IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, April 2026
Impact Factor: 8.2

Design and Development of a Web-Based Decision Support System for Indian Agriculture: A Case Study of Krushi Mitra

Purva Patil, Siddhesh Waghmare, Aditya Yelmar, Mr. Pritesh Patil, Mrs. Mrunal Pathak
Department of Information Technology
AISSMS Institute of Information Technology, Pune, India
purvap783@gmail.com, siddheshwaghmare9m@gmail.com, adityayelmar60@gmail.com

Abstract: *Agriculture remains one of the most important sectors for sustaining food security, employment, and rural development.[1] At the same time, farmers often face challenges such as lack of timely information, fragmented access to guidance, uncertainty in decision-making, and limited use of digital tools.[4] These issues reduce productivity and make farming more dependent on experience rather than data-driven planning.[5] In recent years, digital platforms have emerged as an effective method for improving agricultural support services.[6] This paper presents the design and development of a web-based decision support system called Krushi Mitra, created to assist farmers by providing a centralized digital platform for agricultural information and support.[3] The proposed system aims to simplify access to farming-related knowledge and help users make better decisions through an easy-to-use interface.[3] The paper discusses the problem background, motivation, proposed design, development approach, system modules, implementation strategy, and expected usefulness of the platform. The system is developed using a web-based architecture so that it can be accessed from common devices with internet connectivity.[3] The study also emphasizes the importance of usability, accessibility, and future scalability in smart agriculture platforms.[8] The paper further argues that even a simple decision support system can contribute meaningfully to digital transformation in agriculture by reducing dependency on scattered information sources and improving informed decision-making among farmers.[4].*

Keywords: Smart Agriculture, Decision Support System, Agriculture Web Application, Digital Farming, Farmer Assistance, Agri-Tech, Web-Based Platform

I. INTRODUCTION

Agriculture is the backbone of many economies, especially in countries where a large part of the population depends on farming for livelihood.[1] Farmers play a central role in food production, but they frequently face difficulties related to weather uncertainty, crop selection, irrigation planning, soil conditions, market dependency, and lack of timely guidance.[4] In many rural settings, farming decisions are still made using traditional methods, personal experience, or advice from local sources.[3] Although such experience is valuable, the increasing complexity of modern agriculture makes it difficult to rely only on conventional practices.[10]

In the Indian context, this issue becomes even more important because agriculture still employs a major portion of the workforce—up to 70%—and remains closely linked to rural income and national food security.[1] At the same time, many farmers still do not have easy access to digital tools, structured decision systems, or updated agricultural guidance.[4] This creates a gap between the availability of technology and its actual use in the field.[11]

The rapid growth of digital technology has opened new opportunities to improve the farming ecosystem.[6] Web applications, mobile platforms, data dashboards, and decision support systems are increasingly being used to make agricultural information more available and actionable.[13] A decision support system can help users organize information, understand options, and make more informed decisions.[16] In agriculture, such systems can support farmers by bringing together relevant information in one place and reducing the confusion caused by scattered sources.[18]

The project Krushi Mitra is designed as a web-based agricultural assistance platform.[3] The goal of the system is not only to store or display information, but also to help users interact with agricultural resources in a simple and meaningful way.[3] The system is intended to be useful for farmers, agricultural learners, and others who need access to farming-related guidance.[3] By presenting information through an easy-to-use interface, the platform aims to reduce digital barriers and make agricultural knowledge more accessible.[19]

Background and Motivation

The motivation behind this project arises from real challenges faced in agriculture. Farmers often need to make decisions related to crop choice, weather conditions, irrigation scheduling, pest management, and resource usage. In many cases, the information required for these decisions is available, but not in a simple or centralized format. As a result, users may need to consult multiple sources, ask different people, or depend on guesswork. This can lead to delays, inefficiency, and poor decision-making.

Another major challenge is the digital divide between urban and rural areas. While many sectors have benefited from online systems and digital tools, a large section of the farming community still has limited access to such technologies or lacks confidence in using them. Therefore, any digital agricultural solution must be simple, accessible, and practical. A complicated interface or technical workflow can reduce adoption, especially among first-time users.

The idea of Krushi Mitraa is built around the concept of support rather than complexity. The platform aims to become a digital companion for agricultural users by providing useful information in an organized form. The system reflects the need for a light, understandable, and functional application that can be extended in future with more advanced features such as analytics, prediction, multilingual support, or AI-based recommendations.

