European Economic Letters
ISSN 2323-5233
Vol 15, Issue 3 (2025)
http://eelet.org.uk

An Assessment of Communication Strategies for Agricultural Information Transfer to Stakeholders in Nagpur District, Maharashtra

Mr. Kothiram N. Girsawale
Dr. Ambedkar Institute of Management Studies and Research, Nagpur-India

Mr.Ashish r. Ingale
Orange city institute of management, Nagpur-India

Minakshi L. shendre
Orange city institute of management, Nagpur-India

Asst. Prof. Rajkamal
Orange City Institute of Management, Nagpur-India

Abstract:
This research was conducted to evaluate the utilization of social media as a source of agricultural information among farmers in the Umred block of Nagpur district in Maharashtra State. Farmers in the study area were selected as participants in this study, and the total sample size for this study was 300. Data collection was performed using a meticulously designed questionnaire, and the analysis was carried out using descriptive statistics, percentages, and tables. The study findings indicated that a significant portion (93%) of the respondents primarily utilize social media tools to gather agriculture-related information. WhatsApp, Facebook, and YouTube are some of the popular social media tools used, as indicated by the respondents. The respondents stated that they are using social media tools to gather agriculture-related information, often focusing on topics such as weather conditions and environmental information, educational and training information, technological information, and the variety of seeds. The study identified several critical challenges hindering the effective use of social media for agricultural information dissemination, including poor network access, high relative costs, delayed information delivery, and inadequate infrastructure. Consequently, it is recommended that efforts be made to ensure that relevant information is readily available and accessible to farmers on social media platforms to promote active engagement in agriculture. This is particularly important for rural farmers who may struggle to keep up with the latest agricultural innovations.

Keywords:
Dissemination of agriculture information to farmers, Agriculture Extension Services, The use of social media for agriculture information, Technology in Indian agriculture.

1. Introduction
The agricultural landscape of India reflects the country's remarkable diversity. It includes various agroecosystems shaped by shared climatic, soil, geological, vegetational, and other natural characteristics, which influence the range of habitats and the multitude of crops and livestock that have evolved over thousands of years. India is recognized as one of the earliest locations on the planet where settled agriculture emerged approximately 11,000 years ago. This region is also one of the eight primary centers of origin for crop plants globally. Approximately 166 crop species and 320 wild relatives of these crops have originated in this

area. The genetic diversity within each species is substantial; for instance, a single rice species has given rise to at least 50,000 unique varieties, while one mango species boasts over 1,000 varieties, varying in size from that of a peanut to that of a small pumpkin. India boasts the largest diversity of livestock globally, encompassing all eight buffalo breeds known worldwide. This remarkable diversification is influenced not only by physical adaptations but also by various economic, cultural, religious, and survival factors. For instance, numerous rice varieties and other crops are cultivated across different regions of India specifically for use in festivals, weddings, and other significant events. Additionally, certain crops are grown for their flavour, colour, or aroma, while others are valued for their pesticidal properties or ability to enhance soil fertility (Pathak et al., 2022a).

India showcases diverse cropping patterns, with around 60 major crops cultivated in various states, potentially more if localized varieties are included. Rice is the primary kharif season cereal, while wheat dominates the rabi season. Other significant cereals include maize, sorghum, pearl millet, and finger millet. Pulses, particularly chickpeas, are crucial for plant protein in many Indian diets. Additionally, oilseeds such as soybean, rapeseed mustard, and groundnut are vital for edible oil production. Important industrial crops include sugarcane, cotton, jute, mesta, tobacco, and tea. Non-staple crops consist of vegetables like tomatoes, onions, and potatoes (TOP), as well as fruits such as mangoes, bananas, mandarins, papayas, and melons. Various spices, including chilies, turmeric, and ginger, are cultivated for both domestic use and export, with a rich historical recognition worldwide (Pathak et al., 2022b).

The agricultural extension framework in India can be categorized into two primary types based on their operational focus: the Mass Extension or Field Extension System and the Frontline Extension System. The field extension system is fundamentally aimed at the widespread dissemination of established agricultural technologies to the general populace through various development departments and agencies. In contrast, the frontline extension system focuses on the rapid testing and demonstration of innovative technologies, employing distinct approaches and designs that significantly reduce the time required for these advancements to reach farmers. Additionally, this system emphasizes the capacity building of relevant stakeholders. The overall financial oversight of the frontline extension system is managed by the Indian Council of Agricultural Research (ICAR), with State Agricultural Universities (SAUs), several esteemed non-governmental organizations (NGOs), and State Governments playing a pivotal role at both the state and district levels (Singh et al., 2022).

