



MANAGE Agricultural Extension “Evening4Learning (E4L)” Webinar Series



Theme: “Innovative Technologies for Advancing Agricultural Extension”



Topic: “Artificial Intelligence (AI) in Agricultural Extension”



Schedule:

30-12-2024, 19:00-20:30 PM



About the Program

The MANAGE Agricultural Extension “Evening4Learning” Webinar Series is aimed at enhancing knowledge and professional engagement in the field of agricultural extension. The four day series is structured with each day focusing on a distinct topic under a common theme, allowing participants to gain comprehensive insights into key areas of extension. The programme is intended for a diverse audience, including postgraduate and doctoral students, agricultural faculty, and industry professionals. It covers broad themes ranging from entrepreneurship and sustainability to emerging technologies in agriculture.

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Agricultural Extension
“Evening4Learning”
Webinar Series
Dec 27-30, 2024
19.00-20.30 pm (IST)

Theme: Innovative Technologies for Advancing Agricultural Extension



Speaker

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About the Speaker

Mr. Govardhan Sangani works as a Product Manager at NACL Industries Private Limited. He holds a bachelor's degree in Commercial Agriculture and Business Management from Professor Jayashankar Telangana Agricultural University and has completed Postgraduate Diploma in Agricultural Business Management. His role focuses on launching and marketing innovative, high-performing vegetable seeds tailored to the diverse needs of farming community. He is passionate about empowering agricultural professionals who are dedicated to transferring updated technologies to enhance agricultural productivity and profitability.

Background and Context

Agriculture remains the backbone of India's economy and food security. However, the sector is currently facing unprecedented challenges such as climate change, shrinking landholdings, resource scarcity, labour shortages, declining profitability, and the spread of misinformation. The farmer to population ratio has widened significantly, placing immense pressure on productivity per unit area.

In this context, Artificial Intelligence has significant potential to reshape agricultural extension systems by making them more responsive, inclusive, and effective. When combined with human expertise, AI can help transform agriculture from a labour-intensive practice into a knowledge-driven and sustainable enterprise. Empowering farmers through innovation remains the key to ensuring food security, resilience, and long-term agricultural sustainability.

Need for AI in Agriculture

The integration of AI into agriculture is essential for the following reasons:

Resource Scarcity

- Optimizes the use of land, water, nutrients, and labour through precision farming.
- Supports fertigation, irrigation scheduling, and targeted input application.

Climate Change

- Predictive analytics help anticipate weather extremes and pest outbreaks.
- Supports adaptive crop planning and effective risk mitigation strategies.

Low Productivity

- Identifies yield-limiting factors and improves crop management practices.
- Enhances input efficiency and reduces avoidable losses.

Market Access and Profitability

- Provides real-time market intelligence and price discovery.
- Assists farmers in choosing optimal markets considering logistics and costs.

Need for Innovation and AI in Agricultural Extension

Agricultural extension serves as a critical bridge between scientific research and farming communities. Extension professionals play a vital role in translating research outputs into practical, field-level solutions. However, traditional extension systems face several limitations, including:

Limited Reach of Conventional Extension

- In many regions, one extension agent serves thousands of farmers.
- AI-based systems can provide instant, scalable advisory support.

Need for Personalized Recommendations

- Farmers face multiple, interrelated challenges simultaneously.
- AI enables tailored recommendations based on soil type, crop stage, weather, and resource availability.

Time Sensitivity of Farm Decisions

- Delayed diagnosis of pests, diseases, or nutrient deficiencies leads to irreversible losses.
- AI facilitates real-time monitoring and early warning systems.