The project is also motivated by the growing relevance of smart agriculture. Across the world and especially in India, agriculture is shifting toward data-informed practices. Sensors, weather services, digital marketplaces, and online advisory platforms are slowly becoming part of the farming environment. A student-level project like Krushi Mitraa acan act as a foundational step in this direction by building the base structure of a digital farming system.

Problem Statement

Despite progress in technology, many farmers still face difficulty in accessing clear and timely agricultural information.[4] The key problems addressed by this project are:

Farmers do not always have a centralized digital platform for agricultural support.[3]

Information is often scattered across books, local sources, websites, and videos.[4]

Traditional decision-making methods may not reflect current conditions such as weather changes or updated farming practices.[10]

Many existing digital systems are too complex or too technical for rural users.[13]

There is a need for an accessible web-based platform that can present agricultural guidance in a simple and practical way.[3]

Objectives of the Study

The specific objectives of Krushi Mitra are:

- Develop a digital platform that provides agricultural guidance in a centralized manner.[3]
- Create a user-friendly interface suitable for farmers and first-time users.[3]
- Support decision-making through organized presentation of information.[3]
- Build a modular web application that can be enhanced in the future.[3]
- Demonstrate how simple digital systems can contribute to smart agriculture.[3]
- Create a foundation for future advanced features such as weather integration and analytics.[3]

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 3, April 2026 Impact Factor: 8.2

Scope of the Project

The scope of Krushi Mitra is focused on providing a web-based platform for agricultural support.[3] Within the current scope, the system offers information-related support and basic user interaction suitable for beginner-level adoption.[3] The project does not attempt to replace expert agricultural consultation or full-scale AI-driven platforms but serves as a practical prototype and digital support tool.[3]

The scope of the Krushi Mitra system can be further extended to support a broader range of agricultural stakeholders beyond individual farmers, including agricultural students, researchers, and small-scale agri-entrepreneurs. While the current implementation focuses on structured information delivery and basic decision support, the system architecture allows future expansion toward region-specific recommendations, integration with government agricultural schemes, and localized advisory services. Additionally, the platform can be adapted to include seasonal crop planning tools, resource optimization strategies, and community-driven knowledge sharing modules. This makes the system not only a standalone application but also a potential component of a larger digital agriculture ecosystem aimed at improving productivity, knowledge dissemination, and rural development.

II. LITERATURE REVIEW

Digital agriculture has become an important research area because of the need to improve productivity and accessibility of information.[6] Research often focuses on precision agriculture [6], crop recommendation [14], and weather analysis.[20] Many systems are built using sensors, machine learning, or cloud computing.[1] However, the success of these systems depends heavily on usability; technically powerful platforms may fail if the intended users cannot easily operate them.[18] This is particularly relevant in rural settings where digital literacy varies.[4]

Another observation is that many agricultural platforms are fragmented, requiring users to switch between systems for weather, crop advice, and market prices.[4] A centralized approach, as adopted by Krushi Mitra, reduces effort and improves consistency.[3] Literature also emphasizes modularity, ensuring that a system can evolve from basic information delivery to a more intelligent support tool over time.[8]

Recent studies in digital agriculture highlight the growing importance of decision support systems in improving farm productivity, resource efficiency, and sustainability. Many existing solutions focus on advanced technologies such as machine learning, IoT-based monitoring, and predictive analytics; however, these systems often face challenges related to usability, accessibility, and adoption among rural users. Research indicates that overly complex systems can create barriers rather than solutions, especially for users with limited digital literacy. Therefore, there is a growing emphasis on developing user-centric and lightweight DSS platforms that prioritize simplicity, clarity, and practical usability. The Krushi Mitra system aligns with this research direction by focusing on structured information delivery and ease of use, thereby addressing the gap between technological capability and real-world adoption in agriculture.

Statistical Analysis and Research Evidence

The adoption of digital technologies in Indian agriculture is increasing, but significant gaps persist. Studies indicate that only around 30% of Indian farmers currently use digital technologies.[23] Future projections suggest that 60–70% of farmers may access digital platforms by 2025–2027.[25] However, awareness of advanced tools remains low, with only 34%–42% of farmers familiar with technologies like AI or drones.[3]

Surveys indicate that 59% of farmers have a positive attitude toward adopting new technologies if they are accessible.[28] Government initiatives support this shift; the Digital Agriculture Mission, with a budget of ₹2,817 crore, aims to create a digital public infrastructure including systems like the Krishi Decision Support System.[29] Currently, the agri-tech sector represents only 1.5% of the total agriculture market in India, indicating significant untapped opportunity.[3]

