P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating: 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 7; Issue 9; September 2024; Page No. 561-565

Received: 06-07-2024
Accepted: 11-08-2024

Indexed Journal
Peer Reviewed Journal

Knowledge and access to agriculture information systems (AIS) in modern society: Bridging the gap for sustainable development

[1]Sanjay Shahjit, [2]Lakesh Kumar and [3]Naveen Kumar Tamrakar

[1] Assistant Professor, Library and Information Science, MATS University, Raipur, Chhattisgarh, India

[2] Guest Librarian, Govt. Gundadhur PG College Kondagaon, Chhattisgarh, India

[3] Guest Librarian, Govt. Gajanan Madhav Muktibodh College, Sahaspur Lohara, Kabirdham, Chhattisgarh, India

DOI: https://doi.org/10.33545/26180723.2024.v7.i8h.1076

Corresponding Author: Sanjay Shahjit

Abstract

The distribution and retrieval of information have been revolutionized by advancements in information technology, resulting in the development of sophisticated Agriculture Information Systems (AIS). This paper explores the significance of knowledge and access to Agriculture Information Systems in today's society, highlighting the benefits and challenges they present, and emphasizing their crucial role in establishing resilient and sustainable farming systems. It is essential to also adopt the idea of recycling resources and incorporate agriculture into a circular system. Economy, reducing waste and discovering new methods to make use of resources. Achieving this transformation demands a united front, with farmers, scientists, policymakers, and consumers collaborating to construct a food system that nourishes a growing population while safeguarding the environment. Information systems empower collaboration and knowledge sharing within the agricultural community. Online platforms and mobile applications bridge geographical divides, allowing farmers to establish a communication link and access research, best practices, and expert advice. By embracing technological advancements and empowering farmers with valuable knowledge, we can unlock the transformative potential of agriculture, leading to a brighter and more sustainable future.

Keywords: Agriculture Information Systems, sustainable farming, modern agriculture, information processing and dissemination.

Introduction

Agriculture, the lifeblood of global economies, confronts numerous obstacles in contemporary society. Climate change, population growth, and dwindling resources necessitate a paradigm shift in agricultural practices. Access to precise and up-to-date information is crucial for empowering farmers, researchers, and decision-makers to drive sustainable agricultural development. Technological advancements have transformed information sharing and retrieval, facilitating the development of cutting-edge Agricultural Information Systems (AIS). This paper examines the crucial role of knowledge and AIS access in today's society, exploring their benefits and challenges while emphasizing their indispensable contribution to building resilient and sustainable agricultural practices.

Insufficient resources, exacerbated by climate change and a growing population, necessitate a significant shift in our farming practices. As water availability decreases, arable land shrinks, and essential nutrients become scarcer, we must develop enduring solutions to feed more people. Traditional farming methods that consume excessive water, rely on chemical fertilizers, and practice monoculture are no longer sustainable.

The solution to this challenge resides in a shift towards regenerative farming practices, which hold the key to soil rejuvenation, biodiversity enhancement, and water preservation. These methods include no-till farming, cover cropping, agroforestry, and integrated livestock management. By adopting these practices, we can enhance soil carbon sequestration, increase water infiltration, reduce erosion, and decrease dependency on synthetic fertilizers and pesticides.

Moreover, technological advancements such as precision agriculture, vertical farming, and hydroponics can optimize resource use and boost yields in limited spaces. Embracing a circular economy approach in agriculture, through recycling nutrients, reducing waste, and repurposing resources, is also crucial.

Collaborative efforts among farmers, scientists, policymakers, and consumers are imperative to the successful implementation of these transformative changes. Through collaborative action, we can establish a resilient and sustainable food system that nourishes a burgeoning population while safeguarding our natural environment.

Literature Review

Aubert *et al.* (2012) [1] rent an empirical evaluation to confirm their findings. They make use of survey information to study how one of a kind variables effect farmers` adoption behaviors. Through statistical evaluation, they

display the importance of IT skills in improving agricultural sustainability via way of means of optimizing useful resource allocation and minimizing environmental effect.

Ehrlich *et al*. (1994) [2] gift a pivotal look at titled "Crop location tracking inside a sophisticated agricultural facts system," which investigates the mixing of superior geospatial technology in agricultural tracking. The article underscores the important position of Geographic Information Systems (GIS) and far off sensing in improving precision agriculture practices. By leveraging satellite tv for pc imagery and spatial evaluation techniques, Ehrlich *et al*. show how those technology allow real-time tracking and control of crop areas. Their findings emphasize the functionality of GIS to facilitate correct estimation of crop quantity and condition, thereby enhancing aid allocation and decision-making approaches for farmers and agricultural planners alike. This look at contributes to the wider literature through illustrating the sensible packages of IT in optimizing agricultural productiveness and sustainability via improved spatial information control and evaluation.