In addition to frontline extension services, the mass extension initiatives in agriculture and related sectors are managed by the Department of Agriculture and Farmers Welfare (DAFW), the Department of Fisheries, the Department of Animal Husbandry and Dairying, as well as the relevant ministries of rural development. These entities operate through a comprehensive network of agricultural and associated departments at various administrative levels, including state, district, block, and village. Furthermore, commodity boards under the Ministry of Commerce offer specialized mass extension services tailored to their respective commodities. Agribusiness firms and input suppliers, despite potential conflicts of interest, also provide private extension services to farmers. Frontline extension serves as a vital catalyst for fostering positive behavioral changes, characterized by enhanced knowledge sharing and interaction facilitated by qualified professionals from research and educational institutions. The fundamental principle of the frontline extension system is that scientists who develop new technologies are best positioned to demonstrate these innovations directly to farmers in

their fields, allowing for immediate feedback that can inform further technological improvements (Singh et al., 2022).

Investment in agricultural research and extension plays a crucial role in enhancing productivity and fostering agricultural growth in India. Evidence from various countries indicates that funding in agricultural research and development holds substantial potential for yielding significant returns. Consequently, it is essential to formulate strategies for investing in agricultural research and extension to develop and distribute advanced technologies across diverse agroclimatic regions (Joshi and Varshney, 2022).

Emerging challenges, including climate change, the depletion of natural resources, and food insecurity, necessitate a novel approach and increased investment in research. Future agricultural research will demand greater capital investment, incorporating advanced tools, enhanced infrastructure, and improved skill sets. The adoption of next-generation technologies, such as climate-smart agriculture, cutting-edge innovations, and digital farming, calls for a revised strategy in both technology development and its dissemination. It is essential to reform the agricultural research and extension system by increasing financial allocations, enhancing human resource capabilities, establishing a supportive management framework, fostering interdisciplinary and inter-institutional collaboration, strengthening public-private partnerships, and developing suitable research infrastructure (Joshi and Varshney, 2022).

2. Objective

The following are the study objectives:

- To study about personal traits of farmers (in the study area) using social media.
- To determine the information-seeking behaviour of the farmers (in the study area).
- To find farmers' adoption level of social media (in the study area) for agricultural information.
- To identify the constraints faced by the farmers (in the study area) in adopting social media.
- To provide suggestions for increasing the use of social media by the farmers (in the study area).

3. Research Methodology

This research paper uses data from the field survey and observational research methods. This research was conducted to evaluate the utilization of social media as a source of agricultural information among farmers in the Umred block of Nagpur district in Maharashtra State.

The primary data used for this study were collected from the respondents with the use of a well-structured questionnaire administered to 300 farmers. The questionnaire was well structured in line with the objectives of the study such that it contained open-ended and closed-ended questions.

Descriptive statistics such as frequency, tables, percentages, and inferential statistics to achieve the objectives of the study.

4. Literature Review

Personal Traits of Farmers Using Social Media

According to (Darshan et al., 2017) research, around 90% of farmers utilized Facebook as it was available to them. Moreover, it was demonstrated that while 77% of farmers had been introduced to WhatsApp and used it, only 15% of farmers had been introduced to and used Twitter.

According to (Mishra et al., 2022), social media platforms are digital networks utilized for the dissemination and conversation of content created by users. This is offered in various forms such as opinion, video, audio, multimedia, etc. The way farmers network and interact has changed as a result, reaching even remote rural areas of the country. Study results showed that a large portion of participants, 70%, used social media to a moderate extent. YouTube was found to be the most popular social media platform, with Facebook and WhatsApp coming in second and third place, respectively.

In their study conducted by (Niranjan et al., 2023), it was discovered that farmers held highly unfavorable views towards sustainable agricultural practices (SAPs). Merely one-eighth of the participants expressed a positive perception of SAPs. The dissemination of information regarding SAPs among farmers was primarily facilitated by social factors such as progressive, neighboring, and related farmers. Notably, the majority of SAP informants were officials from the government's agricultural extension department.