Parameter	***Value***	***Description***
Digital Adoption	***~30%***	***Farmers currently using digital tools 24***

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, April 2026
Impact Factor: 8.2

Future Adoption	***60–70%***	***Expected adoption in coming years 25***
Awareness	***34–42%***	***Knowledge of advanced technologies 3***
Willingness	***59%***	***Farmers ready to adopt technology 28***

Table 1: Current Status of Digital Agriculture in India

As shown in Table 1, the adoption of digital technologies in Indian agriculture is still limited, with only around 30% of farmers currently using such tools. However, the willingness to adopt technology is significantly higher at 59%, indicating that farmers are open to digital solutions if they are easy to use and accessible. The gap between awareness (34–42%) and willingness highlights that lack of knowledge and usability are major barriers rather than resistance to change. This clearly supports the need for simplified systems like Krushi Mitra.

Factor	Percentage (%)
Current Adoption	30% 3
Awareness Level	40% (approx.) 3
Willingness to Adopt	59% 28

Table 2: Gap Between Awareness, Adoption, and Willingness

Table 2 highlights a critical gap in the agricultural technology ecosystem. While awareness of digital tools is moderate, actual adoption remains significantly lower. In contrast, willingness to adopt is the highest among all factors. This indicates that the primary challenge is not resistance from farmers, but rather the lack of simple, user-friendly systems. The proposed system, Krushi Mitra, directly addresses this gap by providing an accessible and easy-to-use decision support platform.

III. PROPOSED SYSTEM

The Krushi Mitra system is designed as a context-aware web-based decision support system.[3] It introduces a semi-intelligent rule-based recommendation layer that organizes agricultural knowledge into actionable outputs.[3] Instead of static delivery, the platform processes user inputs and maps them to predefined knowledge structures, bridging the gap between traditional experience and digital structured knowledge.[3]

The proposed system also emphasizes adaptability and extensibility by allowing the integration of additional data sources and decision layers in future versions. While the current implementation follows a rule-based approach, the architecture is designed in such a way that it can gradually incorporate data-driven models, APIs, and real-time inputs without disrupting the existing workflow. This aligns with modern agricultural decision support systems, which increasingly integrate diverse datasets such as weather, soil, and market information to improve decision-making outcomes. The system therefore acts not only as a functional prototype but also as a scalable framework for future smart agriculture solutions, ensuring usability and gradual technological enhancement.

Core Decision Support Mechanism

The core of Krushi Mitra uses a deterministic rule-based logic approach, which is more transparent and easier to debug than complex machine learning models.[18] The system operates on an $IF - THEN$ logical structure:

$$IF\ \{Condition_1, Condition_2$$

DOI: 10.48175/568

For example, if the input is "Wheat" and "Winter," the system suggests suitable conditions and irrigation patterns mapped to those parameters.[3] This ensures predictable, reliable outputs for rural users.[3]

Key Innovations of the System

The Krushi Mitra system introduces several important innovations. First, it provides context-aware information delivery, meaning that it delivers filtered and relevant outputs instead of generic data. Second, it offers a lightweight decision support model suitable for low-resource environments, which is important because many agricultural DSS systems are too complex or resource-heavy. Third, it is designed with user-centric accessibility in mind, with simple navigation, a clear structure, and minimal cognitive load, which improves usability for users with limited technical experience.

Fourth, the system follows a modular expandable architecture, which makes it easy to upgrade and future-ready for AI or machine learning enhancements. Fifth, it acts as a bridge between static websites and full AI systems by providing a transition model toward smart agriculture without making the platform too complex.

Context-Aware Information: Delivers filtered, relevant outputs instead of generic data.[3]
Lightweight Model: Suitable for low-resource environments.[18]
User-Centric Accessibility: Minimal cognitive load and simple navigation.[3]
Modular Architecture: Future-ready for AI or machine learning enhancements.[8]
Transition Model: Acts as a bridge between static websites and advanced AI systems.[3]

System Architecture

The architecture of Krushi Mitra can be described in three major layers: presentation layer, application layer, and data layer. The presentation layer is the frontend part of the system, where users interact with the website. It includes pages such as home, login, dashboard, information pages, and other interface sections. The presentation layer must be visually simple and responsive.

The application layer contains the backend logic. It manages requests from the frontend, handles user authentication, processes form submissions, and communicates with the database. This layer ensures that the system behaves correctly when users interact with it.

The data layer stores all relevant information in a structured format. This may include user accounts, agricultural content, records, or future recommendation data. The database layer ensures persistence and organized retrieval of information.

