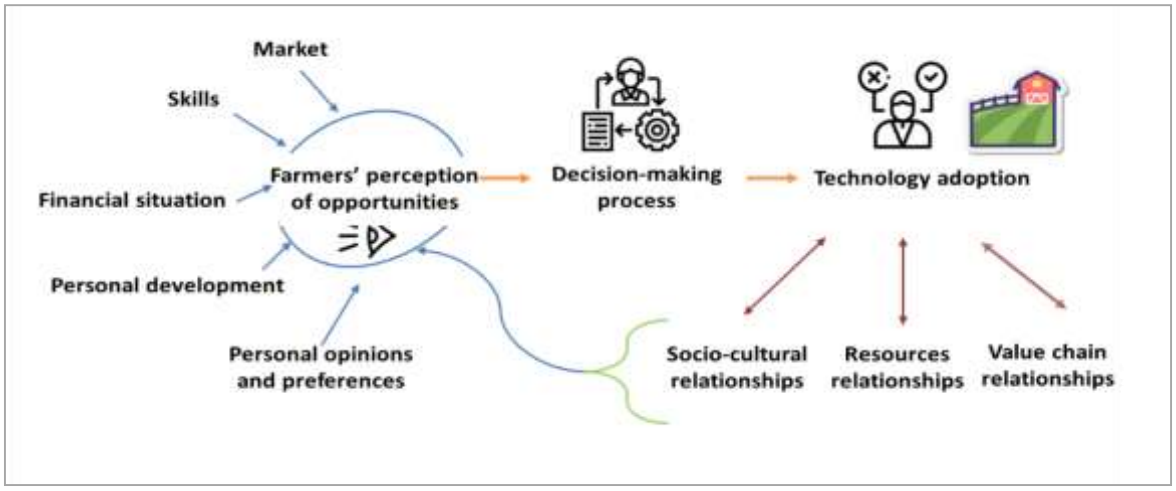


Figure 3. Sources Of Differences in Farmers' Perception (Depending on Encountered Cases)

It is noteworthy that farmers' perceptions of opportunities play a more decisive role in the decision-making process than formal analyses. Therefore, a comprehensive understanding of how business owners perceive opportunities is crucial as it directly impacts the decision-making process.

Study Population

A random sample was selected from all farmers in the village of Tawa in the Biba district of Beni Suef Governorate, consisting of 128 farmers, representing 10% of the total number of holders in the village.

Data Collection and Analysis

To determine farmers' acceptability of resource sharing, this study examined the determinants of adopting the new solutions proposed by the RESILINK project, using field data from January to April 2023 and a personal interview questionnaire. The questionnaire had six parts: the first detailed farmers' personal and social data and the second provided resource-sharing options. The third portion covered respondents' ICT knowledge and sources of information. The fourth part was designed to measure smallholders' readiness to adopt platforms linking local resource-sharing. The fifth section covered their reasons for using digital platforms in agriculture and digital technology barriers and finally, farmers' crises and perspectives to overcome agricultural emergency crises were examined. Focus group discussions (FGDs) were also held for the participants.

To conduct a study on the socio-economic acceptability of digital applications in agriculture, various methods can be used. These methods aim to assess farmers' perceptions, attitudes, and behaviors towards these applications, as well as their potential socio-economic impacts. In this study, using SPSS 22, descriptive statistics like percentages, mean, standard deviation and frequency distribution were used to categorize and describe variables.

Study Scopes & Limitations

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

- Objective Scope: Assessing smallholder farmers' readiness to adopt digital platforms for local resource-sharing in Egypt.
- Time Scope: Data collected from January to April 2023
- Spatial Scope: Study conducted in village of Tawa, Biba district of Beni Suef Governorate, Egypt
- Human Scope: smallholder farmers selected randomly from the same study village.

Results and Discussions

Characteristics of the Study Sample

One of the biggest demographic factors determining respondents' technology knowledge and use is age (Schiffman, 1991). Table (1) shows that 37.5% of respondents are 35-50 years old, with an average age of 44.9 years. The results also showed that 65.6% of respondents have an intermediate qualification and that the illiteracy rate is under 10%. Males made up 68.8% of the respondents, which may indicate that men in rural communities possess most agricultural properties, whereas women's fathers or husbands own them. The rural community's cohesion and value of marriage were also shown by the fact that most responders were married (Table 1). Most of respondents (62.5%) worked in agriculture permanently, while 37.5% worked seasonally. 53.1% of respondents said only one member of their family works in agriculture, usually the father, while 25% said only two people do; this may be due to the dwarfism of their areas, as 46.9% said they own less than feddan. Clearly, there is no general definition of smallholders or a scale criterion. Farms with fewer than 2 hectares are considered small. The classification ignores the significant differences in land size distribution across countries due to agroecological characteristics, historical and contemporary economic and social conditions, and farming technology (HLPE, 2013).

Since 70% of farmer's landlords possess less than a feddan, contemporary technology is difficult to implement. Table 1 shows that 51% of respondents had over twenty years of agricultural experience and the majority owned the land they farmed. However, 93.8% of respondents farm traditionally. Most respondents had negative attitudes toward agricultural extension, and 50% had positive attitudes toward employing digital applications in agriculture. According to the FAO (2011) report, small-scale farmers struggle to get loans, physical assets, and suitable machinery. Despite their minimal education and formal skills, they usually have a lot of knowledge and experience. Women devote a lot of time to agriculture, according to the FAO (2011), in contrast, women are underpaid for their work.

