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Agriculture 4.0: A Farming Technology for Cambodia's Modern Economy

SOTH Sereyboth, MSc [a]
HEAB Kim Ey, MSc [a]

Agriculture 4.0 refers to the application of the Internet of Things (IoT), Cloud Computing (CC), Big Data (BD), Artificial Intelligence (AI), Hyper-spectral Camera (HC), and Robotics to improve the efficiency of agricultural activities, increase productivity, and reduce costs. In terms of economic benefits, applying this agricultural technology can save much money by using resources such as water, energy, fertiliser, and pesticide efficiently. For ecology, Agriculture 4.0 can minimise the negative impacts on the environment and non-target organisms while enhancing farming sustainability. Concerning international trade, the precision of data collection can build trust among local and international consumers.

As a result, Agriculture 4.0 can help increase export volume and establish market linkages among stakeholders, particularly farmers, middlemen, and consumers, thus ensuring price stability and fulfilling market demand.

This article illustrates the current progress and future application of Agriculture 4.0 in Cambodia and the policy framework to adopt it.

Agriculture 4.0 in Cambodia: Current Progress

Agriculture is the backbone of Cambodia's economy, sharing around 23% of the national GDP in 2021 and playing a significant role in sustainable development. The Cambodian government has adopted Agriculture 4.0 with a clear roadmap using smart greenhouses, drone technologies, smart irrigation, and digital marketing platforms. Recently, the National Council of Science, Technology & Innovation (NCSTI) of the Ministry of Industry, Science, Technology & Innovation (MISTI) has launched the AgriTech Roadmap to fully adopt Agriculture 4.0 technologies by 2030.

For smart greenhouses, the Ministry of Agriculture, Forestry, and Fisheries (MAFF) signed a memorandum of understanding with Agri-Sambath Khmer to enable long-term solutions with strong government support and stakeholder cooperation to build 10,000 greenhouses by 2030. The project aims to produce at least 400,000 tons of vegetables annually to provide food security to the Cambodian market and become a net exporter to the entire region.

Moreover, XAG Co., Ltd and Drone Khmer Technology (DKT) Co., Ltd are two tech companies that introduce drone technologies for agriculture in Cambodia. For smart irrigation

[a] **SOTH Sereyboth** and **HEAB Kim Ey** are government officials at the Department of Science, Technology and Innovation Training of the National Institute of Science, Technology and Innovation, Cambodia.

technologies, a Cambodian team has developed the Smart Farm Assistance App that helps farmers take control of their irrigation systems via Short Message Service (SMS) and online.

Concerning digital marketing platforms, several applications have been developed in Cambodia to link farmers with customers, such as Chamkar, Tonlesap, CamAgriMarket, and Angkor Salad Apps. Additionally, Oxfam has developed a blockchain technology that links small-scale rice producers in Preah Vihear province with agricultural cooperatives, rice exporters, and imported manufacturers in the Netherlands using smart contracts. This blockchain technology exemplifies how Agriculture 4.0 helps connect smallholder farmers in Cambodia with their customers digitally.

Additionally, the International Fund for Agricultural Development (IFAD) has been implementing a project called Sustainable Assets for Agriculture Markets, Business and Trade (SAAMBAT) to accelerate agriculture using digital technologies. This project supports start-ups that use digital technologies to boost the agricultural value chains in Cambodia.

Future Application of Agriculture 4.0 in Cambodia

The existing technologies mentioned above are still in the early development stage. Some technologies such as AI, IoT, BD, and mobile applications for improving plant and animal health, enhancing aquaculture productivity, and community-based farming platforms for farmer's discussion are unavailable in Cambodia. Using machines that work like humans for farms, AI technology can help farmers reduce production costs. For instance, AI machine-learning robots such as smart tractors, agribots, and robotics are used to solve labour shortage issues in many large farms and aquacultures.

For IoT technology, farmers can monitor their farm situations, such as soil moisture, relative humidity, temperature, light, and plant health, remotely using remote sensing. Meanwhile, using IoT technology to track agricultural inputs can inform farmers to avoid purchasing fake products for their farms.

In terms of BD technology, farmers can generate, monitor, and visualise data for farming decisions. Accurate data can help farmers make the right choice and save time, money, and other resources. Some mobile applications have been developed to solve farming issues, including marketplaces, farm management, and food recipes. Their usage, however, remains limited. Moreover, a user-friendly and accessible mobile application that allows the community to interact and solve a particular farm issue has yet to be developed. Therefore, developing these technologies is needed to boost the agricultural sector in Cambodia.

Policy Framework to Adopt Agriculture 4.0

To adopt Agriculture 4.0, the Royal Government of Cambodia (RGC) should consider enhancing human capital, investing more in research and development (R&D), providing tax exemption for start-ups that work on AgriTech, and promoting international collaborations with advanced countries.

To build human resources, the RGC should engage young Cambodians with Science, Technology, Engineering, and Mathematics (STEM) subjects and functional laboratories to conduct experiments. Furthermore, standard salaries and incentives should be considered to motivate them to work in Agriculture 4.0.

As Agriculture 4.0 is relatively new to Cambodia, investment in R&D should be included in the policy framework. To ensure that new technology is functional, trials must be conducted with errors along the way, which can be costly and time-consuming.

For tax exemption, the RGC issued Prakas No. 159 of Sub-degree 124 on 17 February 2020 to grant a three-to-five-year tax exemption from income taxes for six priority Micro, Small, and Medium-sized Enterprises (MSMEs), including agriculture-based and IT enterprises. This policy framework is a cornerstone to speed up the adoption of Agriculture 4.0.

As Cambodia is beginning to adopt new technologies, a collaborative framework to engage all relevant stakeholders to work together for robust change and improvement should be developed and implemented to achieve sustainable growth. Furthermore, the multi-disciplinary team of stakeholders should identify priority sectors and digital technologies to address the challenges and take faster action. To conclude, Agriculture 4.0 is extremely significant for the future of Cambodia's economic development.

The views expressed are the author's own and do not reflect the views of the Asian Vision Institute.