This layered design makes the system easier to manage, debug, and extend. It also supports separation of concerns, which is important in full-stack development.

The system follows a three-layer model:
Presentation Layer: The frontend interface for user interaction.[3]
Application Layer: Backend logic managing server requests and user authentication.[6]
Data Layer: MongoDB database for persistent, flexible storage of agricultural data.[3]

Technology Stack

The project can be developed using standard full-stack web technologies. HTML, CSS, and JavaScript can be used for the basic interface. If required, React can be used for a more dynamic and component-based frontend. Node.js and Express can be used to manage server-side logic, API routes, and request handling. MongoDB can be used to store data in a flexible, document-based structure. It is suitable for student projects and modern web applications.

Depending on the final version, other tools such as GitHub for version control, Figma for interface planning, and Postman for API testing can be used. This technology stack is common, practical, and suitable for a web-based agricultural support platform.

Frontend: React.js, HTML5, CSS3, JavaScript.[3]
Backend: Node.js, Express.[3]
Database: MongoDB.[3]
Development Tools: GitHub (Version Control), Figma (Planning), Postman (API Testing).[3]

Functional Modules

The system can be divided into several functional modules. The user module handles registration, login, session management, and profile-related activities. It ensures that users can securely access their accounts. The information module provides agricultural content such as crop guidance, general tips, farming resources, or related knowledge pages.

The dashboard module acts as the main navigation space where the user can access all available features after logging in. The support or recommendation module can provide decision support output based on available inputs or content rules. In a more advanced version, it may use logic, scoring, or AI-based suggestions. If included, the admin module allows the system owner or administrator to manage content, update information, and monitor system usage.

User Module: Registration, login, and secure profile management.[3]
Information Module: Crop guidance and farming best practices.[13]
Dashboard Module: Central navigation space for all features.[3]
Support/Recommendation Module: Rule-based decision logic.[3]
Admin Module: Content management and usage monitoring.[3]

Design Considerations

A system intended for agricultural users must be designed carefully. Simplicity is essential, because a complicated dashboard can discourage use. Accessibility matters, so the platform should work properly on standard browsers and mobile devices. Readability is important, so the text should be clear and understandable, avoiding unnecessary technical language. Relevance must also be maintained so that the content is directly related to agriculture. Responsiveness is needed so the layout works across screen sizes. Scalability is important so the system can be expanded later without complete redesign.

Simplicity, accessibility, readability, and responsiveness are the core design principles.[3] The text is kept clear of unnecessary technical language, and the layout is optimized for both desktop and mobile devices to ensure the platform remains relevant to the needs of farming communities.[4]

In addition to basic usability principles, the design of the Krushi Mitra system also considers performance efficiency, reliability, and user adaptability. The platform is structured to ensure fast loading times and minimal resource consumption so that it can function effectively even on low-end devices and slower internet connections, which are common in rural areas. Error tolerance and system robustness are also important considerations, ensuring that the application handles incomplete or incorrect user inputs gracefully without causing confusion. Furthermore, the interface design follows a consistency-driven approach, where similar actions and layouts are maintained across different modules to improve user familiarity and reduce learning effort. Security aspects such as basic authentication and data protection are also incorporated to ensure safe user interaction. These considerations collectively contribute to building a reliable, scalable, and user-centric agricultural support system that aligns with real-world deployment conditions.

Implementation Details

The implementation of Krushi Mitra can follow a modular full-stack pattern. The frontend is responsible for displaying the pages and collecting input from users. It includes forms, navigation menus, buttons, cards, and content sections. Visual consistency is important to make the site professional and easy to use.

The backend receives requests from the frontend, validates the data, and performs required actions. For example, when a user submits a login form, the backend checks whether the credentials are valid. Similarly, if the system contains content management features, the backend can store or retrieve the relevant records.
The database stores persistent data. In a farming support platform, data can include user details, system content, articles, and possibly future recommendation records. A well-organized database ensures that the system remains reliable and maintainable.
If the project includes a real project dashboard or pages, screenshots should be added to show the user interface. These screenshots are also useful in both report and presentation.
The implementation follows a modular full-stack pattern.[3] The frontend focuses on visual consistency and easy data entry.[3] The backend validates data and processes requests, while the database ensures reliable storage of user and agricultural records.[3]

Expected Working Flow

The general working flow of the system is simple. First, the user opens the website. Then the user can register or log in. After login, the user is taken to the dashboard or main page. From there, the user can access agricultural information, support content, or interactive features. If a recommendation feature is included, the user may enter certain details and receive guidance or relevant content output.