Hansen *et al*. (2011) [4] carried out a complete evaluation titled "Review of seasonal weather forecasting for agriculture in Sub-Saharan Africa" to have a look at the efficacy and software of seasonal weather forecasts (SCFs) in agricultural decision-making throughout the region. The look at addresses the widespread demanding situations posed via way of means of weather variability and change, emphasizing the crucial position of SCFs in improving resilience and variation techniques amongst farmers. Hansen *et al*. synthesize findings from diverse research and initiatives, highlighting improvements in weather modeling strategies and the combination of SCFs into agricultural making plans and management. They underscore the ability of SCFs to tell planting decisions, optimize useful resource allocation, and mitigate dangers related to weather-associated uncertainties. Furthermore, the evaluation identifies gaps in contemporary forecasting practices, together with problems of accessibility, communication, and capability constructing amongst stakeholders. This look at contributes precious insights into the evolving area of weather forecasting for agriculture, advocating for more desirable collaboration among meteorologists, researchers, and agricultural practitioners to enhance the relevance and effectiveness of SCFs in helping sustainable agricultural improvement in Sub-Saharan Africa and beyond.

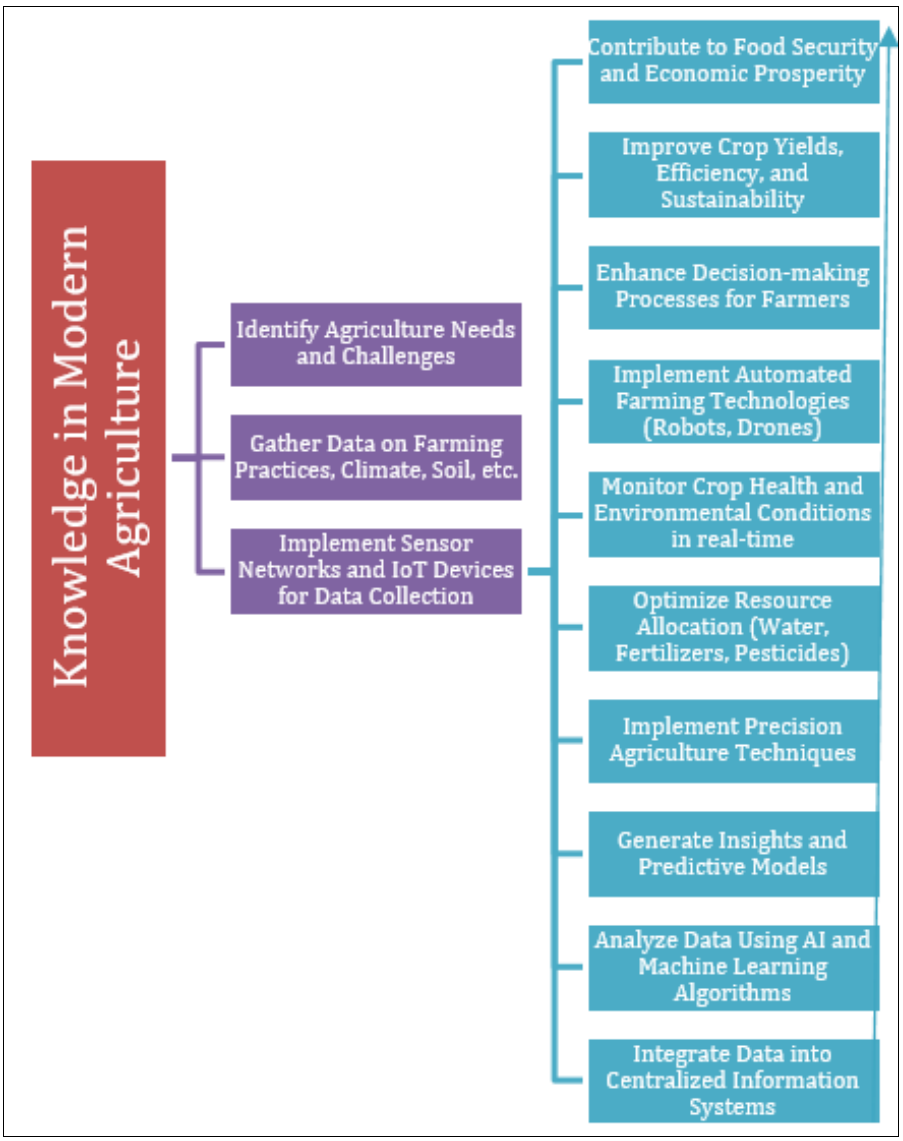

Fig 1: Knowledge in Modern Agriculture

The Significance of Knowledge in Modern Agriculture

Modern agriculture relies on knowledge to increase production, promote sustainability, and improve overall efficiency. The advent of information systems has transformed the way farmers acquire, process, and use knowledge to make informed decisions. These systems enable farmers to optimize all aspects of their operations by providing real-time data, analytical tools, and expert insights.

