



Editorial

Agriculture in the Era of Artificial Intelligence and Automation: A Path Forward for Sri Lanka

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Agriculture has long been the backbone of Sri Lanka's economy, providing livelihoods to millions and ensuring the nation's food security. However, the sector now faces unprecedented challenges, including climate change, labor shortages, and the urgent need for sustainable practices. In this context, the integration of Artificial Intelligence (AI) and automation into agriculture presents a transformative opportunity for Sri Lanka to modernize its farming practices, enhance productivity, and build a resilient future.

The potential of AI and automation in agriculture is vast. From precision farming and predictive analytics to drone technology and smart irrigation systems, these innovations can optimize resource use, reduce waste, and increase yields. For instance, AI-powered tools can analyze soil health, weather patterns, and crop conditions in real time, enabling farmers to make data-driven decisions. Automation, on the other hand, can address labor shortages by streamlining repetitive tasks such as planting, harvesting, and sorting.

The most widely used AI and automation systems in modern agriculture include low-cost, AI-powered mobile apps or SMS-based systems that provide smallholder farmers with real-time advice on weather forecasts, pest control, crop management, and market prices, empowering them to make informed decisions. Affordable IoT sensors monitor soil moisture, temperature, and nutrient levels, transmitting data to farmers' mobile devices to reduce water and input waste while improving crop yields.

Drones equipped with cameras or multispectral sensors monitor crop health, detect pests, and assess field conditions, saving time and labor while providing actionable insights, especially for larger farms. AI-powered early detection systems minimize pesticide use, reduce crop losses, and are easy to implement, enabling proactive issue resolution. Low-cost automated drip irrigation systems, paired with timers or solar-powered controllers, conserve water and reduce operational costs. AI-driven platforms connect farmers with buyers, predict market demand, and provide price trends, helping align production with market needs. AI models analyze historical data, weather patterns, and soil conditions to predict crop yields, assisting farmers in planning, securing loans, and managing risks. Shared AI tools, such as community-managed drone or sensor networks, reduce individual costs, promote collaboration, and ensure wider access to advanced technologies.

However, the adoption of AI and automation in Sri Lanka's agricultural sector remains in its early stages, leaving significant room for growth. With increased investment, awareness, and infrastructure development, these technologies could revolutionize the sector, making it more efficient, sustainable, and resilient to future challenges.

Yet, the path to adoption is not without obstacles. In a developing country like Sri Lanka, where smallholder farmers dominate the agricultural landscape, the integration of AI and automation must be inclusive and context-specific. Unlike large-scale commercial farms in developed countries, Sri Lanka requires scalable, affordable solutions tailored to the needs of small and medium-sized farmers. Initiatives such as mobile-based advisory services, low-cost sensors, and community-driven AI models can bridge the gap between cutting-edge technology and grassroots agriculture.

Several barriers hinder this transition, including limited access to technology, inadequate digital infrastructure, high initial investment costs, and a lack of technological awareness and expertise. Smallholder farmers, who form the majority of the agricultural workforce, may struggle to adopt AI-powered farming without adequate support and training. To overcome these challenges, a collaborative approach is essential. The government, private sector, and academic institutions must work together to invest in research, build digital literacy, and create policies that encourage innovation while safeguarding farmers' interests.

Ensuring that new technologies are user-friendly and accessible to smallholder farmers is a critical priority. Scientists should focus on developing open-source, locally made, or cost-effective solutions, while policymakers and implementers must invest in essential digital infrastructure, such as internet connectivity and electricity, in rural areas. Additionally, providing farmers with the necessary training

and resources is vital to help them effectively utilize these technologies. Government policies should incentivize innovation, offer subsidies, and protect farmers' interests to facilitate a smooth transition.

Public-private partnerships, government-led incentives, and collaborations with academic institutions will play a pivotal role in fostering innovation. Tailored training programs and access to affordable smart farming solutions can empower farmers to integrate AI and automation into their practices, enhancing productivity and sustainability.

Moreover, the ethical implications of AI and automation must not be overlooked. As these technologies are adopted, it is crucial to ensure they do not exacerbate inequalities or displace rural livelihoods. Instead, they should empower farmers, create new opportunities, and promote sustainable agricultural practices.

In conclusion, the era of AI and automation offers Sri Lanka a unique opportunity to reimagine its agricultural sector. By harnessing these technologies thoughtfully and inclusively, the country can address pressing challenges, boost productivity, and pave the way for a more prosperous and sustainable future. The time to act is now—by embracing innovation, Sri Lanka can ensure that its agriculture not only survives but thrives in the 21st century.