Farming is smallholders' main source of income, but it's not their only source (59.4% of respondents said they had no other income out of agriculture). The majority of Smallholders (65%) earn 33%-66% of their income from agricultural operations, including seasonal labor. However, different sources help farmers diversify and mitigate risk. Other than their farms, smallholders do many jobs to have money. Furthermore, remittances from family members working in various locations can significantly support the family (FFR 2013). In this context, Table 1 shows that respondents earned 26,210 pounds per year and that agricultural output cost 40.36%. Figure 3 shows that respondents' non-farm income came from commercial operations, overseas work, pensions, allowances, and family farming.

Table 1. Distribution Of Respondents According to Their Independent Variables Studied (N = 128)

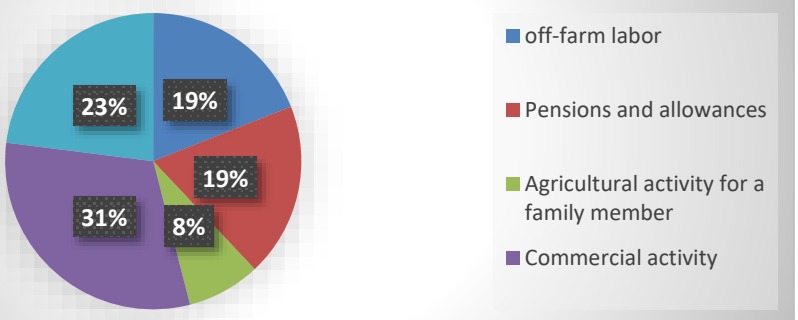
socio-economic variables	No.	%	Mean	SD	socio-economic variables	No.	%
Age (Years)					Educational level		
35-20	40	31.3	44.9	12.46	Illiterate	12	9.38
50 -35	48	37.5			Reads and writes	16	12.50
above 50	40	31.3			Secondary	84	65.62

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

					Tertiary	16	12.50
Number of family members working in agriculture					Land size (feddan)		
one person	68	53.1			<1	60	46.9
two persons	32	25.0			1-2	36	28.1
more than two persons	28	21.9			> 2	32	25
Sex					Social status		
Male	88	68.8			married	124	96.9
Femaile	40	31.3			Divorced	4	3.1
Nature of agricultural work					cultivation type		
Seasonal	48	37.5			traditional		93.8
Permanent	80	62.5			Organic farming		6.2
Agricultural experience (years)					Ownership of agricultural land		
years 10 Less than	32	25	23	13.8	Owner	68	53.1
10-20	32	25			tenant	40	31.3
years 20 More than	64	50			Owner and tenant	24	15.6
Attitude towards agricultural extension:					Income outside the farm		
N 17 egative less than degrees	60	46.9	14.8	6.81	Yes	52	40.6
degrees 22 - 17 Neutral	44	34.4			No	76	59.4
degree or more 22) positive (	24	18.8					
Attitude towards digital applications					Farm Income		
degree13 less than) Negative (	19	14.84			5000- 20,000	36	28.13
18-13) Neutral degree	45	35.16	17.7	5.8	20,000 - 35,000	72	56.25
degree or more 19) ositive P(	64	50.00			35,000 -50,000	20	62 . 15
Agricultural production cost out of total income					Family income from agricultural activity		
less than 33%	36	28.12			less than 33%	24	18.8
%66 -From 33	40	31.25	41.5	24	%66 -From 33	84	65.6
more than 66%	52	40.63			more than 66%	20	15.6

Source: filed study 2023

Figure 3: Respondent's Sources of income outside the farm



Source: filed study 2023

Current Alternatives for Sharing Resources and Factors Influencing This Sharing

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

The results presented in Table 2 indicated that the most important current resources and raw materials shared by the respondents came in the forefront of the human effort in the form of employment by 65.5%, followed by participation in agricultural operations (irrigation - fertilization - harvesting ... etc.) by 62.5%, followed by the participation of seeds and seedlings with a percentage of 56.3%. While animal fodder and land came in the last ranks with a rate of 34.6% and 32.2%, respectively. The weak sharing of resources for agricultural land is due to the dwarfism of the areas owned by farmers, as we indicated before.

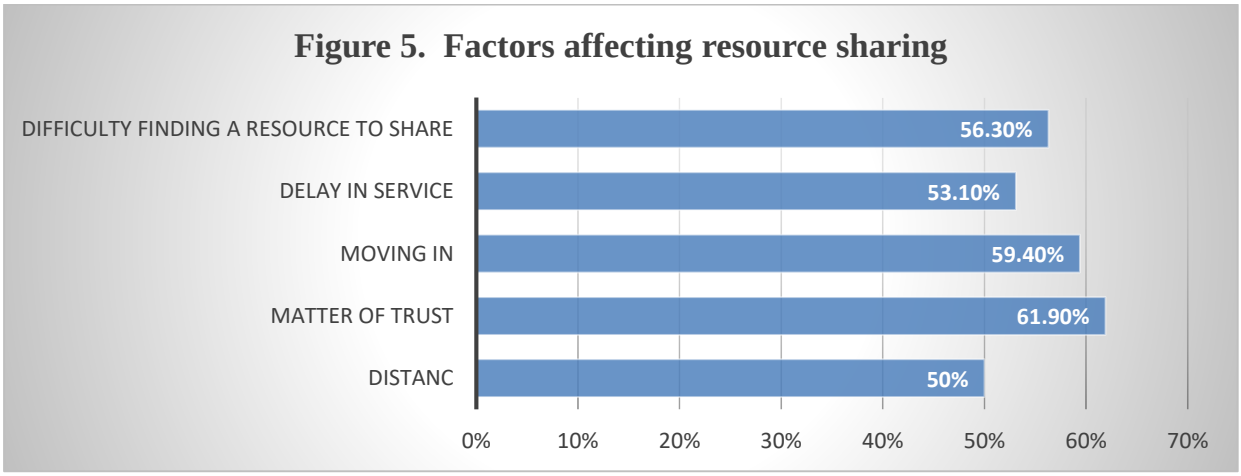
Table 2. Distribution of the Respondents According to Their Sharing of the Farm Resources (N = 128)