Integrated information systems compile and analyze extensive data from sources like market research, weather observations, and sensors to provide actionable insights. These insights aid farmers in optimizing crop selection, irrigation timing, pest control, and financial planning. By using combined data, farmers can make knowledgeable choices that optimize crop production and financial gain. Information systems empower farmers with data-driven guidance to optimize agricultural practices. The integration of diverse data sources within information systems enables farmers to enhance their decision-making processes. For instance, weather forecasting systems offer accurate predictions of weather patterns, allowing farmers to plan their activities and minimize risks. Yield monitoring devices allow farmers to track crop performance in real time, enabling them to pinpoint areas for improvement and optimize yields.

Bridging the gap between farmers and agricultural experts, information systems cultivate collaboration and knowledge sharing through digital platforms and mobile applications. These systems empower farmers with access to cutting-edge research, best practices, and expert guidance, transforming agriculture into a data-driven field. By providing farmers with accurate data to inform their decisions, information systems enhance productivity, minimize costs, and promote sustainable practices. Recognizing their potential to ensure food security and financial prosperity for future generations, the importance of information systems in modern agriculture will only grow.

The Role of Agriculture Information Systems (AIS)

Agriculture Information Systems leverage advanced technological platforms to seamlessly connect data to practical applications.

Data Collection and Analysis

Modern agriculture relies heavily on data collection and analysis for informed decision-making and enhanced crop production. Data is sourced from various platforms including weather stations, remote sensing technology, soil tests, and farm records. Weather stations monitor atmospheric conditions such as temperature, humidity, rainfall, and wind speed, aiding crop management and forecasting crop production. Remote sensing utilizing satellite images and drones provides a comprehensive analysis of crop health, soil moisture, and other parameters, facilitating timely interventions and precision farming. Soil testing reveals soil characteristics such as nutrient concentration, pH, and texture, assisting farmers in optimizing fertilizer usage and improving soil fertility. Farm records, meticulously maintained by farmers, track yields, production costs, and other pertinent information to enable performance evaluation and informed decision-making. By amalgamating data from these sources, farmers can obtain a comprehensive understanding of their operations, recognize trends, and make well-informed decisions to boost crop productivity and sustainability.

Information Processing and Dissemination

Turning raw data into actionable insights is essential. This involves using analytical tools to analyze data, uncover patterns, and gain valuable insights. These insights are then effectively communicated through data visualization techniques such as charts, graphs, and dashboards, making the information easier to comprehend and interpret. Additionally, custom reports are generated to meet specific user needs, providing a complete view of the data. This efficient process allows organizations to make knowledgeable decisions, optimize operations, and obtain a competitive edge. By effectively utilizing information processing and dissemination, businesses can fully leverage their data, empowering them to pursue strategic initiatives, improve customer experiences, and achieve their long-term goals.

Knowledge Management

Knowledge management entails adopting a comprehensive approach to collect, organize, and share information within an organization or community. This can be achieved through the use of online tools, mobile applications, and educational materials, which allow for the effective collection, storage, and distribution of valuable knowledge and skills. These resources facilitate the creation of knowledge databases, providing easy access, search, and retrieval of information for authorized users. Mobile applications enhance the accessibility of knowledge management systems, enabling employees to access information and collaborate remotely. At the same time, online courses and webinars help individuals to keep updated with current trends and best practices in their fields through ongoing learning opportunities. Constantly updating through online courses and webinars helps people stay current with the latest industry advancements and top practices.

Decision Support Tools

Agricultural industry is being transformed by decision support tools which provide farmers with timely and location-specific predictions, recommendations, and insights to optimize their farming practices. By utilizing advanced technologies such as artificial intelligence, machine learning, and remote sensing, these tools analyze extensive datasets encompassing factors like weather patterns, soil conditions, crop health, market prices, and more. As a result, farmers receive actionable insights such as optimal planting dates, fertilization schedules, irrigation requirements, pest and disease warnings, and market forecasts. This enables farmers to make well-informed decisions, maximizing crop yields, minimizing resource consumption, and increasing profitability.

