NO. 2025-12, NOVEMBER 2025
ISSN: 2086-8154

Economic Research Institute for ASEAN and East Asia

Policy Brief

Digitalisation in Agriculture and Food Systems in ASEAN: Pathways to Its Resilience and Sustainability

Masanori Kozono, Ari Aji Cahyono, and Siti Mustaqimatud Diyanah

Digital technologies are transforming the agriculture and food systems of ASEAN, offering new opportunities to enhance productivity, sustainability, and resilience. ASEAN has taken collective steps to accelerate this transition through initiatives such as the ASEAN Guidelines on Promoting the Utilisation of Digital Technologies for ASEAN Food and Agricultural Sector *(2021), the* ASEAN Leaders' Declaration on Strengthening Food Security and Nutrition in Response to Crises *(2023), and the* Action Plan for Sustainable Agriculture in ASEAN *(2024).*

To support these regional efforts, this study assesses the current utilisation of digital tools across agricultural value chains, identifies barriers to technology diffusion, and analyses enabling policy frameworks. Based on surveys of 824 respondents across eight ASEAN Member States (AMS), the study finds that smartphone-based solutions – such as advisory applications, digital payments, and marketplaces – are the most widely adopted. However, adoption is primarily driven by economic objectives rather than environmental benefits. The main constraints include limited infrastructure, low digital literacy, and high adoption costs. Looking ahead, digital marketplaces and drones are expected to become the most in-demand technologies. Comprehensive and inclusive policies – anchored in strong infrastructure, skills development, financing mechanisms, and regional co-operation – are critical to advancing sustainable digital transformation in ASEAN's agri-food systems.

Key Messages:

- Digitalisation can significantly enhance ASEAN's agricultural productivity, sustainability, and resilience but requires coherent regional and national strategies.
- Adoption of digital tools remains limited by weak infrastructure, low digital literacy, and financial constraints faced by smallholders.
- Governments should prioritise investments in rural connectivity, digital skills, and financing mechanisms, supported by multi-stakeholder partnerships and integrated data systems.
- Translating ASEAN's regional guidelines into implementable national strategies will accelerate the region's transition towards sustainable, inclusive, and climate-resilient agri-food systems.

Masanori Kozono
Senior Policy Fellow, ERIA

Ari Aji Cahyono
Research Associate,
Project Officer, ERIA

Siti Mustaqimatud Diyanah
Research Associate, ERIA

Introduction

Agriculture and food systems in ASEAN face multiple interconnected challenges – including rising food demand from a growing population, increasing malnutrition, the adverse impacts of climate change, overexploitation of natural resources, and persistent food loss and waste – that threaten the region's food security and long-term sustainability.

Digital technologies offer innovative solutions to address these challenges by increasing productivity, improving market access, optimising resource allocation, and ensuring traceability along supply chains. Recognising this potential, ASEAN has adopted a range of collective frameworks to promote agricultural digitalisation. These include the *ASEAN Guidelines on Promoting the Utilisation of Digital Technologies for ASEAN Food and Agricultural Sector* (2021), the *ASEAN Leaders' Declaration on Strengthening Food Security and Nutrition in Response to Crises* (2023), and the *Action Plan for Sustainable Agriculture in ASEAN* (2024).

To support these initiatives, the Economic Research Institute for ASEAN and East Asia (ERIA) conducted a regional study to assess the current landscape of digitalisation in ASEAN's agriculture and food systems, identify challenges and enabling factors, and recommend policy actions that can advance resilience and sustainability in the sector.

Summarised Results

This study covered eight ASEAN Member States[1] and surveyed 824 respondents, mainly farmers and other agricultural value-chain actors who have already utilised digital technologies in their operations. Data were collected through interviews and surveys conducted between January and May 2025. The key findings are summarised below.