Resources or services that are exchanged	%	Rank
Machinery and equipment	59.4	3
Seeds and seedlings	56.3	4
Participation in agricultural operations (irrigation - fertilization - harvesting)	62.5	2
Participation in post-harvest operations (sorting-drying-transportation-storage)	41.6	5
Land	32.2	7
animal feed	34.6	6
Services (labor) without materials	65.6	1

Source: filed study 2023

Fig. 4 shows that the Trust issue was the biggest barrier to resource sharing for respondents (61.9%), which is expected as respondents won't give their resources to farmers they don't trust. Following moving (59.4%), respondents prefer to share their resources with members of the same local community, which boosts confidence, and 56.3% of farmers do not share their resources because they cannot find a suitable resource to share. Sharing resources may delay the farmer's ability to provide farm services, which makes him reluctant to share, as indicated by 53.1% of respondents, followed by nearness by 50%, as farmers prefer to share with neighbors, which is common in rural communities. Most responders (65.6%) rent from nearby farms when they lack resources or equipment. A tiny minority (22.9%) buys necessary equipment and tools. The devaluation of the Egyptian pound and the difficulty of getting imported items, whose costs have skyrocketed, are projected to lower this proportion.

Figure 5. Factors affecting resource sharing



Source: filed study 2023

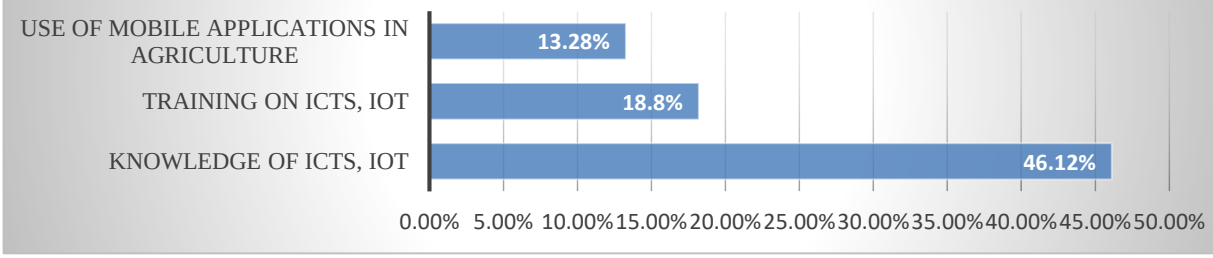
Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

Respondent's Knowledge about information and communication technology and their sources of information about these tools.

Information and communication technology tools may enhance information delivery, but their adoption is still low (Rose et al., 2016). The findings (Fig. 5) showed that only 46.12% of respondents have knowledge about concepts like ICTs, the Internet of Things (IoT), and its agricultural applications, whereas 18.8% had ICT training. At the same time, their use of these applications was very limited in the field of agriculture.

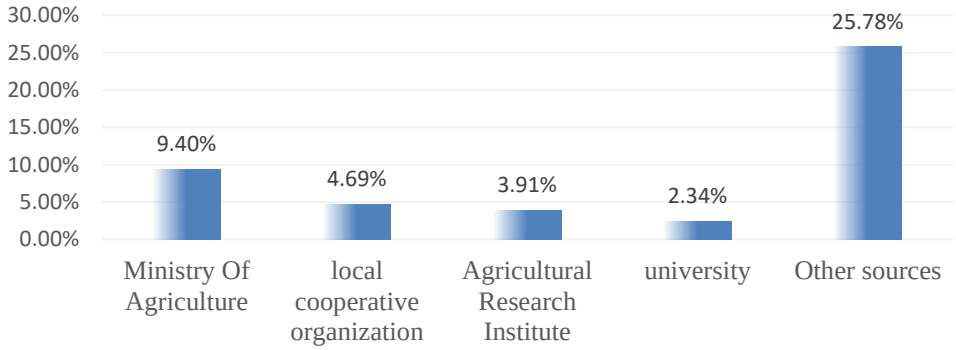
The respondents' information sources about these tools (Fig. 6) show the Ministry of Agriculture, agricultural research centres, and universities playing a limited role in training farmers and raising their awareness of these modern tools. Thus, agricultural extension should study this problem and try to fix it by providing contemporary extension services and stronger farmer relationships. Therefore, we must emphasize the need to educate farmers and provide them with the hidden benefits of information and communications technology, which may alert farmers to weather changes, natural disasters, price changes, and other concerns, as confirmed by Ali et al. (2018)

Figure 6. Frequency distribution of respondents according to their knowledge about ICT tools and training on them



Source: filed study 2023

figure 7. distribution of respondents according to their agricultural sources of information about ICT tools



Source: filed study 2023

Readiness to Adopt Platforms Linking Local Resource-Sharing in the Future

The results (Table 3) indicated that the respondents planned to share seeds and seedlings (65.5%) with farmers or other consumers in the future, followed by machinery and equipment and agricultural operations (irrigation, fertilization, harvesting). (62.5%) While post-harvest activities (sorting-drying-transportation-storage) and animal feed ranked lowest with 34.6% and 32.2%. Thus, low- and middle-income countries

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

(LMICs) like Egypt must capitalize on the growing availability of smartphones and mobile networks. This makes digital extension tools a good fit for these challenges (Fabregas et al., 2019).