Applications of AI across the Crop Cycle

Step	AI Application	Benefit
Soil Preparation	Soil health monitoring	Optimized fertilization
Planting	Precision seed placement	Increased land use efficiency
Growth Monitoring	Crop health analysis via drones/sensors	Early disease/pest detection
Irrigation	Smart irrigation systems	Reduced water usage
Harvesting	Robotic harvesters	Efficient and timely harvest
Selling	Market price prediction	Maximized profits

Benefits of AI in Agricultural Extension

Key benefits of adopting AI include:

- In terms of time efficiency, traditional extension relies on manual and slow processes, whereas AI enables real-time insights and faster decision-making.
- Resource use in conventional systems is largely generalized, while AI supports precision farming by applying inputs based on actual field needs.
- Yield improvement in traditional extension depends heavily on personal experience, whereas AI-driven extension uses data-based optimization to enhance productivity.
- From an environmental perspective, traditional practices often involve high chemical usage, while AI helps reduce inputs and promotes eco-friendly, sustainable farming practices.

Overall, AI enhances the effectiveness, efficiency, and sustainability of agricultural extension services.

Challenges in Implementing AI in Agricultural Extension

Key challenges that limit the effective adoption of artificial intelligence (AI) in agricultural extension systems:

- High costs of hardware and software, which restrict access, especially for small and marginal farmers.
- A lack of digital skills and low digital literacy among stakeholders, slowing AI adoption.
- Poor internet connectivity in rural areas, hindering real-time AI applications and timely advisory services.
- Data gaps, such as incomplete or irrelevant datasets, which reduce the accuracy and reliability of AI-based recommendations.
- Resistance to change due to cultural scepticism, further slowing integration.
- Regulatory and data privacy concerns that create uncertainty and delay implementation.

Together, these challenges underline the need for capacity building, infrastructure improvement, reliable data systems, and supportive policies to successfully deploy AI in agricultural extension.

Future Trends in AI for Agricultural Extension

Emerging trends include:

- Precision Farming 2.0, enabling more accurate, data-driven farm management.
- Autonomous farming systems that reduce labour dependency and improve efficiency.
- Generative AI to support crop innovation through improved breeding, advisory services, and problem-solving.
- Climate-smart agriculture will leverage AI to address climate risks and enhance sustainability.
- Integration of IoT with AI to enable real-time monitoring and advisory systems.
- AI-powered market insights to help farmers make informed decisions related to pricing, demand, and market linkages.

Collectively, these trends indicate a transformative role of AI in making agricultural extension more responsive, efficient, and farmer-centric.

Key Highlights

- AI as a necessity for sustainable agriculture: In the face of climate change, resource scarcity, shrinking landholdings, labour shortages, and declining profitability, AI is critical to improve productivity, resilience, and food security in Indian agriculture.
- Transformation of agricultural extension systems: AI can overcome the limited reach of traditional extension by providing scalable, real-time, and personalized advisory services, making extension more responsive and farmer-centric.
- Improved productivity and resource efficiency: AI-driven precision farming optimizes the use of land, water, nutrients, and inputs, reduces avoidable losses, and enhances yields while lowering costs and environmental impact.
- Enhanced decision-making and market access: AI supports timely farm decisions through early warning systems, predictive analytics, and real-time market intelligence, helping farmers improve profitability and reduce risks.
- Challenges and future direction: While high costs, digital skill gaps, connectivity issues, data limitations, and regulatory concerns hinder adoption, emerging trends such as Precision Farming 2.0, Generative AI, IoT integration, and climate-smart agriculture signal a transformative future for agricultural extension.

Interactive discussion

1. What is the most effective way to reach farmers and encourage them to adopt these technologies?

The main challenge lies not in the technology itself but in effective farmer outreach and communication. Farmers are already occupied with multiple issues, so one-time awareness programs are ineffective. Adoption requires a well-designed campaign with multiple, repeated touchpoints. This includes introducing the technology and its benefits at the village level, followed by live demonstrations, hands-on usage by farmers, documentation of results, and the sharing of testimonials from successful users. These efforts should be reinforced through posters and continuous local campaigns to ensure recall. According to adoption theory, when the surrounding environment changes such as farmers seeing peers benefit from a technology adoption naturally increases. Farmers are not resistant to technology; when value is clearly communicated and consistently reinforced, adoption spreads quickly through peer influence and word of mouth.

YouTube link:
<https://youtu.be/IdKgueszwU?t=1>

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