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Original Article

Dissemination of Information for Small Family Farms in Algeria

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Abstract: *This study aims to evaluate the use of ICTs in disseminating useful information to small family farms in Algeria and to identify the obstacles hindering their use. We selected 153 small family farms in the study area. We identified five provinces for the study, all of which possess diverse agricultural potential. The results show that farmers do not express any need for market access for selling agricultural products. Social networks are emerging as a means of sharing information on disease screening in dairy and beef cattle (25.5%), crop management practices (23.5%), meteorology and weed control (20.3%), and soil analysis (16.3%). Radio is an important source of information for weather forecasting (33.9%), soil analysis (26.8%), and livestock feed (dairy and beef) (19.6%). Television broadcasts information on weather (47.7%) and agricultural operations (18.3%). The findings from remote areas of the country call for urgent and decisive action. A national survey on ICT use is recommended.*

Keywords: *Information, ICT Use, Small Family Farm, Constraints, Algeria.*

I. INTRODUCTION

Smallholder farms play a central role in agriculture and rural communities. Integrating them into the digital environment has considerable potential to reduce hunger and strengthen food security (Lyu et al. 2025). Farmers need continuous access to up-to-date information on farming practices, climate conditions, technological innovations, and research developments. Information and communication technologies (ICTs) facilitate this by providing platforms for virtual demonstrations, simulation-based learning, and access to global agricultural databases. According to (Sagar Pujar et al. 2024), ICT tools are a key driver of agricultural transformation. ICTs enable efficient data collection and analysis, remote sensing, weather forecasting, optimization of farming techniques, and improved decision-making processes. They are a key factor in the development of precision agriculture. They are used to increase yields, reduce risks, and improve sustainability. They are fundamental to improving agricultural production and efficiency, from monitoring soil fertility to crop management. ICTs help farmers become more efficient and productive by facilitating timely decision-making. They enable better monitoring of the production process by optimizing resource use. ICTs can also, according to (Sagar Pujar et al. 2024), help farmers leverage automation through agricultural probes, sensors, and drones, which allow for monitoring crop growth, soil nutrients, and weather conditions. The use of ICTs in agriculture will help farmers reduce their reliance on traditional paper-based tools and adopt more advanced and automated technological solutions. The main beneficiaries of the ICT revolution have been population segments located in areas with developed infrastructure; the poor and those living in remote areas have been excluded. Mobile phones can act as a remedy due to their wide range and low cost of information dissemination (Balasubramanian et al. 2010).

People around the world use ICTs in a variety of ways. Farmers prefer to watch television and regularly check the weather and market information. They also rely on other forms of communication. Many developing countries have established various ICT centres to provide farmers with agricultural information. However, for farmers in the poorest countries, television remains a reliable source of agricultural information (Kumari et al. 2022).

The use of ICTs offers a tremendous opportunity to improve the dissemination of agricultural information to farmers. During the COVID-19 pandemic, mobile agricultural advisory services played a crucial role in facilitating access to information and knowledge sharing on weather forecasts, online marketing, pest and disease management, seed availability, and livestock services (Sandhiya and Balakrishnan, 2022).

ICTs are a force multiplier, transforming development goals and strategies on several levels. Many projects have proven that ICTs can potentially address the information and communication needs of populations in agriculture and development. Facilitating the sharing of information and innovations is pivotal in enhancing the agricultural sector and farmers' livelihoods through access to information and knowledge (Balasubramanian et al. 2010).

According to Lyu et al. (2025), to unlock the potential of smallholder farmers in adopting ICTs, extensive studies have focused on the knowledge, skills, and attitudes of smallholder farmers regarding ICT adoption and have proposed

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corresponding development suggestions. Unfortunately, the practical application of these suggestions is limited by constraints imposed by specific contexts and theoretical perspectives. Furthermore, the weak interconnectedness of studies makes it difficult to identify and understand globally important or neglected skills. To address this, the authors conducted a systematic review including 56 studies worldwide. Two main findings were published in 2025. The first concerns the adoption of ICTs by smallholder farmers, which crucially depends on six skill areas: information literacy, communication, digital content creation, security, problem-solving, and basic technical skills. However, insufficient attention has been paid to digital content creation and security. The second finding highlights the scarcity of studies that comprehensively consider all the skills of smallholder farmers. The reviewed studies emphasize the creative use of ICTs. Authors suggested increasing capacity on digital skills for smallholder farmers as well, and extending research perspectives. A line of potential tech-based solutions involves both skills development and digital environment training programs for smallholder farmers.