Social media serves as an exceptional tool for agricultural intervention, offering reliable information and insights to farmers who may not receive timely support. In an era where knowledge is a catalyst for change, it is essential to utilize the latest technologies in extension services to engage and assist farmers effectively. The transformative impact of social media across various sectors underscores the importance of this study (Jena et al., 2024).

Traditionally, agricultural information has been shared through conventional media outlets such as newspapers, television, and radio. However, individuals, including farmers, are increasingly utilizing social media platforms like Facebook, Twitter, YouTube, and blogs to share both personal and agricultural insights. Research findings indicate that social media can significantly improve farmers' engagement and collaboration with extension officers (Ramavhale et al., 2024). The study advocates for the dissemination of agricultural news and communication via social media channels that are widely used within farming communities. It also suggests the establishment of information centers where farmers can access social media and receive support while navigating this information. Furthermore, it emphasizes the necessity for farmers to undergo training on effectively using social media platforms. Extension officers should also be trained to effectively package and convey pertinent information to farmers (Ramavhale et al., 2024).

Information Communication Behaviour of Farmers

The utilization of communication channels in agricultural communities tended to be linked with moderate information-seeking groups more frequently than with low or high-information-seeking groups (Patel, 2015).

The research conducted by (Kharmudai et al., 2018) centered on farmers who are enrolled in m4agriNEI, a mobile agricultural advisory service that is active in Meghalaya. The findings of the study indicated that the local channel was the primary choice and likely the most favored method for accessing, analyzing, and disseminating information. A majority of farmers (approximately 70%) possess average communication abilities.

The study conducted by (Rahman et al., 2020) examines the utilization of mobile phones by farmers in the Mymensingh District of Bangladesh to interact with agricultural extension workers. The research findings highlight several key challenges faced by farmers when communicating with agricultural extension agents through mobile phones. These include a limited understanding of receiving information via cell phones, indifference to accessing agricultural information through cell phones, and a lack of familiarity with cell phone operations.

(Shukla et al., 2022) Stated that a farmer admitted that his Android phone could serve as a breakthrough in closing information gaps among stakeholders in the study area. The study concludes that factors such as education, social participation, and annual family income play a crucial role in enhancing farmers' information-seeking behavior (ISB) in agriculture.

A smartphone is a device connected to the internet that enables users to share and exchange multimedia, audio, video, and opinion content. This technology has revolutionized communication among farmers in rural areas, facilitating interaction and information sharing nationwide (Kumar, 2023). Research indicates that a majority of farmers in Haryana have been utilizing mobile phones for over three years to access agricultural information. Proficient in Hindi, they use this language to acquire and disseminate knowledge on various agricultural practices such as post-harvest monitoring, weeding, thinning, and storage. Farmers rely on a variety of agricultural information platforms including the Kisan Agriculture Mobile App, WhatsApp, and YouTube. They believe that utilizing these digital tools is the most effective way to enhance their understanding of modern agricultural practices.

Introduction of Social Media and Its Use by Farmers

Various factors impact the adoption and utilization of technology-driven agricultural methods by farmers. Findings indicate that the implementation of new technologies is linked to shifts in the economic landscape of the country, the financial gains derived from technology adoption, information accessibility, travel costs, technological attributes, and individual-specific variables (Obayelu et al., 2017).

Pune-based freelance journalist and agriculture analyst Deepak Chavan, who founded the Indian Farmers Club in the clubhouse in June, said social media is a powerful tool for farmers to express themselves, and their thoughts. “These platforms are self-help systems that help each other,” he says (Murthy, 2021).

According to (Kesherwani et al., 2022), social media has made it more convenient to involve, identify, and elucidate agricultural methods that enhance quality, productivity, and output across various agricultural sectors. By engaging on platforms like YouTube, Twitter,

Facebook, WhatsApp, Instagram, Telegram, and LinkedIn, you can amplify your voice and share your narrative in revolutionary ways.

(Balkrishna and Deshmukh, 2017) highlighted the current and future applications of social media in agricultural and extension sectors in their analysis. The research revealed that Facebook is widely used for establishing pages and profiles. YouTube videos are an effective tool for sharing information through visual content. WhatsApp is commonly preferred by groups sharing similar interests due to its practicality in social media usage.

