REVIEW OF LITERATURE ON THE STUDY ON DIGITAL DIVIDE THROUGH INSIGHTS ON FARMERS' PROFILES, DIGITAL LITERACY, AND ICT ADOPTION IN AGRICULTURE

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ABSTRACT: The rapid growth of Information and Communication Technology (ICT) has revolutionized various sectors, including agriculture. In rural India, ICT tools are emerging as key enablers for disseminating agricultural knowledge and practices. However, the adoption of these tools is hindered by socio-economic, infrastructural, and digital literacy challenges, creating a digital divide. The exploration of farmers' profiles and ICT use reveals that the digital divide in agriculture is both a technological and socio-economic challenge. While ICT has immense potential to transform farming practices, its uneven adoption highlights deep-seated issues related to access, education, gender, and affordability. Bridging this gap will require a comprehensive approach that combines infrastructure development, digital literacy training, financial support mechanisms, and inclusive policies.

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Introduction:

Agriculture in India contributes significantly to the economy, employing over 50% of the population. The sector faces challenges such as fragmented landholdings, unpredictable weather, and limited access to information. ICT tools have the potential to address these challenges by facilitating timely dissemination of knowledge, access to markets, and decision-making support. Despite these benefits, rural India faces a digital divide, characterized by disparities in ICT access and usage due to socio-economic and infrastructural barriers.

Agriculture, as the backbone of many economies, has undergone significant transformation due to the integration of digital technologies. The adoption of information and communication technologies (ICT) in farming has facilitated better decision-making, improved productivity, and enhanced access to markets and advisory services. Digital platforms, such as mobile apps, online marketplaces, weather forecasting services, and farm management software, provide farmers with timely and relevant information that was previously difficult to obtain. However, the level of adoption varies widely among farmers, influenced by factors such as age, education, farm size, financial capacity, and access to technology. Understanding these patterns and preferences is crucial for designing interventions that promote equitable access and maximize the benefits of digital agriculture.

The increasing penetration of smartphones and internet connectivity in rural areas has created opportunities for farmers to adopt digital tools. Mobile-based applications provide access to crop advisory services, pest management guidance, weather updates, and price information, enabling farmers to make informed decisions. Social media platforms, such as WhatsApp and Facebook, have also emerged as informal networks for sharing farming knowledge, marketing produce, and engaging with peers. Despite these opportunities, adoption remains uneven. While some farmers readily embrace new technologies, others face barriers such as low digital literacy, limited financial resources, lack of awareness, and infrastructural challenges. These disparities contribute to a digital divide in agriculture, which may exacerbate existing socio-economic inequalities. Previous studies have highlighted the potential of digital tools to transform farming practices, but few have comprehensively examined the patterns, preferences, and usage trends among farmers in specific regions. This study addresses this gap by profiling farmers' demographics, assessing their digital literacy, and analyzing their adoption of digital platforms and tools. By investigating the relationship between demographic characteristics and technology usage, the research provides insights into which factors facilitate or hinder adoption. Furthermore, identifying the most preferred digital platforms and tools can inform the development of more user-friendly and accessible ICT solutions tailored to farmers' needs. The objectives of this study are to profile farmers based on demographic characteristics, examine their usage patterns of digital platforms, identify preferred tools, and analyze factors influencing adoption. The

study employs a structured questionnaire to gather data from a representative sample of farmers, with subsequent analysis using descriptive and inferential statistics. The findings are expected to inform policymakers, agricultural extension agencies, and technology developers on strategies to enhance digital literacy, improve access to ICT tools, and bridge the digital divide in agriculture. By exploring the adoption of digital platforms and tools among farmers, this study contributes to the growing body of knowledge on digital agriculture. It highlights how demographic factors, digital literacy, and farm characteristics shape adoption patterns, and provides practical recommendations for enhancing the effectiveness of ICT-based interventions. Understanding these dynamics is essential for promoting inclusive digital transformation in agriculture, ultimately improving productivity, sustainability, and livelihoods for farmers.