In Algeria, the quality and reliability of information from various sources are a primary concern for small family farms, which represent 70% of the agricultural population in Algeria (Himeur et al. 2022). ICTs enable the rapid dissemination of information to a wide audience at a relatively affordable price. They are essential for development, stimulating the economy, creating jobs, improving rural areas, and reducing poverty. However, their use remains limited.

This research explores the use of ICTs in disseminating information useful to farmers and livestock breeders on a daily basis. It also attempts to identify some of the significant constraints encountered by farmers and livestock breeders in their use of ICTs.

II. RESEARCH METHODOLOGY

The research method is based on surveys. These were conducted in the form of individual interviews between September and December 2025. The selection of 153 small family farms was carried out using simple random sampling. Several remote locations were visited at random. The interview questionnaire was pre-tested on approximately fifteen farmers to ensure the clarity, relevance, and reliability of the questions. Based on the initial results, necessary modifications were made to improve the quality of the tool. Its format was redesigned to facilitate conducting interviews in a single visit. The interviews were conducted with the head of the family who was willing to listen. The collected data were entered into an Excel 2010 spreadsheet for quantitative analysis.

We did not rely on the representativeness or exhaustiveness of the sample. Our study does not aim to extrapolate the results. Rather, it envisions a preliminary exploratory diagnosis on the use of ICTs concerning the agricultural sector, in landlocked areas in Algeria.

III. RESULTS AND DISCUSSION

A) Farmer Characteristics

The characteristics of the interviewees describe the general profile of the farmers involved in this study. Understanding the characteristics of the respondents is important to provide insight into their demographic, social, and economic conditions, which can influence their goals, decision-making processes, and farming activities. These characteristics were analysed according to age, gender, education level, and years of experience in farming (Table 1).

Table 1: Farmers' Characteristics

Characteristics	Category	Number of farmers	Rate (%)
Age (Years)	< 30	7	4.6
	31 – 45	18	11.8
	46 – 55	32	21
	56 – 65	52	34
	> 65	44	28.8
Gender	Male	139	90.9
	Female	14	9.2
Educational Level	No Schooling	76	49.7
	Elementary School	51	33.3
	Junior High School	17	11
	Senior High School	6	4
	Higher Education	3	2
Farming Experience (Years)	< 10	7	4.6
	10 - 20	25	16.3
	21 - 30	33	21.6
	31 - 40	41	26.8
	> 40	47	30.7

Source: *Survey Results, 2025*

The farmers surveyed were predominantly of working age, particularly those aged 56 to 65, who comprised 34% of the total. The average age of farmers was 59. This means that the majority were older young adults or middle-aged individuals working in agriculture. As for gender, farmers were composed of 91% men compared to only 9% women, indicating high male dominance in agriculture. In terms of education level, most respondents had low-medium formal qualifications. The proportion of farmers who had finished primary school was 33.3%, followed by lower (11%) and upper secondary education (4%). Three farmers (2%) had higher education, whereas most of them, 49.7%, were uneducated formally. Even though they have an average level of education, most farmers have practical knowledge about agriculture and good decision-making skills owing to one experience. In fact, many of the respondents had prior experience in farming. Most of the farmers had more than 30 years of experience (57.7%), followed by those with between 21 and 30 years (21.6%). The average experience in the profession was 32 years, indicating that farmers possessed considerable practical knowledge and a long-term commitment to agriculture.

B) Use of ICTs in the Dissemination of Agricultural Information

The information listed for the study in Table1 and illustrated in Figure1, considered useful for farmers, is not all actually so. It is important to note that 78% of those interviewed have a mobile phone, which they say is only occasionally connected to the internet. Those who do not have one continue to operate under difficult conditions, and their few (one or two) dairy cows remain an essential source of income. They confirm that no information is disseminated on a large scale via mobile phone (SMS and apps). Furthermore, not all of them own a computer dedicated to agricultural activities.

Radio is an important source of information for weather forecasting (33.9%), followed by soil analysis (26.8%) and feed for dairy and beef cattle (19.6%).

Television broadcasts 47.7% of information on weather and 18.3% on agricultural operations. The study population receives 25.5% of information on disease screening in dairy and beef cattle via social media. They receive 23.5% of information related to agricultural operations. They share 20.3% of information on weather and weed control/herbicide selection, and 16.3% of information on soil analysis. Social media is emerging as a key platform for information sharing in agriculture in Algeria.