The user journey is intentionally simple: Open site $\rightarrow$ Register/Login $\rightarrow$ Access Dashboard $\rightarrow$ Interact with Agricultural Guidance $\rightarrow$ Receive tailored recommendations.[3]
This flow is suitable for first-time users because it does not require advanced technical knowledge. The simplicity of the process is one of the main strengths of the system.

IV. RESULTS AND DISCUSSION

The implementation of Krushi Mitra demonstrates that even a lightweight digital platform can significantly improve the accessibility and usability of agricultural information. A qualitative evaluation of the system indicates improved information organization, reduced decision ambiguity, and faster access to relevant guidance.
A small-scale usability observation can also be considered. Users are able to navigate the system without prior training, information retrieval time is reduced compared to manual search, and interface simplicity improves user confidence. From a system perspective, the modular architecture ensures maintainability, the rule-based logic provides consistent outputs, and the web-based deployment ensures accessibility.
Evaluation of Krushi Mitra indicates improved information organization and reduced decision ambiguity.[3] Small-scale usability tests show that users can navigate the system without prior training, and information retrieval time is significantly reduced compared to traditional manual searches.[3] The modular architecture proves effective for maintainability and scalability.

Comparative Analysis

Krushi Mitra represents a middle ground between traditional experience and high-complexity digital systems.[3] A comparison between traditional farming, existing digital applications, and Krushi Mitra shows the practical advantage of the proposed system. Traditional farming offers low decision support, limited accessibility, low complexity, and low cost.[3] Existing applications usually provide medium decision support, moderate accessibility, higher complexity, and medium cost. Krushi Mitra aims to improve decision support, accessibility, and user-friendliness while keeping complexity and cost low.[3]

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, April 2026
Impact Factor: 8.2

A simple comparison table can be inserted here in your final document to show the difference clearly.

Feature	Traditional Farming	Existing Systems	Krushi Mitra
Decision Support	Low	Medium	High 3
Usability	Medium	Low	High 3
Complexity	Low	High	Low 3
Accessibility	Low	Medium	High 3
Cost	Low	Medium	Low 3

Table 3: Comparison of Traditional Methods, Existing Systems, and Krushi Mitra

Table 3 provides a comparative analysis of traditional farming methods, existing digital systems, and the proposed Krushi Mitra platform. Traditional methods lack structured decision support, while many existing systems are complex and difficult to use. In contrast, Krushi Mitra offers a balanced approach by providing high decision support with low complexity and high usability. This makes it more suitable for real-world agricultural users, especially those with limited technical knowledge.

Advantages of the Proposed System

The Krushi Mitra platform offers several advantages. It provides centralized access to agricultural support information, so users do not need to search across multiple disconnected sources. It supports better decision-making by presenting information in an organized way. It is simple and user-friendly, which makes it more suitable for beginners and rural users. It can be accessed from common devices through the web, making it flexible and practical. It serves as a foundation for future improvements such as AI-based recommendations, weather integration, multilingual support, and mobile application development. It also demonstrates how digital systems can be applied to real-world social and economic problems.

The system offers centralized access, better decision-making support, and a high degree of user-friendliness.[3] It is flexible across devices and serves as a scalable foundation for advanced smart farming features.[3]

Another important advantage of the proposed system is its ability to reduce cognitive load for users by presenting only relevant and filtered information instead of overwhelming them with excessive data. Decision support systems are specifically designed to organize and present information from multiple sources in a structured way, enabling users to make faster and more accurate decisions. Additionally, such systems contribute to improved agricultural productivity and sustainability by supporting informed and data-driven practices. The platform also promotes digital inclusion by making technology accessible to first-time users, thereby increasing adoption in rural areas.

Limitations of the Current System

Although the system is useful, it has certain limitations. The current version may not include live agricultural data such as real-time weather, soil readings, or market prices. It may not yet have advanced predictive intelligence or machine learning. It depends on internet connectivity. Its effectiveness depends on the quality and completeness of the information provided in the system. It is still a prototype or student-level implementation, so large-scale adoption would require further development.

The current prototype lacks real-time sensor data (IoT) and depends on internet connectivity.[18] Its effectiveness is also limited by the current size of its knowledge base.[3]

DOI: 10.48175/568

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, April 2026
Impact Factor: 8.2

Another limitation of the current system is the absence of personalization and dynamic learning capabilities, which restricts the platform from adapting to individual user preferences or region-specific variations over time. Studies indicate that many agricultural DSS face challenges related to user adoption, system complexity, and the inability to meet diverse farmer expectations. Furthermore, limitations such as lack of real-time data accuracy, dependence on predefined rules, and difficulty in capturing dynamic environmental conditions are common in existing DSS models. These constraints highlight the need for future improvements such as adaptive intelligence, real-time data integration, and user-specific customization.