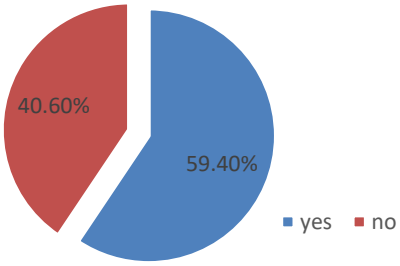
In this context, the results indicated the willingness of the vast majority of respondents to replace the traditional method of participation with a digital platform (phone application) to share resources and services (59.4%) as shown in Fig. 7. This reflects the respondents' willingness to deal with electronic platforms and that the environment is paving for the *Reselink* platform to enter into this society to take an active role contributes to sharing resources and obtaining marketing information in a timely manner.

Table 3. Distribution Of Respondents According to Shared Resources or Services in the Future (N=128)

Resources or services that can be shared in the future	%	Rank
Machinery and equipment	62.5	2
Seeds and seedlings	65.6	1
Participation in agricultural operations (irrigation - fertilization - harvesting)	62.5	2
Participation in post-harvest operations (sorting-drying-transportation-storage)	34.6	5
Land	41.6	4
animal feed	32.2	6
Services (labor) without materials	59.4	3

Source: filed study 2023

Figure (8) Readiness to replace the traditional method of participation with a digital platform (phone application) to share resources and services



Source: filed study 2023

Respondents' Motives for Adaptation Digital Platforms in Agriculture

The results indicate that the most common reasons farmers utilize information digital platforms in agriculture are to find new markets, boost productivity, and increase profitability (84.4%, 81.25%, 78.13%). While 50% said they wanted to eliminate agricultural input supply risks (fig. 8). These findings confirm Salunkhe and Deshmush (2012), who said agricultural knowledge and assistance are the most significant factors in production.

Smallholder farmers dwell on the periphery, making information and services difficult to access. We can empower the worldwide agricultural community by offering rapid, reliable, and locally relevant information. though integrating interactive platforms to spread information and connect farmers to conventional markets, especially in emergencies. Van Es and Woodard (2017) confirmed that digital agricultural extension

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

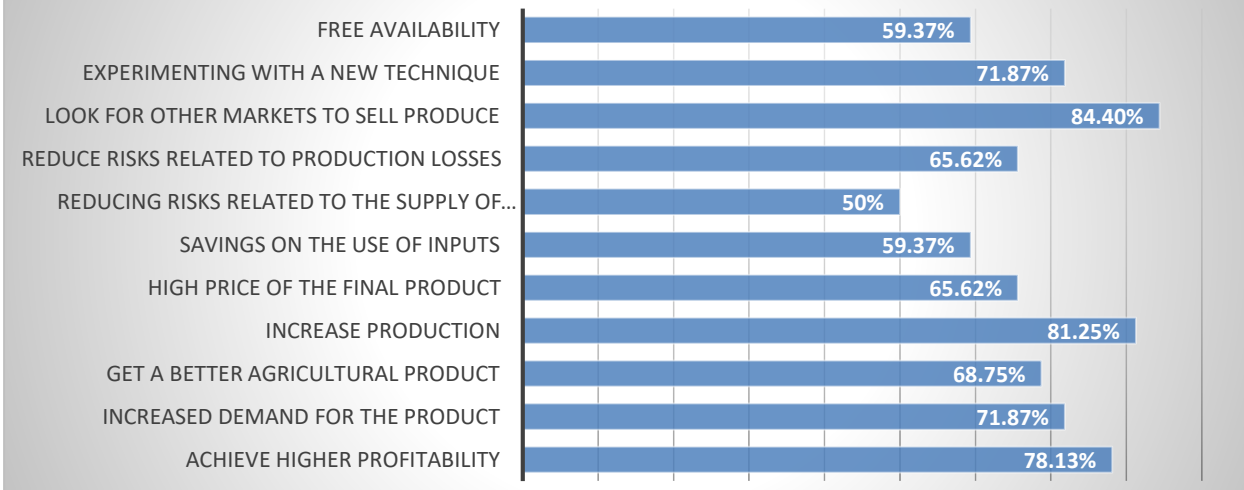
has given millions of farmers globally the best agricultural knowledge and help via mobile devices. This can be applied in Egypt using such platforms

Barriers To Adopting Digital Applications in Agriculture

The results (Table 4) showed that lack of knowledge of new digital application tools, lack of confidence in their efficacy, lack of coordination between farmers and extension workers, and lack of training are the biggest obstacles, with rates of 81.25%, 75.00%, 65.60%, and 62.50%, respectively. Poor internet service and lack of price discrimination between the market and the platform were also factors. These findings are congruent with Anyan & Frempong (2018), who found that agricultural workers and farmers are unaware of digital solutions that may help them embrace information and communication technology. Farmers and extension workers may be reluctant to accept advice offered using these technologies. As noted by Rose et al. (2016)

One of the existing challenges is the restricted accessibility and insufficient coverage of internet connection. The internet has become a crucial driver of social and economic advancement in the twenty-first century. However, globally, only 3.2 billion people have internet access, leaving approximately 4 billion people unconnected. This lack of connectivity results in a lack of awareness of available opportunities and an inability to participate in activities (GSMA, 2017).

Figure 9. Motivations for respondents' use of digital platforms in agriculture



Source: filed study 2023

Table 4. Obstacles of Respondents Concerning Adopting Digital Application (N = 128).