Agricultural development programs achieve much higher success rates when extension activities are incorporated. Farmers still rely on agricultural extension workers (EWs) to deliver comprehensive and continuous management support, technical guidance, and assistance. The significance of independent agricultural extension (IAE) workers has grown due to the scarcity of government EWs (Kurnia et al., 2023).

Limitations on Farmers' Adoption of Social Media

Farmers face several obstacles when utilizing social media, as stated by (Meena and Darshan, 2017). The study's results indicate that farmers perceive the exorbitant expenses associated with data services as the primary hindrance to adopting social media platforms. Additionally, inadequate network coverage and slow internet speeds, along with the challenge of sifting through numerous sources to find relevant information, contribute to the difficulties faced by farmers. The study emphasizes the significance of acknowledging farmers' limitations, as they directly influence the accessibility of the Internet and the utilization of social media platforms.

The ongoing Internet Plus Agriculture policy's efforts and the Chinese government's initiatives to alleviate poverty in underdeveloped areas and modernize agriculture in developed regions present captivating prospects for social media marketing (SMM) (Hang et al., 2021).

To fully harness the power of social media marketing (SMM), it is possible to combine and enhance it with video-sharing platforms. Moreover, by integrating digital technology into the entire process, it is feasible to significantly reduce economic inequality (Zaffar et al., 2019).

Using social media exclusively for agricultural purposes to enhance extension services is considered acceptable (Rani et al., 2023). Extension officers argue that social media can bridge the knowledge gap between themselves and farmers by facilitating access to crucial agricultural information. However, several challenges are hindering the delivery of agricultural extension services through social media. These challenges encompass the need for gender sensitivity, inadequate infrastructure, limited participation, absence of institutionalization, and insufficient support from government authorities. Despite these obstacles, social media is increasingly recognized for its value in providing agricultural extension services.

Mobile phones have been recognized as valuable tools for enhancing agricultural development by helping farmers optimize their use of resources. Nevertheless, there exist various challenges hindering farmers in developing countries from taking full advantage of

cell phone technology. These obstacles encompass the costs related to mobile phones, insufficient infrastructure, and language barriers (De Steur et al., 2022).

Suggestions for Increasing the Use of Social Media in the Agriculture Sector

Social media is recognized as a tool for digital communication. In India, its adoption for agricultural purposes has not seen substantial growth. Therefore, it is crucial to establish institutions and encourage all stakeholders to utilize training and other strategies to maximize their advantages in agricultural extension and rural development (Mamgain et al., 2020).

Social media serves as a valuable resource for farmers and promoting agriculture. When gathering information, farmers can save both time and money. Facebook is the internet's most widely used platform for creating profiles. The most commonly used way to consume information is by watching videos on YouTube. WhatsApp is predominantly used by connected groups as a social networking platform (Bhowal et al., 2022).

The impacts of Covid-19 on the agro-food system and its economy were investigated by (Sridhar et al., 2022). The study findings suggest strategies such as conserving resources and implementing technology in digital agriculture. This includes giving importance to methods like crop rotation, urban farming, small-scale farming, and hydroponics. Suggestions have been made that the agro-food sector could gain advantages through new ideas such as utilizing digital tools, specifically artificial intelligence, machine learning, deep learning, and blockchain technology.

Social media platforms offer a fresh avenue for sharing advanced agricultural technology. They serve as direct channels for users to express their experiences with the technology, shaping their attitudes towards its adoption. These attitudes play a crucial role in users' cognitive decision-making process. To gain insights into users' opinions on agricultural matters, the study conducted data mining on user comments and conversations related to agriculture on Twitter. Based on their findings, the research study (Yadav et al., 2023) proposes effective communication strategies for managers to enhance farmer engagement and improve decision-making among users.

The advancement of Agriculture 4.0 in Brazil represents a multifaceted challenge, necessitating a deeper understanding of the genuine obstacles that hinder its implementation within the agricultural production chain. Farmers have frequently identified several significant barriers, including inadequate infrastructure, limited access to solutions tailored for farmers, the necessity to promote research and development alongside innovative business models, concerns related to the age demographic, and insufficient effectiveness of data about the rural landscape (Silveira et al., 2023).

5. Findings

Social Media Tools Used in Accessing Agricultural Information

Most of the respondents (about 93%) have indicated that they are using social media tools to gather agriculture-related information.