For example, a tool that supports decision-making can inform a farmer of an approaching drought based on weather forecasts and soil moisture data, thus allowing them to modify their irrigation practices and avoid possible crop damage. In the same way, these tools can recommend the

most efficient pest control techniques by tracking real-time crop health and local pest infestations. By giving farmers precise information in a timely manner, decision support tools bridge the gap between data and action, enabling farmers to adapt to shifting conditions, optimize their operations, and increase the sustainability and resilience of their farms.

Benefits of Access to AIS

The Advantages of Access to Agricultural Information Systems (AIS)

1. Enhanced Decision-Making Capabilities through Agricultural Information Systems (AIS): By giving farmers up-to-the-minute information on weather conditions, market prices, disease outbreaks, and crop performance, AIS enables farmers to make informed decisions about crop selection, irrigation techniques, and pest management, leading to increased yields and profitability.
2. Improved Communication through AIS: As a communication platform, AIS facilitates interaction among farmers, extension services, and research institutions. Farmers can share knowledge and experiences, while extension agents and researchers can disseminate information on best practices and new technologies.
3. Increased Efficiency in Agriculture with AIS: AIS optimizes agricultural processes by merging data from different sources such as sensors, drones, and satellite imagery. This integration enables farmers to monitor crop health, improve irrigation methods, and reduce wastage.
4. The Agriculture Information System supports disadvantaged farmers by closing the information divide, especially for small-scale farmers in developing nations who frequently do not have access to traditional resources. Mobile and online platforms offer the information and resources necessary for improving their livelihoods.

Online platforms for agricultural content in India

1. **Government Websites**: Indian Council of Agricultural Research (https://icar.org.in/)
2. **AgriTech Platforms:** AgriNation (https://www.agrination.in/) or AgriBazaar (https://www.agribazaar.com/) often have educational resources and content.
3. **Educational Institutions:** Many agricultural universities and institutions in India have their e-content portals. For instance, the Indian Agricultural Research Institute (IARI) might have online resources available for students and researchers.
4. **Online Learning Platforms:** Discover online educational websites such as Coursera. (https://www.coursera.org/) or Udemy (https://www.udemy.com/), which often offer courses on agriculture and related topics. While not specific to India, they might have relevant content.
5. **Research Journals and Publications:** Websites of agricultural research journals or publications like the Indian Journal of Agricultural Sciences might have access to e-content or articles related to agriculture.

Challenges to Access and Utilization

Challenges in Accessing and Utilizing Agricultural Information Systems, despite the potential benefits, obstacles remain in achieving widespread access and effective utilization of Agricultural Information Systems:

1. **Overcoming the Digital Divide:** The absence of internet connection, fundamental computer skills, and digital literacy in rural regions prevents numerous farmers from obtaining digital information.
2. **Language Obstacles:** Farmers who speak local dialects may encounter difficulties in comprehending information presented in English or other dominant languages.
3. **Financial Constraints and Infrastructure:** The high expenses related to technology, mobile devices, and internet services pose challenges for farmers with limited financial resources.
4. **Trust Issues and Skepticism:** Long-standing traditional farming practices and doubts about new technologies can hinder the acceptance of Agricultural Information Systems.
5. **Data Precision and Credibility:** It is crucial to maintain the accuracy and reliability of data used in Agricultural Information Systems to avoid misinformation and inaccurate recommendations.

Bridging the Gap: Future Directions

Agricultural Information Systems (AIS) have the capacity to greatly advance sustainable development by improving agricultural practices, increasing productivity, and promoting efficient resource use. Yet, with all the technological progress and increasing availability of data is still present significant challenges that must be addressed to completely achieve this potential. One major challenge is the digital divide, or the gap between those with and without access to digital technologies. This divide is especially apparent in rural areas where farmers may not have the necessary infrastructure, skills, or resources to access and benefit from AIS. To overcome this, investment in digital infrastructure such as broadband and mobile networks is required, as well as training and support for farmers to develop digital literacy skills.

Another challenge is the lack of standardization and interoperability within AIS. With many different systems and platforms in use worldwide, they often fail to communicate or share data effectively. The lack of consistent data formats and incompatible systems hinders our ability to compile and analyze agricultural data. This makes it challenging to make well-informed choices and assess the effectiveness of the Agriculture Information System. To address this issue, we must champion open standards, encourage interoperability between systems, and promote collaboration and data sharing among relevant organizations and stakeholders.

Agricultural Information Systems face a critical challenge in protecting data privacy and security due to the sensitive nature of the information they handle, including personal and confidential business data. As such, strong data protection policies and measures are crucial to ensure responsible and secure data management. This necessitates the implementation of robust technical and organizational safeguards to prevent unauthorized access, utilization, and

disclosure of sensitive information.