Barriers to digital application adoption	%	Rank
Lack of knowledge of the new tool	81.25	1
Lack of training in using digital tools	62.50	4
The new tool is not compatible with the used phone	59.37	6
Poor internet service	56.30	7
Lack of coordination between farmers and extension workers	65.60	3
Low confidence in the effectiveness of the new tool	75.00	2
It takes longer to achieve the expected result	61.80	5

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

Barriers to digital application adoption	%	Rank
Non-discrimination in prices at the platform and market level	46.9	8

Source: filed study 2023

The Problems Respondents Face During Crises

Data in Table 5 show that the most important problem facing the respondents was the decrease in the net yield from the feddan (90.6%). The lack of information on prices in foreign markets (87.5%). Moreover, 84.4% of respondents indicated that the high prices of production inputs were considered to be problems affecting the agricultural sector. Also, the poor level of extension services (81.3 %). In contrast, problems such as lack of government services provided to farmers, high labor wages for various production processes, and the spread of some pests and diseases came in the last ranks with rates of 59.37%, 53.12%, and 43.75%, respectively.

Similar problems were reported by Abebe et al. (2022) and López-Ridaura et al. (2021) who mentioned that during the COVID-19 pandemic, 74.8% of respondents experienced significant disruptions in agricultural supplies, including inorganic fertilizers, herbicides, and insecticides. This may lead to reduced production and a shortage of workers due to partial lockdowns and limited public mobility. This resulted in a decrease in farmers expected monthly earnings, affecting their ability to engage in agricultural operations.

Table 5. Respondent's Problems During Crises (Corona as An Example) (N = 128).

Problems	%	Rank
Low net yield per acre.	90.6	1
Increased prices of production inputs.	84.4	3
Increasing labor wages for various production processes.	53.12	7
Poor level of extension services.	81.3	4
Absence of a contract farming system	65.62	5
Lack of government services provided to farmers	59.37	6
The spread of some pests and diseases	43.75	8
[illegible]	87.5	2

Source: filed study 2023

Respondent's Suggestion to Overcome the Crisis in the Agricultural Sector

The utilization of digital technology in emergency situations serves as a catalyst for facilitating essential transformations that empower small-scale farmers and enable them to effectively address the issues of food security, market expansion, climate change, and disease outbreaks (Grote et al., 2021). Although the Corona pandemic poses numerous obstacles, it also provides prospects for optimizing digital tools to enhance support for farmers. Therefore, these technologies can be modified to aid in public health responses and facilitate preparedness for emerging agricultural requirements (FAO, 2020).

In this regard, the findings in Table 6 revealed that the primary suggestions put forth by the participants for progress were guaranteeing uninterrupted assistance to rural producers through electronic extension and transitioning to digital technology (68.81%). Additionally, 59.4% of respondents emphasized the need to raise awareness about the rural crisis by providing precise and timely information. In addition, 56.3% of

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

the participants recommended enhancing the availability of agricultural supplies, market knowledge, storage techniques, and the use of labor-saving measures. The proposals to enhance the role of agricultural extension services by providing technical and marketing information to farmers, establish partnerships to address market disruptions through the promotion of electronic commerce, and collaborate with the private sector and non-governmental organizations, were ranked lowest with rates of 46.88%, 43.75%, and 40.62%, respectively.

Table 6. Suggestions of Respondents to Overcome Emergency Crises in the Agricultural Sector (N = 128).

Suggestions	%	Rank
Raising awareness about the crisis in rural areas through timely and accurate information	59.4	2
Ensure continued support for rural producers through e-extension and digitalization	68.8	1
Providing financing facilities for farmers until the crisis ends	53.1	4
Build partnerships to overcome market disruptions with promoting e-commerce	43.75	6
Facilitating access to agricultural inputs, market information, storage methods, and the use of labor-saving practices.	56.3	3
Cooperation with the private sector and non-governmental organizations	40.62	7
Activating the role of agricultural extension by providing technical and marketing information to farmers	46.88	5

Source: filed study 2023

Farmers Interviews

A focus group discussion was conducted with the respondents before compiling the questionnaire, and these are some responses:

"*Awareness seminars are rarely held for farmers, and clean seeds are not provided so that the farmer obtains productivity that benefits the country*" Suleiman Abdel Azim said, as one of the farmers. One of the participants pointed out the absence of cooperative marketing, saying: "*I wish you knew that we reach companies directly and do not sell to the merchant who exploits the farmer*" Hemmat Mustafa said.

one of the participants doubted the feasibility of such meetings, saying: "*We sincerely hope that there will be an agricultural extension service, not promises that will not be implemented*" Ahlaham Ashry said. Most respondents agreed on the importance of returning to the agricultural cycle, the necessity of introducing a contract farming system for other crops like sugar beets, and the necessity of having guaranteed prices for agricultural crops. In addition to the importance of cooperative marketing, also, they welcomed the idea of establishing links for farmers in the villages.

Conclusions

Farmers' perceptions of digital resource-sharing applications may vary. Some farmers may see them as a promising opportunity to enhance their productivity and profitability by expanding their collaboration network and accessing resources they couldn't afford otherwise. On the other hand, others may express concerns regarding data privacy, trust in potential partners, and the complexity of using these platforms. Hence, understanding the farmer's socio-economic factors, as well as the benefits and challenges faced by farmers, is crucial.This research examines how linked local resource-sharing networks may boost smallholder resilience. particularly In emergencies, when personal communication networks are impractical extension services are scarce and underfunded by the government. in such cases, These instruments may allow local resource sharing and meet agricultural demands, including crop types, animal breeds, improved seeds, disease

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

and insect control techniques, market pricing, and acceptable financing. However, the Digital transformation has several obstacles, such as insufficient understanding of new digital tools, poor coordination between farmers and extension workers, insufficient training, and unstable Internet connectivity, which are the primary impediments to farmers' adoption of digital apps. To overcome these obstacles, it is crucial to provide support and resources for digital extension initiatives in order to facilitate the transition to new methods with the aim of facilitating local resource sharing and delivering context-specific information tailored to the requirements of responders.