Table 1: General Assessment of Use of Social Media Tools by the Respondents

Category of Responses	No. of Responses	In %
Yes	280	93%
No	20	7%
Total	300	100%

In today's technology-savvy world, even people in rural areas have become mobile-friendly due to the availability of mobile devices as well as availability of the information online.

Table 2: Type-wise Social Media Tool – Using or Not Using – In %

Type of Social Media Tool	Using	Not Using
WhatsApp	93%	7%
Facebook	93%	7%
You Tube	42%	58%
Kisan Call Centre	11%	89%
Kisan SMS Portal	6%	94%
e-Choupal	11%	89%
Twitter	0%	100%
LinkedIn	3%	97%

Some of the popular social media tools used, as indicated by the respondents are:

- WhatsApp (93% of the respondents).
- Facebook (93% of the respondents).
- YouTube (42% of the respondents).

Respondent's Frequency of Using Social Media Tools to Access Agricultural Information

Nearly two-thirds of the respondents (about 67%) have indicated that they are using social media tools occasionally to gather agriculture-related information. About 27% of the respondents said that they are regularly using social media tools.

Table 3: General Assessment of the Frequency of Use of Social Media Tools by the Respondents

Category of Responses	No. of Responses	In %
Regularly	80	27%
Occasionally	200	67%
Never	20	7%
Total	300	100%

When doing type-wise evaluation, the responses to this question are correlated with the responses given to the 'usage of social media tool' question.

Table 4: Type-wise Social Media Tool – Frequency of Using – In %

Type of Social Media Tool	Regularly	Occasionally	Never
WhatsApp	75%	18%	7%
Facebook	43%	51%	7%
You Tube	42%	52%	7%
Kisan Call Centre	6%	24%	70%
Kisan SMS Portal	0%	31%	69%
e-Choupal	11%	17%	72%
Twitter	0%	5%	95%
LinkedIn	3%	5%	92%

Earlier, we have seen that some of the popular social media tools used, as indicated by the respondents are:

- WhatsApp - Frequency of use
  - Regularly (75% of the respondents), Occasionally (18% of the respondents).
- Facebook - Frequency of use
  - Regularly (43% of the respondents), Occasionally (51% of the respondents).
- YouTube - Frequency of use
  - Regularly (42% of the respondents), Occasionally (52% of the respondents).

Type of Agricultural Information Sourced and Accessed Using Social Media

Some of the popular categories (Top-5) of information (of interest to the respondents) are:

- Weather Conditions and Environmental Information (78% of the respondents).
- Educational and Training Information (76% of the respondents).
- Technological Information (67% of the respondents).
- Variety of Seeds (66% of the respondents).
- Market Trends, Prices, and Stock available (65% of the respondents).

Table 5: Kind of Information (Searched) – In %

Kind of Information	Yes	No
Technological Information	67%	33%
Educational and Training Information	76%	24%
Business and Trade Information	37%	63%
Government Agri Policies and Plans	44%	56%
Weather Conditions and Environmental Information	78%	22%
Variety of Seeds	66%	34%
Agrochemicals	11%	89%
Credit Facilities, Source, Terms, and Conditions	53%	47%

Market Trends, Prices, and Stock available	65%	35%

Challenges Encountered when Accessing Agricultural Information Using Social Media by Farmers

Group 1: These statements are agreed upon by most of the survey respondents.

Top Five statements with a high rating (responses for 'Strongly Agree' and 'Agree' taken together).

Table 6: Top Five SD Statements – Group 1

Statement	Response (In %)
Language and cultural issues. [SD9]	50%
Farmers do not have faith in social media. [SD3]	48%
Absence of financial support in getting the facilities required to access social media. [SD2]	45%
Absence of encouragement and financial assistance in promoting the use of social media amongst the farmer community in the study area. [SD12]	31%
Fear that things will go wrong when using social media. [SD6]	26%

Conclusion

Some of the Recommendations

- Types of different information sources used by the respondents: It is seen that for diverse types of sources, a large percentage of respondents have mentioned the option "No." This indicates that there is a scope to promote these sources in the study area. This also means that the reach of these sources is limited in the study area.

- In the context of constraints faced by the farmers to obtain agriculture information, there is a need to work on some aspects. The following are some of them as mentioned by the respondents:
  - Lack of technical knowledge required to understand and use social media.
  - The absence of the required infrastructure results in connectivity issues and limited access to data.
  - Due to poor network connectivity, there is limited access to social media.
  - Fear that things will go wrong when using social media.
  - Absence of encouragement and financial assistance in promoting the use of social media amongst the farmer community in the study area.