Table 2: Distribution of Farmers According to their use of Information

Useful information	ICT	Number of farmers	Rate (%)
Weather information	Radio	52	33,9
	TV	73	47,7
	Computer	0	0
	Mobile	0	0
	Social networks	31	20,3
	Internet	0	0
Soil analysis	Radio	60	39,2
	TV	19	12,4
	Computer	0	0
	Mobile	0	0
	Social networks	25	16,3
	Internet	0	0
Farming operations	Radio	25	16,3
	TV	18	18,3
	Computer	0	0
	Mobile	0	0
	Social networks	36	23,5
	Internet	0	0
Seed varieties adapted to the area	Radio	17	1,1
	TV	0	0
	Computer	0	0
	Mobile	0	0
	Social networks	0	0
	Internet	0	0
Use of chemical fertilizers/Recommended doses	Radio	28	1,8
	TV	0	0
	Computer	0	0
	Mobile	0	0
	Social networks	0	0
	Internet	0	0

Weed control/Herbicide selection	Radio	14	1
	TV	0	0
	Computer	0	0
	Mobile	0	0
	Social networks	31	20,3
	Internet	0	0
Disease control	Radio	23	1,5
	TV	0	0
	Computer	0	0
	Mobile	0	0
	Social networks	14	0,9
	Internet	0	0
Livestock feeding Cattle farming (dairy and beef)	Radio	30	19,6
	TV	0	0
	Computer	0	0
	Mobile	0	0
	Social networks	19	12,4
	Internet	0	0
Reproduction management Cattle farming (dairy and beef)	Radio	14	9,1
	TV	0	0
	Computer	0	0
	Mobile	0	0
	Social networks	21	13,7
	Internet	0	0
Livestock management Cattle farming (dairy and beef)	Radio	0	0
	TV	0	0
	Computer	0	0
	Mobile	0	0
	Social networks	8	5,2
	Internet	0	0
Disease screening	Radio	21	14
	TV	0	0
	Computer	0	0
	Mobile	0	0
	Social networks	39	25,5
	Internet	0	0
Market access/Sale of agricultural products	Radio	0	0
	TV	0	0
	Computer	0	0
	Mobile	0	0
	Social networks	0	0
	Internet	0	0

Source: *Survey Results, 2025*

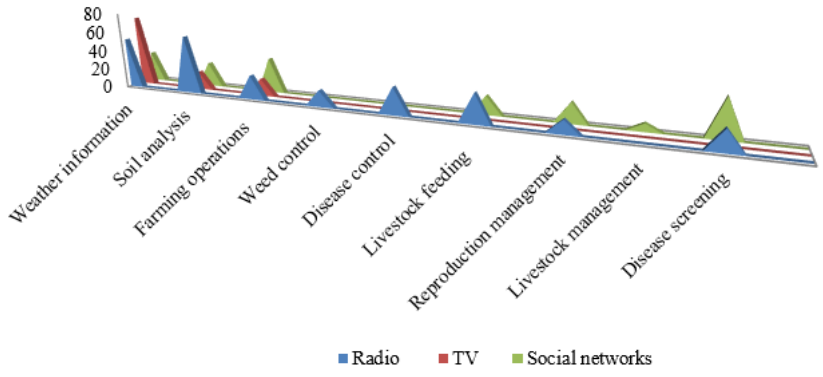

Figure 2. Graph Relating to the Dissemination of Information Via ICTs

C) Use of ICTs in Agriculture

At the World Summit on the Information Society (WSIS, 2003-2005) (IICD, 2007), the role of ICTs in providing access to broader information was officially endorsed, with a view to improving food security and supporting rural livelihoods. According to (FAO, 2011), information sharing is essential for actors in the agricultural value chain to reduce information and communication asymmetries and break the cycle of poverty. Few empirical studies have sought to identify the factors that limit the adoption of ICTs in general in developing countries (Zahonogo, 2011). Empirical studies have shown that effective communication via ICTs accelerates the adoption of improved agricultural practices, leading to increased productivity, income, and market participation (Sadick and Abdulai, 2021; Zondo and Ndoro, 2023; Joel et al., 2025; Esin, 2026).

Agricultural extension relies heavily on information exchange involving a wide range of actors (Himeur and Ikhlef, 2023). The use of ICTs appears to bridge the information gap. Appropriate knowledge, information, and learning methods enable farmers to advance rural development. According to Syiem and Raj (2015), the role of ICTs as an instrument for progress and development is widely recognized in the global information age, and it is observed that the information and technology sector has a direct or indirect impact on people from all walks of life. According to Spielman et al. (2021), with the new opportunities offered by ICTs, an abundance of products and services has emerged on the market, promising to revitalize agricultural extension and advisory services in developing countries. Nonetheless, an expanding body of evidence has shown that not all extension approaches using ICTs are equally successful in delivering results like farmer knowledge gains or improved adoption rates, crop and livestock yields, farm incomes or individual well-being. There is also growing evidence that the extension approaches mediated through ICT will not work equally well for all farmers.