The main lesson learned lies in the ability of smallholder farmers not only to use digital agricultural platforms but also to co-create them by prioritizing desired content. By expressing a strong willingness to share their local resources through the application, respondents hope that this initiative will significantly contribute to the cooperative marketing of their agricultural products. Digital extension services help farmers access new input markets and provide vital market, pricing, and supplier information. Access to new knowledge and quality inputs might convert subsistence agriculture to a market-oriented strategy, changing production techniques and input use. These digital extension services may also increase farmers' negotiating power by providing additional input purchase alternatives from diverse vendors. However, illiteracy, limited agricultural tenure, and poor crop output continue to hinder agricultural digitalization. Emphasizing the crucial importance of establishing mechanisms to ensure the sustainability of the interactive platform, the success of this project depends on its ability to maintain functionality beyond the funding period. Ultimately, this article provides valuable contextual information and can serve as concrete examples to inform decisions regarding the development and implementation of a digital application for resource sharing in agriculture

Recommendations

Establish sustainable and affordable rural technology solutions for resource-sharing.
Develop methods to ensure farmers' participation in all stages of platform creation to boost farmers' confidence and digital resource-sharing application success.
Raise awareness and instruct farmers about the benefits and challenges of digital applications.
Strengthen IT infrastructure in rural areas, especially access to the Internet and sustainable services.
Support research on resource sharing in emergencies to enhance farmers' preparedness and response and enhance agricultural sustainability and resilience.

Study Future Directions

Future research should focus on impact assessments, comparative regional studies, participatory platform design, integration with extension services, women's participation, and scaling, including:

post-implementation studies evaluating effectiveness, economic and social impacts

Comparative studies analyzing regional variations in readiness and adoption

Co-creation platforms aligning with farmers needs and enabling their content prioritization

Models integrating digital advisory in conventional extension and their knowledge dissemination efficacy

Solutions enhancing marginalized groups' equitable access and agency

Prerequisites and policies for evidence-based national scaling-up and long-term sustainability

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

Further investigation across diverse disciplines can provide additional evidence-based guidance for promoting context-specific digital platforms as part of resilient, sustainable small farming systems.

The Study Implications

Study implications pertain to the prospective outcomes; possible outcomes of the research may encompass:

Inform policies to support farmer-centric digital transformation. Findings provide insights into smallholders' readiness to adopt appropriate, sustainable digital platforms aligned with their needs and constraints.

The anticipated outcome of this project is to provide evidence that will aid in developing a digital platform (RESILIENCE) to enhance the living circumstances of the local community by improving digital technology in agriculture and facilitating communication and resource sharing.

Evidence to Advance Digital Advisory Services Identifies effective approaches to integrating digital extension tools to compensate for shortages of frontline agricultural workers.

Customized Solutions to Boost Crisis Resilience through Understanding Farmer Perceptions enable tailored platforms to improve preparedness and response to crises like disease outbreaks or climate shocks.

Establish baselines for further research on technology adoption, barriers, and socio-economic impacts to inform Egypt's digital transition.

Practical Advocacy for Multi-Sectoral Investments Supports evidence-based campaigns for stakeholders to increase strategic investments and capacity building in farmer-centric digital agriculture.

In summary, the findings lay the groundwork to advance equitable, resilient digital solutions through informed policies, research, and coordinated multi-sectoral efforts centred on strengthening smallholder agencies.

Study Limitations

limitations of this study include, but are not limited to:

Narrow Geographic Focus: The single village locale limits wider generalization across Egypt's diverse agricultural settings.

Reliance on specific time-bound data: The short data collection period provides only a temporal snapshot missing longer-term trends.

Sample Size and Diversity: The small, homogeneous sample poses some constraints on representativeness.

The inability to study other broader factors: the other economic and social factors influencing local resource participation in agriculture were not investigated.

Self-Reported Qualitative Data: Subjective perceptions were gathered prone to inherent biases.

In total, this focused locality and group offers valuable initial qualitative insights into adoption readiness but precludes definitive quantitative conclusions applicable nationally. There remains scope for ongoing investigation into the nuances around digital platform acceptance using mixed methods across wider geographic and demographic ranges to strengthen robustness. With further engagement, the limitations can provide constructive direction for enriching the emerging knowledge base.

Author Contributions

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

Conceptualization, C. Ph., S.M.A.E.-G and T.G.I.M.; methodology, C. Ph., S.M.A.E.-G., T.G.I.M., H.L. and Z.F.F.; software, C. Ph., S.M.A.E.-G. and T.G.I.M.; validation, C. Ph. and S.M.A.E.-G.; formal analysis, C. Ph., S.M.A.E.-G. and T.G.I.M.; investigation C. Ph., S.M.A.E.-G., T.G.I.M., H.L. Z.F.F., S.A. Sh. And N.A.A.; resources, C. Ph. and S.M.A.E.-G.; data curation, S.M.A.E.-G. and T.G.I.M.; writing—original draft preparation, S.M.A.E.-G. and T.G.I.M.; writing—review and editing, C. Ph., S.M.A.E.-G., T.G.I.M., H.L. and Z.F.F.; visualization, C. Ph., S.M.A.E.-G., T.G.I.M., H.L. and Z.F.F.; supervision, C. Ph.; project administration, C. Ph. and S.M.A.E.-G.; funding acquisition, C. Ph.