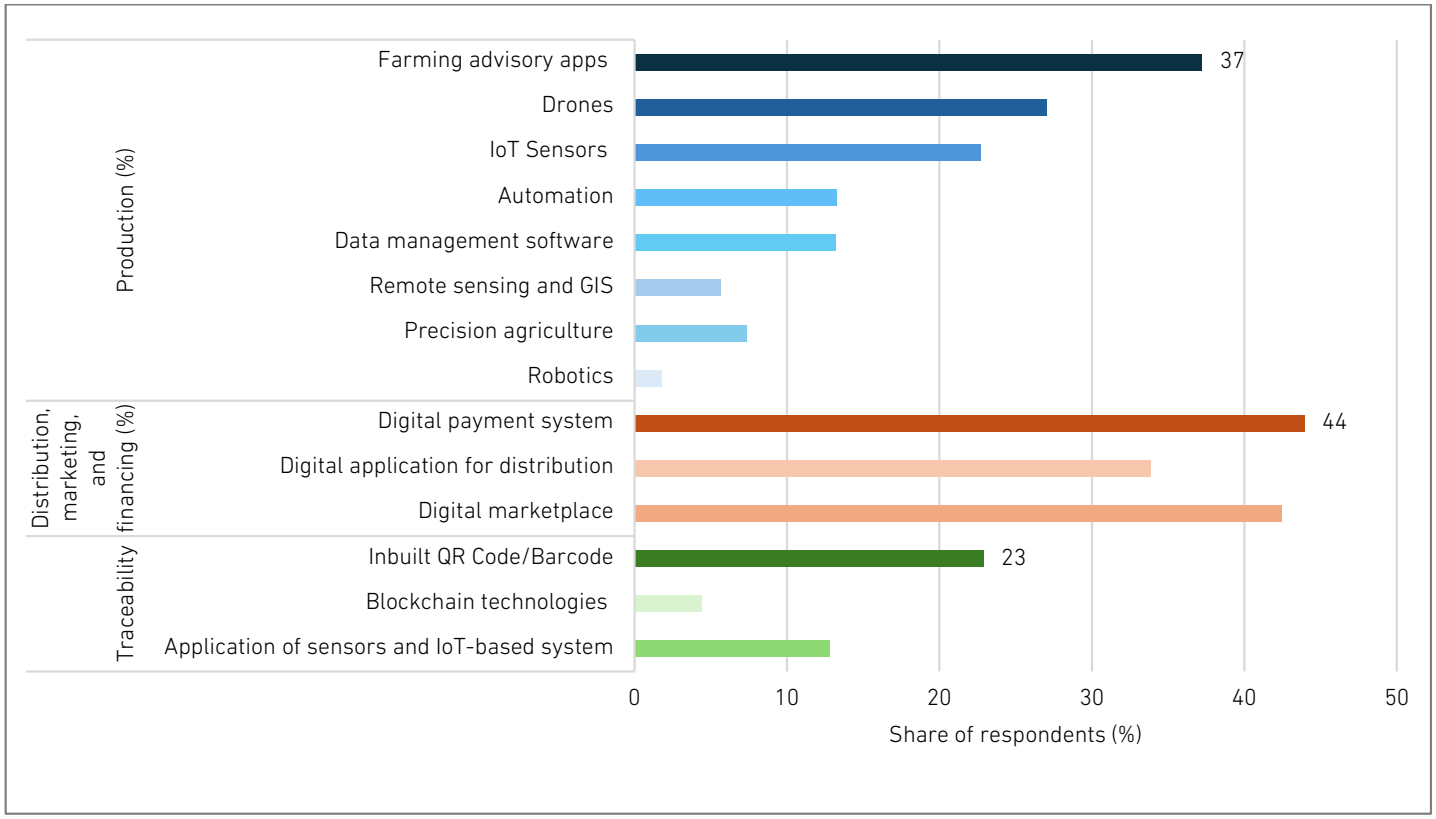
[1] Countries involved: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Philippines, Thailand, and Viet Nam.

1. Status of Technology Utilisation

Smartphone-based technologies are the most widely used digital tools in ASEAN's agricultural sector. At the production stage, 37% of respondents reported using farming advisory applications, while in distribution and marketing, 44% use digital payment systems and 38% use digital marketplaces. These technologies are relatively accessible, affordable, and easy to use.

By contrast, digital traceability systems – critical for ensuring transparency and quality assurance along the supply chain – are the least adopted. This gap highlights a key area for improvement as ASEAN moves towards more resilient and transparent food systems.

Figure 1. Digital Technologies Commonly Applied in ASEAN



Source: Authors.

2. Challenges

The main barriers to scaling up digital agriculture in ASEAN are financial constraints, limited human resource capacity, and underdeveloped infrastructure. The high cost of technology adoption remains the most cited challenge, particularly for smallholders. Low digital literacy amongst farmers also hampers effective utilisation of technologies (Figure 2).

In addition, the lack of rural connectivity and mechanisation infrastructure continues to limit access to digital tools. While most ASEAN countries have integrated digitalisation into their national policy frameworks, few have operationalised these into detailed technical or sectoral initiatives. These challenges are compounded by fragmented data systems and limited availability of reliable agricultural information.