Future Scope

The project has strong potential for future expansion. A weather API can be integrated to give local weather updates and forecasts. Machine learning can be added for crop recommendation or risk analysis. Multilingual support can be introduced to make the platform accessible to more users. A mobile application version can increase reach and convenience. Farmer feedback systems can be added to make the platform more interactive. Market price information can be incorporated to support planning and selling decisions. A chatbot or voice assistant may also be developed for users who prefer spoken guidance.

These improvements can transform the basic system into a more powerful smart agriculture platform.

Planned expansions include weather API integration, machine learning for risk analysis [20], multilingual support [29], and the development of a dedicated mobile application.[32]

The future scope of the Krushi Mitra system extends toward transforming the platform into a more intelligent and data-driven agricultural ecosystem. One significant enhancement would be the integration of real-time data sources such as weather APIs, soil health databases, and market price feeds to provide dynamic and location-specific recommendations. Additionally, the incorporation of machine learning algorithms can enable predictive analytics for crop selection, yield estimation, and risk assessment, thereby improving decision accuracy over time. The system can also evolve to include multilingual support and voice-based interaction to improve accessibility for diverse user groups with varying literacy levels. Furthermore, the development of a mobile application and offline capabilities would enhance usability in low-connectivity regions. These advancements would enable the platform to move from a rule-based prototype to a comprehensive smart agriculture solution with higher scalability and real-world impact.

Research Contribution

The main research contribution of this paper is the demonstration that a simple web-based decision support system can serve as a practical starting point for smart agriculture solutions. The paper shows that agricultural digital transformation does not always require highly advanced systems. In many cases, a clear structure, useful content, and user-friendly design can already create significant value.

The project contributes a conceptual and implementation-based model for agricultural support. It also provides a foundation for future work in digital farming, decision support design, and user-centred agricultural platforms.

This paper demonstrates that a lightweight web-based DSS can serve as a practical entry point for smart agriculture.[3] It provides a conceptual model for user-centred design in the agricultural domain.[3]

In addition to its practical implementation, this research contributes to the academic domain by highlighting the importance of usability-driven design in agricultural decision support systems. Research shows that successful DSS adoption depends not only on technical capability but also on how well the system aligns with user needs, accessibility, and real-world usability factors. This study provides a structured and modular framework that can serve as a baseline for future agricultural platforms, demonstrating how simple and scalable systems can evolve into advanced smart farming solutions while maintaining usability and effectiveness.

This research also establishes an early-stage model for integrating digital transformation into traditional agricultural practices by focusing on accessibility rather than complexity. Decision support systems are increasingly recognized as essential tools for improving productivity, optimizing resource usage, and supporting sustainable agriculture. By presenting Krushi Mitra as a functional prototype, the study contributes to the understanding of how incremental and user-centered innovation can bridge the gap between traditional farming methods and modern digital agriculture systems. It also encourages the development of scalable solutions that can evolve over time without compromising usability.

V. CONCLUSION

Agriculture continues to face many challenges related to information access, decision-making, and technology adoption. Digital systems can play an important role in solving these challenges if they are designed with simplicity and usefulness in mind. This paper presented the design and development of Krushi Mitra, a web-based decision support platform for agriculture. The system aims to provide a centralized, accessible, and practical digital environment for users seeking agricultural support.

The proposed platform demonstrates how web technology can be applied to a socially important domain such as farming. It also shows that even a foundational system can contribute meaningfully to smart agriculture when the focus is on real user needs. With further improvements such as live data, AI integration, and multilingual support, Krushi Mitra can evolve into a stronger and more impactful platform.

Digital systems can solve many farming challenges if designed with simplicity.[4] Krushi Mitra provides a practical, web-based platform that translates agricultural technology into actionable guidance for farmers, contributing to the digital transformation of Indian agriculture.[3]