All authors have read and agreed to the published version of the manuscript

Funding

Financial support has been provided by PRIMA (grant number 1707/RESILINK), RESILINK project is funded by PRIMA S2 2021 with id 1707. The consortium partners are: (1) University of Pau in France (UPPA) as coordinator, (2) Orange SA in France, (3) University Mohammed-Chérif Messaadia Souk- Ahras (UMCM) in Algeria, (4) Institut National de la Recherche Agronomique (INRA) in Morocco, (5) University Sultan Moulay Slimane (USMS) in Morocco, (6) Arab Company for Information and Communication Technology (ACICT) in Egypt and (7) Agricultural Research Center (ARC) in Egypt

Acknowledgment

Authors thank the PRIMA for financial support of this research publication, Egypt Academy of Scientific Research and Technology (ASRT) the local funding agency of RESILINK in Egypt, Agricultural Research Center (ARC), Egypt for the assistance conducting the investigation on small farmers.

References

Abebe, M., Legesse, A., Gadisa, F., & Hussen, M. (2022, March 23). Challenges and Opportunities for the Agricultural Producers in Sinana District in Reflection of COVID-19 Pandemic. Advances in Agriculture. https://doi.org/10.1155/2022/4511995

Aker, J. C., Ghosh, I, & Burrell, J. (2016). The promise (and pitfalls) of ICT for agriculture initiatives. Agricultural Economics, 47(1), 35-48.

ALİ, M., Man, N., Abd Latif, I., Muharam, F. M., & ZOBİDAH OMAR, S. (2018, March 20). The Use of Information and Communication Technologies in Agricultural Risk Management by The Agricultural Extension Services in Malaysia. International Journal of Agriculture Environment and Food Sciences, 2(1), 29–35. https://doi.org/10.31015/jaefs.18005

Anyan, F. Y., & Frempong, G. (2018). An investigation into barriers that hinder the effective use of ICT in farming by small scale farmers in Asuogyaman District, Ghana.

International Journal of Humanities Social Sciences and Education (IJHSSE), 5(1), 23-
32.

Ayre, M., Mc Collum, V., Waters, W., Samson, P., Curro, A., Nettle, R., Paschen, J.A., King, B. and Reichelt, N., 2019. Supporting and practicing digital innovation with advisers in smart farming. NJAS-Wageningen Journal of Life Sciences, 90, p.100302.

Breisinger C, Raouf M, Thurlow J, and Wiebelt M, 2019, Beyond the Business Case for Agricultural Value Chain Development, an economywide approach applied to Egypt, REGIONAL PROGRAM | WORKING PAPER 18 | March 2019 Egypt: International Food Policy Research Institute (IFPRI). https://aps.aucegypt.edu/en/articles/1077/beyond-the-business-case-for-agricultural-value-chain-development-an-economy-wide-approach-applied-to-egypt

Davis, K. and Franzel, S., 2018. Extension and Advisory Services in 10 Developing Countries: A Cross-country Analysis. Developing Local Extension Capacity (DLEC) Project. The US government's global hunger and food security initiatives

https://pdf.usaid.gov/pdf_docs/PA00TVGT.pdf

Danso-Abbeam, G., Ehiakpor, D. S., & Aidoo, R. (2018). Agricultural extension and its effects on farm productivity and income: insight from Northern Ghana. Agriculture & Food Security, 7(1), 1-10.

Evenson, R.E. & Mwabu, G., 2001. The effects of agricultural extension on farm yieldsin Kenya. Afr. Dev. Rev., 13(1):1-23.

Fabregas, R., Kremer, M., & Schilbach, F. (2019, December 13). Realizing the potential of digital development: The case of agricultural advice. Science, 366(6471). https://doi.org/10.1126/science.aay3038

FAO. 2011. The State of Food and Agriculture 2010–11 Women in agriculture. Closing the gender gap for development. FAO Published in 2011, 247 pp. ISBN: 978-92-5-106768-0. Available at http://www.fao.org/docrep/013/i2050e/i2050e00.htm (also in Arabic, Chinese, French, Russian and Spanish). (2011, December). Animal Genetic Resources/Ressources Génétiques Animales/Recursos Genéticos Animales, 49, 118. https://doi.org/10.1017/s2078633611000567

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

FAO. 2017. Information and communication technology (ICT) in agriculture: A report to the G20 agricultural deputies, Rome. Available at: https://www.fao.org/3/i7961e/i7961e.pdf

Food and Agriculture Organization of the United Nations (FAO). (2020). Enabling agricultural innovation systems to promote appropriate technologies and practices for farmers, rural youth and women during COVID-19. Rome.

On line Available at: https://doi.org/10.4060/ca9470en.

FAO. (2023). "Digital Agriculture Extension and Communication Services Project." Food and Agriculture Organization of the United Nations. https://www.fao.org/egypt/programmes-and-projects/digital-agriculture/en/

FFR. 2013. Five years of the Financing Facility for Remittances. (n.d.). IFAD. https://www.ifad.org/en/web/knowledge/-/publication/ffr-brief-five-years-of-the-financing-facility-for-remittances

Fuchs, C., Matt, C., Hess, T. and Hoerndlein, C., 2016. Human vs. Algorithmic recommendations in big data and the role of ambiguity, Conference: Proceedings of the 22nd Americas Conference on Information Systems, San Diego, USA, August 2016.

https://aisel.aisnet.org/amcis2016/Adoption/Presentations/5

GSMA. 2017. Connected Society Unlocking Rural Coverage:Enablers for commercially sustainable mobile network expansion. London: GSMA Intelligence. https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/07/Unlocking-Rural-Coverage-enablers-for-commercially-sustainable-mobile-network-expansion_English.pdf