From a systemic perspective, the creation and use of knowledge extend beyond individual actors and are embedded in networks, institutions, and interactions that shape the production, exchange, and application of information (Priya et al., 2025).

At present, in the digital age, we are witnessing a revolution in the production, dissemination, and use of agricultural knowledge. According to (Priya et al., 2025; Asnakew et al., 2026), digital tools such as mobile platforms, web systems, artificial intelligence (AI), the Internet of Things (IoT), block chain, and other information and communication technologies (ICTs) have profoundly transformed traditional models of agricultural extension and advisory services. These technologies improve accessibility, efficiency, decision-making, and collaboration by enabling the timely, geo-localized, and interactive dissemination of knowledge to farmers via mobile applications, SMS, e-learning platforms, and digital advisory systems. They are reshaping food systems, strengthening their resilience, and offering solutions to address complex challenges such as climate change, resource scarcity, food insecurity, and unemployment (Asnakew et al., 2026; Tanha et al., 2020; Gebresenbet, 2021). Empirical evidence shows that digital technologies improve evidence-based decision-making, optimize resource use, and increase productivity and efficiency, thereby contributing to more sustainable and resilient agricultural systems (Usigbe et al., 2024; Lidder et al., 2025; Asnakew et al., 2026). Nevertheless, a significant digital divide persists. Approximately 37% of the world's population still lacks internet access, with rural areas disproportionately affected, precisely where the dissemination of agricultural knowledge is most crucial (Priya et al., 2025; Asnakew et al., 2026). In Algeria, access to advanced digital services remains limited for small family farms. These farms continue to rely on basic ICTs, such as radio and traditional mobile phones. This situation exacerbates economic and social inequalities. Digital tools allow farmers to access real-time weather forecasts, market information, agronomic advice, and climate change adaptation strategies all of which directly influence farm-level decision-making and productivity (Lidder et al., 2025; Asnakew et al., 2026). Furthermore, digital knowledge-sharing platforms and social networks facilitate peer learning and strengthen interactions between farmers, advisors, and researchers, thereby promoting the adoption of innovative practices (Geleta, 2023; Asnakew et al., 2026). This research explores how farmers acquire useful information in their daily agricultural activities. It fills a significant gap in the literature on the use of ICTs by farmers in Algeria. The study highlights the importance of adapting ICTs to local contexts. It provides factual information to inform agricultural policies and shows how ICTs improve resilience to climate shocks and promote rural development in Algeria.

Empirical research has shown that telephones, radio, and television are the main communication tools available to farmers for obtaining agricultural information and knowledge in Nigeria and Malaysia (Olaniyi, 2013); Chhachhar et al., 2014). Farmers in Sub-Saharan Africa (Nakweya, 2013), Nigeria (Emmanuel, 2010), Tanzania (Shetto, 2008), and Iran (Nazari and Hasbullah, 2008) have also been found to use traditional ICTs (radio and television) to access agricultural information. Our findings corroborate this.

D) Constraints on ICT Use

Several studies have shown that unreliable electricity supply and poor internet connectivity are the main constraints to ICT use by farmers in Tanzania (Chilimo, 2008), Nigeria (Ajani and Agwu, 2012), Kapurthala (Sharma et al., 2012), Bangalore (Rural Development, 2012), and Oyo State (Oyeyinka and Bello, 2013). In Ethiopia, poor electricity coverage and farmers' lack of trust in ICT use have been identified as barriers to the expansion of ICT services in rural areas (UNDP, 2012).

In Bangalore, a lack of practical experience hinders the use of ICTs (Rural Development, 2012). In Nigeria, the high cost of hardware and software impedes ICTs (Oyeyinka and Bello, 2013). In Tanzania, mobile phone use is entirely dependent on the availability of mobile phone infrastructure and the ability to recharge batteries (Mtega and Msungu, 2013). Frequent and irregular power outages in remote areas create a constraint on mobile phone charging. This hinders ICT use.