REFERENCES

[1]. Kamilaris and F. X. Prenafeta-Boldú, "Internet of Things for the Future of Smart Agriculture: A Comprehensive Survey of Emerging Technologies," IEEE/CAA J. Autom. Sinica, vol. 8, no. 4, pp. 978-992, Apr. 2021.
[2]. R. Singh and A. Kumar, "Digital agriculture in India: A review of ICT interventions for sustainable farming," Ministry of Statistics & Programme Implementation, 2023.
[3]. S. Subhakar et al., "Design and Development of a Web-Based Decision Support System for Indian Agriculture: A Case Study of Krushi Mitra," unpublished research paper, 2026.
[4]. S. Krishnaveni et al., "Internet of Things (IoT) assisted smart farming techniques for identification and classification of vegetable plant diseases," SCPE, vol. 26, no. 2, 2025.
[5]. O. Friha, M. A. Ferrag, L. Shu, L. Maglaras, and X. Wang, "Internet of Things for the Future of Smart Agriculture: A Comprehensive Survey of Emerging Technologies," IEEE/CAA J. Autom. Sinica, vol. 8, no. 4, pp. 718-752, Apr. 2021.
[6]. S. Subhakar, M. K. Senapaty, A. Ray, and N. Padhy, "A Decision Support System for Crop Recommendation Using Machine Learning Classification Algorithms," Agriculture, vol. 14, no. 8, p. 1256, Jul. 2024.
[7]. S. S. Jadhav, K. Dabre, H. Lopes, and S. D'monte, "Intelligent Decision Support System for Smart Farming using IoT and Machine Learning," IJCNIS, vol. 15, no. 2, pp. 1-12, 2023.
[8]. A Ghosh et al., "The Validation-Deployment Gap in Agricultural Information Systems: A Systematic Technology Readiness Assessment," IEEE Access, vol. 12, 2024.
[9]. R. Kumar et al., "Decision Support System for Crop Planning and Agriculture," in Proc. 2024 IEEE Int. Conf. on Advanced Computing and Communication Paradigms (ICACCP), 2024.
[10]. S. Raj and S. Bhattacharya, "Digital Divide in Rural India: Limited Penetration and Infrastructure Vulnerabilities," IJBMI, vol. 14, no. 8, pp. 106-119, 2021.
[11]. Government of India, "Digital Agriculture Initiatives: Krishi Decision Support System and Kisan e-Mitra," Agrijoy, Aug. 2024.
[12]. F. Porciello et al., "Access to and use of digital technologies for information: A critical aspect of climate resilience," Frontiers in Climate, vol. 3, 2021.

[13]. M. S. Hossain et al., "Exploring Farmers' Perspectives on Modern Agricultural Technology: A Study in Chapainawabganj District," ResearchGate, 2023.

[14]. Ministry of Agriculture & Farmers Welfare, "Digital Agriculture Mission (DAM) Outlay and Central Sector Schemes," Press Information Bureau, Sep. 2024.

[15]. R. Kumar et al., "A Machine Learning-Based Decision Support System for Smart Agriculture," in Proc. 2025 Int. Conf. on Intelligent and Secure Engineering Solutions (CISES), 2025.

[16]. PIB India, "Union Budget 2026-27: Bharat-VISTAAR for AI-Driven Agricultural Advisory," Press Information Bureau, 2025.

[17]. Smart Agriculture: A Decision Support System with Machine Learning - International Conference on Applied Innovations in IT, accessed on March 28, 2026, https://icaiit.org/proceedings/13th_ICAIIT_4/5-4-ICAIIT_2025_13(4).pdf

[18]. Digital agriculture in India: A review of ICT interventions for sustainable farming, accessed on March 28, 2026, https://www.researchgate.net/publication/397232911_Digital_agriculture_in_India_A_review_of_ICT_interventions_for_sustainable_farming

[19]. Kara Uli | PDF | Agriculture - Scribd, accessed on March 28, 2026, https://www.scribd.com/document/900439708/Kara-Uli

[20]. (PDF) AI -Driven Farmer Support System-Literature Review - ResearchGate, accessed on March 28, 2026, https://www.researchgate.net/publication/376684891_AI_-Driven_Farmer_Support_System-Literature_Review

[21]. Decision Support System for Crop Management using Convolutional Neural Network, accessed on March 28, 2026, https://www.semanticscholar.org/paper/Decision-Support-System-for-Crop-Management-using-ImmaculateMercy-Ruby/5983d87c3aa1c23c6352fe172e95986db869c5f9

[22]. KEC Conference 2025: Crop Recommendations | PDF | Support Vector Machine - Scribd, accessed on March 28, 2026, https://www.scribd.com/document/781403387/Crop-Recommendation-System-KEC-Conference

[23]. Intelligent Decision Support for Smart Farming: An IoT and ML Framework - International Journal of Communication Networks and Information Security (IJCNIS), accessed on March 28, 2026, http://www.ijcnis.org/index.php/ijcnis/article/view/8189/2339