GSMA Intelligence, 2021. The mobile economy 2021. GSMA.. https://www.gsma.com/mobileeconomy/

GSMA, 2022. Trends in digital agriculture advisory as the pandemic wanes | Mobile for Development. (2022, November 1). Mobile for Development. https://www.gsma.com/mobilefordevelopment/programme/agritech/trends-in-digital-agriculture-advisory-after-covid-19/

Grote, U., Fasse, A., Nguyen, T. T., & Erenstein, O. (2021). Food security and the dynamics of wheat and maize value chains in Africa and Asia. Frontiers in Sustainable Food Systems, 4, 1-17

HLPE. 2013. Investing in smallholder agriculture for food security: A report by the High Level Panel of Experts on Food Security and Nutrition | FAO. (n.d.). https://www.fao.org/family-farming/detail/en/c/273868/

IFPRI. 2020. Agricultural Extension. Available online at: https://www.ifpri.org/topic/agricultural-extension.

IFPRI, et al. (2023). "Potential of Digital Tools to Support Smallholder Farmers in Egypt." International Food Policy Research Institute. https://www.ifpri.org/event/potential-digital-tools-support-farmers-egypt-lessons-learned-and-way-forward

Kilelu, C. W., Klerkx, L., Leeuwis, C., & Hall, A. (2011, May). Beyond knowledge brokering: an exploratory study on innovation intermediaries in an evolving smallholder agricultural system in Kenya. Knowledge Management for Development Journal, 7(1), 84–108. https://doi.org/10.1080/19474199.2011.593859

Kurdyś-Kujawska, A., Strzelecka, A., & Zawadzka, D. (2021, March 16). The Impact of Crop Diversification on the Economic Efficiency of Small Farms in Poland. Agriculture, 11(3), 250. https://doi.org/10.3390/agriculture11030250

López-Ridaura, S., Sanders, A., Barba-Escoto, L., Wiegel, J., Mayorga-Cortes, M., González-Esquivel, C. E., Lopez-Ramirez, M. A., Escoto-Masis, R. M., Morales-Galindo, E., & García-Barcena, T. S. (2021, August 1). Immediate impact of COVID-19 pandemic on farming systems in Central America and Mexico. Agricultural Systems. https://doi.org/10.1016/j.agsy.2021.103178

Mubarak, M A M, (2006) Scientific Research: Foundations and Method of Writing, Academic Library, Cairo.

Ongachi, W., Onwonga, R., Nyanganga, H. & Okry, F., Comparative analysis of video mediated learning and farmer field school approach on adoption of striga control technologies in Western Kenya. International Journal of Agricultural Extension, 5(1),

pp. 1–10, 2017. http://erepository.uonbi.ac.ke/handle/11295/103427

Rajkhowa, P., & Qaim, M. (2021, October 28). Personalized digital extension services and agricultural performance: Evidence from smallholder farmers in India. PLOS ONE, 16(10), e0259319. https://doi.org/10.1371/journal.pone.0259319

Rawlinson, R. (2023, August 15). Egypt's farmers are prepping the soil for a digital revolution. AGBI. https://www.agbi.com/articles/agtech-special-report-digitalisation-farming-egypt/

Rupavatharam, S., Schumann, C., Kennepohl, A. & Dhulipala, R.K. 2017. Automated disease detection-cutting edge technology available for farmers in India. Chronica Horticulturae. 57(1), 9-12.

Rose, D. C., Sutherland, W. J., Parker, C., Lobley, M., Winter, M., Morris, C., Twining, S., Ffoulkes, C., Amano, T., & Dicks, L. V. (2016, November). Decision support tools for agriculture: Towards effective design and delivery. Agricultural Systems, 149, 165–174. https://doi.org/10.1016/j.agsy.2016.09.009

Salunkhe, H. (2012). The overview of Government subsidies to agriculture sector in India. IOSR Journal of Agriculture and Veterinary Science, 1(5), 43–47. https://doi.org/10.9790/2380-0154347

Schiffman LG, Leslie LK. Consumer Behavior 4th ed. New Jersey: Prentice Hall, 1991. One line Available at: https://archive.org/details/consumerbehavior0005schi/page/n1/mode/2up

UNCTAD Secretariat (2022). "The Role of Digitalization in Agriculture." Frontiers in Environmental Science. https://unctad.org/fr/publications

United Nations. 2020. Sustainable Development Goals Report 2020. United Nations. https://doi.org/10.1002/cprt.30571

Unlocking digital potential: UNDP's support to Egypt's digital transformation. (n.d.). UNDP. https://www.undp.org/egypt/blog/unlocking-digital-potential-undps-support-egypts-digital-transformation

Van Es, H. and Woodard, J., 2017. Innovation in agriculture and food systems in the digital age. The global innovation index, pp.97-104.

https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2017-chapter4.pdf

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 10932 – 10950
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.5702
Submission Date: July 7, 2024

World Bank. 2008. World Development Report 2008: Agriculture for Development. Washington, DC.: World Bank. https://doi.org/10.1596/978-0-8213-6807-7

World Bank (2019). For Up to 800 Million Rural Poor, a Strong World Bank Commitment to Agriculture. (2019, April 26). World Bank. https://www.worldbank.org/en/news/feature/2014/11/12/for-up-to-800-million-rural-poor-a-strong-world-bank-commitment-to-agriculture

Zou, T., & Cheshmehzangi, A. (2022, June 10). ICT Adoption and Booming E-Commerce Usage in the COVID-19 Era. Frontiers in Psychology, 13. https://doi.org/10.3389/fpsyg.2022.916843.