This compounds farmers' ignorance of the social and economic benefits of ICTs. Poor internet connectivity is an alarming obstacle. A lack of awareness of the potential benefits of ICTs hinders the incentive for their use in rural development in Algeria. Infrastructure and spatial factors strongly influence digital adoption. Access to electricity is one of the most important predictors, especially for mobile internet use, as a reliable power supply is essential for device operation and sustained engagement. This finding aligns with broader evidence highlighting rural electrification as a prerequisite for digital agricultural initiatives (Priya et al., 2025; Asnakew et al., 2026).

ICTs are primarily used for social communication by our farmers. This finding corroborates that of (Mittal and Mehar, 2012) in India. Another constraint is a limited ability to use mobile phones, only for calls. This points to farmers in the study having not only low education status but also limited skills in using mobile phones. This validates the finding of (Khan et al., 2019) in Pakistan. Education seems to be one of the most robust and stable predictors of uptake. Opposing Lines of Evidence: Educated farmers adopt all types of digital technologies better and faster, as the interpretation capability and navigation relevancy in both information seeking and verify/interpret advice content depend on knowledge capacity lerenien. Education leads to increased confidence and sustained engagement also in voice-based services, lending further weight to the relatively recent evidence of education being a key determinant for digital inclusion in agriculture (Feder et al., 1985; Wossen et al., 2015; Abd Majid et al., 2025).

These gender differences suffuse across multiple dimensions: frequently, social norms prohibit involvement of women in decision-making; limited time availability tames selection into the agricultural digital technology equipment and less exposure results in lower levels of technology engagement among females (GSMA 2023, Asnakew et al., 2026).

Age positively impacts all technologies, suggesting that older farmers have a higher probability of adopting mobile phones, SMS, voice-based services and mobile internet. It rebuts the common assumption that digital technologies are mainly targeted at youth, therefore placing emphasis on experience, knowledge and authority in decision-making around agriculture. Older farmers also adopt digital tools to mitigate production and market risks, as evidenced in smallholder farming systems of sub-Saharan Africa (Asfaw, 2012) and Asia (Asnakew et al., 2026).

The use of ICT also depends on institutional and financial factors. Credit access also increases the uptake of all four technologies, given that liquidity allows farmers to purchase devices and sustain Internet or data subscriptions as well as explore new technologies without financial risks. This emphasizes the relationship between financial inclusion and digital uptake, a relationship corroborated by recent studies (Karlan et al., 2020; Girma, 2022; Asnakew et al. 2026).

That distance from the market negatively influences adoption by suggesting that farmers farther away from economic centers have restricted access to training, information and business-oriented digital services, continuing a pattern where physical remoteness evidently continues to limit digital inclusion (Ajam and Jagm, 2019; Asnakew et al., 2026).

IV. CONCLUSION

This study constitutes a preliminary assessment of ICT use in the agricultural sector in Algeria. The results obtained in remote areas of the country call for further consideration. A national survey on ICT use is recommended. This survey would help coordinate the efforts of all institutions under the supervision of the Ministry of Agriculture. These institutions disseminate information, provide technical support to farmers, and participate in their training.

Among the constraints mentioned by farmers are:

1. Lack of access to agricultural extension services and reliable sources of information,
2. Lack of basic infrastructure,
3. Fear of technology due to its complexity,
4. Lack of knowledge and skills in using ICTs,
5. Limited internet access due to poor network coverage,
6. High cost of internet subscriptions,
7. Content disseminated via ICTs is unsuitable for farmers' needs,
8. Language used by ICTs is unsuitable for farmers' languages,
9. Time constraints related to agricultural workload make the use of ICTs impractical,
10. Priority given by farmers to traditional knowledge and skills, to the detriment of content disseminated via ICTs,
11. Lack of capacity building for the effective use of ICTs,
12. Lack of administrative and financial support.

It is therefore clear that training is needed to improve farmers' skills and strengthen their capacity to use ICTs effectively. Support through administrative procedures and a financial assistance mechanism is recommended.

ICTs provide up-to-date information for more profitable agriculture. They have the ability to bridge agricultural extension services and farmers. Novel solutions of ICTs are critical for revolutionizing and upgrading the agricultural domain in Algeria. Daily decision-making by means of mobile applications provides instant, clear and relevant advice. They should also be created, designed and available to farmers in all national and local languages.

Furthermore, the spatial variation in ICT use suggests integrating the geographical factor into policies promoting their use. National policies should prioritize targeted measures based on territorial specificities and take into account the significant gender disparities, given the unusually low number of women in the sample, particularly in rural areas.

Interest Conflicts

I declare that there is no conflict of interest concerning the publishing of this paper.

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