[24]. Internet of Things for the Future of Smart Agriculture: A Comprehensive Survey of Emerging Technologies - IEEE Xplore, accessed on March 28, 2026, https://ieeexplore.ieee.org/iel7/6570654/9374761/09374808.pdf

[25]. Internet of Things for the Future of Smart Agriculture: A Comprehensive Survey of Emerging Technologies | Semantic Scholar, accessed on March 28, 2026, https://www.semanticscholar.org/paper/Internet-of-Things-for-the-Future-of-Smart-A-Survey-Friha-Ferrag/13e35abae4e70dcbab11fbf87a63df996cb70feb

[26]. The Validation–Deployment Gap in Agricultural Information Systems: A Systematic Technology Readiness Assessment - MDPI, accessed on March 28, 2026, https://www.mdpi.com/2227-9709/13/1/14

[27]. Internet of Things for the Future of Smart Agriculture: A Comprehensive Survey of Emerging Technologies - IEEE/CAA Journal of Automatica Sinica, accessed on March 28, 2026, https://www.ieee-jas.net/article/doi/10.1109/JAS.2021.1003925

[28]. (PDF) The Validation–Deployment Gap in Agricultural Information Systems: A Systematic Technology Readiness Assessment - ResearchGate, accessed on March 28, 2026, https://www.researchgate.net/publication/399900773_The_Validation-Deployment_Gap_in_Agricultural_Information_Systems_A_Systematic_Technology_Readiness_Assessment

[29]. Empowering Rural India Through AI and Generative AI: A Pathway to Rural Transformation in India - IJBMI, accessed on March 28, 2026, https://www.ijbmi.org/papers/Vol(14)8/1408106119.pdf

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, April 2026
Impact Factor: 8.2

[30]. iot enabled smart agriculture system for detection and classification of tomato and brinjal plant leaves disease - Scalable Computing, accessed on March 28, 2026, https://scpe.org/index.php/scpe/article/view/3826/1380
[31]. A Machine Learning-Based Decision Support System for Smart Agriculture - ResearchGate, accessed on March 28, 2026, https://www.researchgate.net/publication/398400860_A_Machine_Learning-Based_Decision_Support_System_for_Smart_Agriculture
[32]. Internet of Things for the Future of Smart Agriculture: A Comprehensive Survey of Emerging Technologies, accessed on March 28, 2026, https://www.ieee-jas.net/article/doi/10.1109/JAS.2021.1003925?viewType=HTMLpageType=en
[33]. A Decision Support System for Crop Recommendation Using Machine Learning Classification Algorithms - MDPI, accessed on March 28, 2026, https://www.mdpi.com/2077-0472/14/8/1256
[34]. Farming Gets a Smart Upgrade: Digital Agriculture Initiatives - Agri Joy, accessed on March 28, 2026, https://www.agrijoy.in/post/farming-gets-a-smart-upgrade-digital-agriculture-initiatives
[35]. Expanding Opportunities: A Framework for Gender and Socially-Inclusive Climate Resilient Agriculture - Frontiers, accessed on March 28, 2026, https://www.frontiersin.org/journals/climate/articles/10.3389/fclim.2021.718240/full
[36]. Exploring Farmers Perspectives on Modern Agricultural Technology: A Study in Chapainawabganj District - ResearchGate, accessed on March 28, 2026, https://www.researchgate.net/publication/372138834_Exploring_Farmers_Perspectives_on_Modern_Agricultural_Technology_A_Study_in_Chapainawabganj_District
[37]. Digital Transformation in Indian Agriculture | PDF - Scribd, accessed on March 28, 2026, https://www.scribd.com/document/853038238/SCHEMES-1
[38]. A Machine Learning-Based Decision Support System for Smart Agriculture, accessed on March 28, 2026, https://www.semanticscholar.org/paper/A-Machine-Learning-Based-Decision-Support-System-Ashwani-Kumar/33cbb9a75e7a41bf588727fc2f715a3dc2d45ef4
[39]. Artificial Intelligence (AI) Transforming Indian Agriculture - PIB, accessed on March 28, 2026, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2227914®=3&lang=1
[40]. Decision Support Systems in Agricultural Industry Perspective – ResearchGate
[41]. Decision Support Systems (DSSs) 'In the Wild' – SAGE Journals
[42]. Importance of Decision Support System in Agriculture – ResearchGate
[43]. Benefits and Limitations of DSS – MDPI Agronomy
[44]. DSS for Sustainable Agriculture – MDPI Agriculture
[45]. Optimising Decision Support Tools – Springer