- From the analysis of Group SD statements, some interesting aspects were found. In this context, the following measures may be taken:
  - Making efforts to address and resolve language and cultural issues (if any).
  - Encouraging farmers to use social media and providing them with related knowledge (as they are less inclined to use social media).
  - Ensuring availability of genuine, and authentic content online.

- Providing training (to farmers) about the use of social media.

References

1. Bhowal Pratik, Pandey Aman, and Maurya Abhilash Singh. (2022). A study on the role of social media in agriculture marketing and farmers and its scope. The Pharma Innovation Journal 2022; SP-11(6): 934-936. https://www.thepharmajournal.com/archives/2022/vol11issue6S/PartL/S-11-6-108-774.pdf.
2. Bite Bhalchandra Balkrishna Prof. and Deshmukh Anand A. Dr. (2017). A Study on the Role of Social Media in Agriculture Marketing and its Scope. Global Journal of Management and Business Research (E) Volume XVII Issue I Version I.
3. Da Silveira F., Da Silva S. L. C., Machado F. M., Barbedo J. G. A., and Amaral F. G. (2023). Farmers' perception of the barriers that hinder the implementation of agriculture 4.0. Agricultural Systems, 208, 103656.
4. Darshan N. P., Meena B. S., and Meena H. R. (2017). Influence of socio-economic characteristics of farmers on their use of social media in Haryana, India. (DOI: https://doi.org/10.20546/ijcmas.610.002).
5. De Steur H., Aparo N., and Odongo W. (2022). Unraveling Heterogeneity in Farmer's Adoption of Mobile Phone Technologies: A Systematic Review. Technological, Forecasting, and Social Change, 185, 122048. (DOI: https://doi.org/10.1016/techfore.2022.122048).
6. Hang H., Xiong J., and Zhao K. (2021). Digital inclusion in social media marketing adoption: the role of product suitability in the agriculture sector. Inf Syst E-Bus Manage. DOI: https://doi.org/10.1007/s10257-021-00522-7.
7. Jena Ankit Kumar, Jena Aanshuman, Sahoo Sweta, Mohanty Smarainka, and Sahoo Gayatri (2024). Commercial Vegetable Growers' Socio-economic Status on Usage of Social Media in Odisha, India. Journal of Experimental Agriculture International, 46(2), 99-107. DOI: https://doi.org/10.9734/jeai/2024/v46i22312.
8. Joshi P. K., and Varshney Deepak. (2022). Agricultural Technologies in India: A Review. NABARD Research and Policy Series No. 5/2022. (ISBN 978-93-5607-717-1). Department of Economic Analysis and Research, National Bank for Agriculture and Rural Development, Mumbai.
9. Kesherwani Bhagyashree Dr., Rout Sandeep, Padhy Deepayan, and Irachandran Subramanian. (2022). Social Media Help Farmers: For Improving Agriculture Practices. 11. 410-418. DOI: 10.31032/IJBPAS/2022/11.1.1051.
10. Kharmudai Achin, Devarani Loukham, Pandey Dileep, and Singh Ram. (2018). Communication Behaviour of Farmers Registered Under m4agriNEI. July 2018. Indian Research Journal of Extension Education.
11. Kumar Rajinder. (2023). Farmer's Use of the Mobile Phone for Accessing Information in Haryana: An Analytical Study. Open Information Science, 7(1), 20220145. (DOI: https://doi.org/10.1515/opis-2022-0145).
12. Kurnia Suci I., Ashari A., Iwan S. A., Saptana S., and Mewa A. (2023). Factors Influencing the Role and Performance of Independent Agricultural Extension Workers in Supporting Agricultural Extension. Open Agriculture, 8(1), 20220164, Feb. 2023. (DOI: https://doi.org/10.1515/opag-2022-0164).