To fully leverage the potential of Agricultural Information Systems for sustainable development, a comprehensive and inclusive approach that involves all relevant stakeholders, including farmers, governments, private sector companies, and civil society organizations, is necessary. This approach should be guided by the principles of sustainability, inclusivity, and innovation, with a focus on developing the necessary infrastructure, skills, and capacities to effectively utilize these systems.

In conclusion, realizing the full potential of Agricultural Information Systems for sustainable development requires collaboration from all stakeholders. By addressing challenges such as the digital divide, lack of standardization and interoperability, and data privacy and security, we can unleash the transformative power of these systems in agriculture and contribute to achieving the Sustainable Development Goals. Creating a supportive atmosphere is essential that fosters innovation, supports farmers, and promotes sustainable development.

Conclusion

Agriculture's future strongly depends on gaining knowledge and using agricultural information systems. These systems are crucial in closing the gap between digital disparities, supporting local adaptation, and encouraging sustainable practices. By focusing on the creation and application of Agricultural Information Systems, we can tackle food security issues, boost economic growth, and increase environmental resilience. By accepting technological innovations and giving farmers important knowledge, we can unleash agriculture's transformative power, resulting in a brighter and more sustainable future.

Agricultural information systems, which provide knowledge and access to data, are essential to the future of agriculture, bringing about an era of precision, sustainability, and resilience. It is crucial to close the digital divide, promote inclusivity, and empower farmers with easily accessible data to achieve this vision. Farmers' decision-making can be improved by providing real-time insights on weather, market prices, crop health, and best practices, resulting in increased yields, lower input costs, and improved profitability. In addition, these systems provide access to vital resources such as climate-smart technology, water management strategies, and disease management protocols, enabling Farmers need to adjust to evolving conditions. environmental conditions and mitigate risks. Agricultural information systems also provide online platforms that connect farmers to markets and buyers, promoting fair trade and minimizing post-harvest losses, thus contributing to food security and economic growth. The integration of artificial intelligence and machine learning into these systems enhances their precision, personalization, and automation, transforming the agricultural landscape into a technologically advanced and data-driven sector.

Reference

1. Aubert BA, Schroeder A, Grimaudo J. IT as enabler of sustainable farming: An empirical analysis of farmers' adoption decision of *precision agriculture* technology. Decision Support Systems. 2012;54(1):510-520. DOI: 10.1016/j.dss.2012.07.002
2. Ehrlich D, Estes JE, Scepan J, McGwire KC. *Crop area monitoring* within an advanced *agricultural information* system. Geocarto International. 1994;9(4):31-42. DOI: 10.1080/10106049409354468
3. Feder G, Just RE, Zilberman D. Adoption of *agricultural innovations* in developing countries: a survey. Economic Development and Cultural Change. 1985;33(2):255-298. DOI: 10.1086/451461
4. Hansen JW, Mason SJ, Sun L, Tall A. *Review of seasonal climate forecasting for agriculture* in sub-Saharan Africa. Experimental Agriculture. 2011;47(2):205-240. DOI: 10.1017/s0014479710000876
5. Horwith B. A role for *intercropping* in modern agriculture. BioScience. 1985;35(5):286-291. DOI: 10.2307/1309927
6. Kizilaslan N. *Agricultural information systems*: A national case study. Library Review. 2006;55(8):497-507. DOI: 10.1108/00242530610689347
7. Ozcatalbas O, Brumfield RG, Ozkan B. The *agricultural information system* for farmers in Turkey. Information Development. 2004;20(2):97-105. DOI: 10.1177/0266666904045322
8. Rigby D, Cáceres D. *Organic farming* and the sustainability of *agricultural systems*. Agricultural Systems. 2001;68(1):21-40. DOI: 10.1016/s0308-521x(00)00060-3
9. *Agricultural survey methods*. Wiley eBooks; c2010. DOI: 10.1002/9780470665480
10. Slingo JM, Challinor AJ, Hoskins BJ, Wheeler TR. Introduction: *food crops* in a changing climate. Philosophical Transactions - Royal Society. Biological Sciences. 2005;360(1463):1983-1989. DOI: 10.1098/rstb.2005.1755
11. Neill SP, Lee DR. Explaining the adoption and disadoption of *sustainable agriculture*: the case of *cover crops* in Northern Honduras. Economic Development and Cultural Change. 2001;49(4):793-820. DOI: 10.1086/452525
12. Engel S, Pagiola S, Wunder S. Designing *payments for environmental services* in theory and practice: An overview of the issues. Ecological Economics. 2008;65(4):663-674. DOI: 10.1016/j.ecolecon.2008.03.011