Conceptual Review

Shehrawat, P. et al., (2024) The study was conducted at districts of Hisar and Fatehabad in the state of Haryana during the period 2022–23 to examine the farmers' awareness and willingness to adopt digital technologies in agriculture. Digitalization may be broadly classified into two domains: its direct impact on augmenting agricultural productivity and its indirect function in enabling farmers to make better-informed and higher-quality decisions. Thus, four villages, Rajli, Ghirai, Berseen, and Majra, were randomly selected for data collection. A total of 120 farmers were selected as respondents, and their socio-personal, socio-economic, and communicational characteristics were analyzed. The findings of the study revealed that the respondents exhibited a high level of awareness about digitalization in agriculture, with a significant percentage aware of various aspects of digital technologies. They were well-informed about the potential benefits, including enhanced productivity and sustainability. In terms of adoption, a substantial number of farmers had already integrated digital technologies into their farming practices. They used digital tools for various purposes, such as online data collection, automation of farm works, nutrient management, and soil health monitoring. Overall, the study highlighted the growing awareness and adoption of digital technologies among farmers in the selected regions. These technologies have the potential to revolutionize agricultural practices and improve productivity, sustainability, and the overall quality of produce. Digitalization in agriculture is poised to play a crucial role in shaping the future of farming. Jadhav, Mangesh. (2024). The study explores the adoption of digital technology among farm households in Hiware Bazaar, a village in Maharashtra renowned for its successful transformation from a drought-stricken community to a prosperous one through collective efforts and innovative agricultural practices. The research utilizes a comprehensive case study methodology, including interviews, surveys, and focus group discussions with local farmers to gather detailed insights. The results indicate a high level of awareness and use of digital tools, such as mobile applications for market prices, weather forecasting, and crop management, which have led to significant improvements in crop yields and resource management. Despite these benefits, the study identifies challenges like limited training, infrastructural deficiencies, and socio-cultural resistance to technology adoption. The conclusion emphasizes the potential of digital technology to revolutionize agricultural practices in rural India, advocating for enhanced educational programs, infrastructure development, targeted incentives, and community engagement to overcome these barriers. Additionally, it suggests integrating traditional agricultural knowledge with modern digital tools to maximize benefits and ensure sustainable development. Mukherjee, Sweety et al., (2024) The introduction of digital platforms has transformed agricultural practices by farmers' access to essential information and advisory services. The present study undertaken to explore the level of awareness among farmers concerning various platforms for Extension and Advisory Services (EAS) in the Indo-Gangetic region of, a key agricultural zone. Utilizing a multi-stage random sampling approach, 350 farmers from Uttar Pradesh, Haryana, and West Bengal were selected for the . Awareness was measured using a structured questionnaire, and categorized into low, medium, and high categories following CSRF method. The study employed Pearson correlation and multiple linear analyses to explore the socio-demographic factors impacting . The findings reveal notable regional disparities, with Haryana farmers demonstrating higher awareness compared to other states. Key determinants viz. landholding size, ICT ownership, and social media usage positively affected awareness, while age and farming experience were negatively associated. The study underscores the need for focused digital literacy programs to boost the awareness of digital platforms among farmers, especially in areas with lower awareness.

Mogashane, C. et al., (2025) Smallholder farmers are challenged by limited resources, finances, and access to complex production technologies, which hinder the implementation of good production practices such as good seed selection, knowing when to plant and harvest, pest and disease control, and access to lucrative markets. This paper used quantitative

research methods to explore smallholder farmers' perceptions, adoptions, and differences in agricultural incomes between adopting and non-adopting farmers. This study reveals that smallholder farmers perceive access to real-time information as important; however, adopting digital technologies as information sources is still considered low. Binary regression analysis further revealed that the access to extension services variable positively correlated with adopting the internet (web pages), YouTube and Farmers Weekly website as information sources. Digital technologies were generally perceived to be reliable, time-effective, and easy to use; however, adopting these technologies had no significant impact on the farmer's agricultural income. This paper concludes that digital technology adoption is still considerably low; however, more and more farmers are not only open to adopting these technologies, but those who have adopted prefer incorporating them among sources they use to acquire farming information. Using digital technologies did not cause differences in agricultural income for these farmers. This study recommends public-private partnerships and community engagement through cooperatives to further drive technology adoption, fostering market access and improving livelihoods for smallholder farmers. Sam, Abraham et al., (2021) Globally, the agriculture sector is faced with multiple challenges especially in developing countries where smallholder farmers face barriers such as lack of access to financial services, information, formal and/or economic identity. The utilization of digital platforms in agriculture can offer solutions such as information services, financial inclusion and access to credit, digital identities, track and traceability systems, farm management systems and access to markets. This paper explores the research trends, theories and concepts associated with the utilization of digital platforms in agriculture. Using a scoping review and a directed content analysis approach, 52 papers were studied. It was found that studies have so far focused mainly on the policy, economics, knowledge and innovation systems, impact and adoption of digital agriculture platforms. The findings of this scoping review will aid in the understanding of the state of research on the utilization of digital platforms in agriculture and contribute to future research by helping to identify gaps in the relevant literature.

Concept of Digital Divide

The concept of the digital divide refers to the disparity between individuals or communities who have access to and can effectively use information and communication technologies (ICTs) and those who do not. This divide encompasses several dimensions, including physical access to technology, the quality of internet connectivity, and the skills necessary to use digital tools effectively (van Dijk, 2017). In the realm of agricultural extension, the digital divide highlights significant challenges faced by rural farming communities compared to their urban counterparts. Rural areas often experience limited access to ICT infrastructure, such as reliable internet connections and modern communication devices, which can hinder their ability to benefit from digital tools designed to support agricultural practices (Pardo & Villareal, 2016). Furthermore, low levels of digital literacy among farmers exacerbate these challenges, preventing them from fully utilizing digital resources such as mobile applications for weather updates, pest control, and market information (Bertot et al., 2016). Addressing the digital divide involves more than just improving physical access to technology. It also requires enhancing digital skills and providing relevant training to ensure that individuals can effectively use the technologies available to them (Hargittai & Walejko, 2020). In agricultural extension, bridging this divide is crucial for ensuring that farmers can access timely and accurate information that can lead to improved productivity and sustainable agricultural practices (Zhang et al., 2021). Efforts to close the digital divide in agricultural contexts include initiatives aimed at expanding ICT infrastructure in rural areas, developing affordable technology solutions, and offering training programs to enhance digital literacy among farmers (Duncombe & Heeks, 2018). These measures are essential for ensuring that the benefits of digital technologies are equitably distributed and can contribute to the advancement of agricultural practices and rural development.

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