13. Mamgain Ajay, Joshi Udit, and Chauhan Jaidev. (2020). Impact of Social Media in Enhancing Agriculture Extension. Agriculture and Food: E-Newsletter, Vol. 2, Issue 9, Sept. 2020, pg. 367-370, Article ID: 31526.
14. Meena Brajendra, and Darshan N. P. (2017). Constraints in Using Internet and Social Media as Perceived by Farmers in Karnal District of Haryana, India. International Journal of Current Microbiology and Applied Sciences. 6. 1465-1468. DOI: 10.20546/ijcmas.2017.610.173.
15. Mishra Ayush, Singh Jogender, Malik Joginder, and Maurya, Abhilash. (2022). Social Media Use Profile of Farmers in Haryana. 58. 51-54. DOI: 10.48165/IJEE.2022.58311.
16. Murthy Neeraja. (2021, July 30). Farmers make time for social media to network, share, and solve. The Hindu, July 30, 2021. https://www.thehindu.com/sci-tech/agriculture/farmers-make-time-for-social-media-to-network-share-and-solve/article35630298.ece.
17. Niranjan S., Singh D. R., Kumar N. R., Jha G. K., and Nain M. S. (2023). Do Information Networks Enhance Adoption of Sustainable Agricultural Practices? Evidence from Northern Dry Zone of Karnataka, India. Indian Journal of Extension Education, Vol. 59, No. 1, 86-91, (Jan. – Mar. 2023). (DOI: https://doi.org/10.48165/IJEE.2023.59118).
18. Obayelu A. E, Ajayi O. D, Oluwalana E. O. A., and Ogunmola, O. O. (2017). What does the literature say about the determinants of the adoption of agricultural technologies by smallholder farmers? Agricultural Research and Technology: Open Access Journal, 6 (1): 1-5.
19. Pathak H., Mishra J. P., and Mohapatra T. (2022a), Indian Agriculture after Independence. Indian Council of Agricultural Research, New Delhi 110 001. ISBN: 978-81-7164-256-4.
20. Pathak H., Rout P. K., and Mohapatra T. (2022b), Indian Agriculture: Achievements and Aspirations. pp. 1-40. Indian Council of Agricultural Research, New Delhi 110 001. ISBN: 978-81-7164-256-4.
21. Patel B. (2015). A study on utilization pattern of communication channels by the farmers of Sehore block of Sehore district, Madhya Pradesh. M.Sc. (Ag.). Thesis Submitted to Rajmata Vijyaraje Scindia Krishi Vishwa Vidyalaya, Jabalpur (M.P.)
22. Rahman M., Uddin Mohammed, and Khan Md. (2020). Communication Behaviour of Farmers with the Agricultural Extension Agents Using Cell Phone: A Case of Bangladesh.
23. Ramavhale P. M., Zwane E. M., and Belete A. (2024). The Benefits of Social Media Platforms Used in Agriculture for Information Dissemination. South African Journal of Agricultural Extension, Pretoria, 52(2), 77-90. DOI: http://dx.doi.org/10.17159/2413-3221/2024/v52n2a15342.
24. Rani Ella and Verma Vandana (2023, May 5). Role of Social Media in Extension – A Review. International Journal of Humanities, Social Sciences, and Management (IJHSSM), Volume 3, Issue 3, May-June 2023, pp. 7-17.
25. Shukla Gyan, Ansari, M.N., Lal Sudhanand, and Bandhavya Mallela. (2022). Information Seeking Behaviour of Farmers through Mobile: An Innovative ICT Tool. DOI: 10.13140/RG.2.2.27632.53765.
26. Singh A.K. Roy Burman R., Chahal V. P., Singh R., and Keshav (2022), Achievements in Agricultural Extension in Independent India. pp. 333-357. Indian Council of Agricultural Research, New Delhi 110 001. ISBN: 978-81-7164-256-4.

27. Sridhar A., Balakrishnan A., and Jacob M. M. (2022). Global impact of Covid-19 on agriculture: role of sustainable agriculture and digital farming. Environ Sci Pollut Res. DOI: https://doi.org/10.1007/s11356-022-19358-w.
28. Yadav Jitendra, Yadav Avikshit, Misra Madhvendra, Rana Nripendra P., and Zhou Jianlong. (2023). Role of Social Media in Technology Adoption for Sustainable Agricultural Practices: Evidence from Twitter Analytics. Communications of the Association for Information Systems, 52, 833-851. (DOI: https://doi.org/10.17705/1CAIS.05240).
29. Zaffar M. A., Kumar R. L., and Zhao K. (2019) Using agent-based modelling to investigate the diffusion of mobile-based branchless banking services in a developing country. Decision Support System 117:62–74. DOI: https://doi.org/10.1016/j.dss.2018.10.015.