3. Drivers and Priorities for Adoption

Across ASEAN, the main motivations for adopting digital technologies are economic: reducing production costs (67%), increasing productivity (65%), and promoting labour efficiency (56%). In Indonesia, most respondents (83%) cited expanding market opportunities as the main driver, while in Cambodia, 55% reported adopting technologies to address labour shortages (Figure 3).

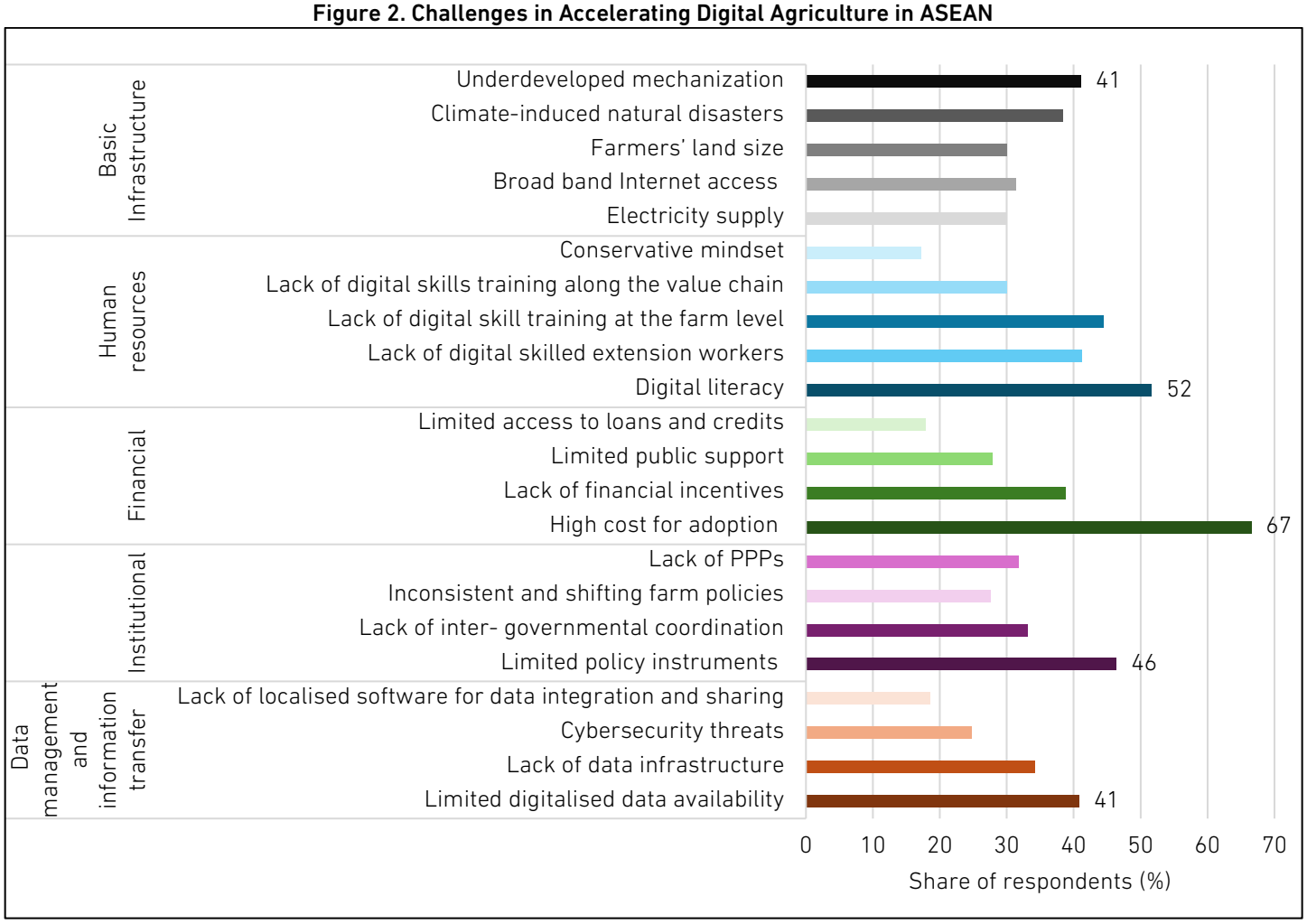
By contrast, environmental objectives – such as climate change mitigation and environmentally friendly farming practices – remain secondary. This suggests that policies promoting digital agriculture must integrate sustainability considerations into their economic incentives.

4. Government and Institutional Support

Public support plays an important role in enabling digital agriculture. Around 30% of respondents reported receiving financial assistance such as capital loans, and nearly half received technical assistance through training and capacity-building programmes. However, only 19% reported receiving in-kind support, such as equipment or tools.

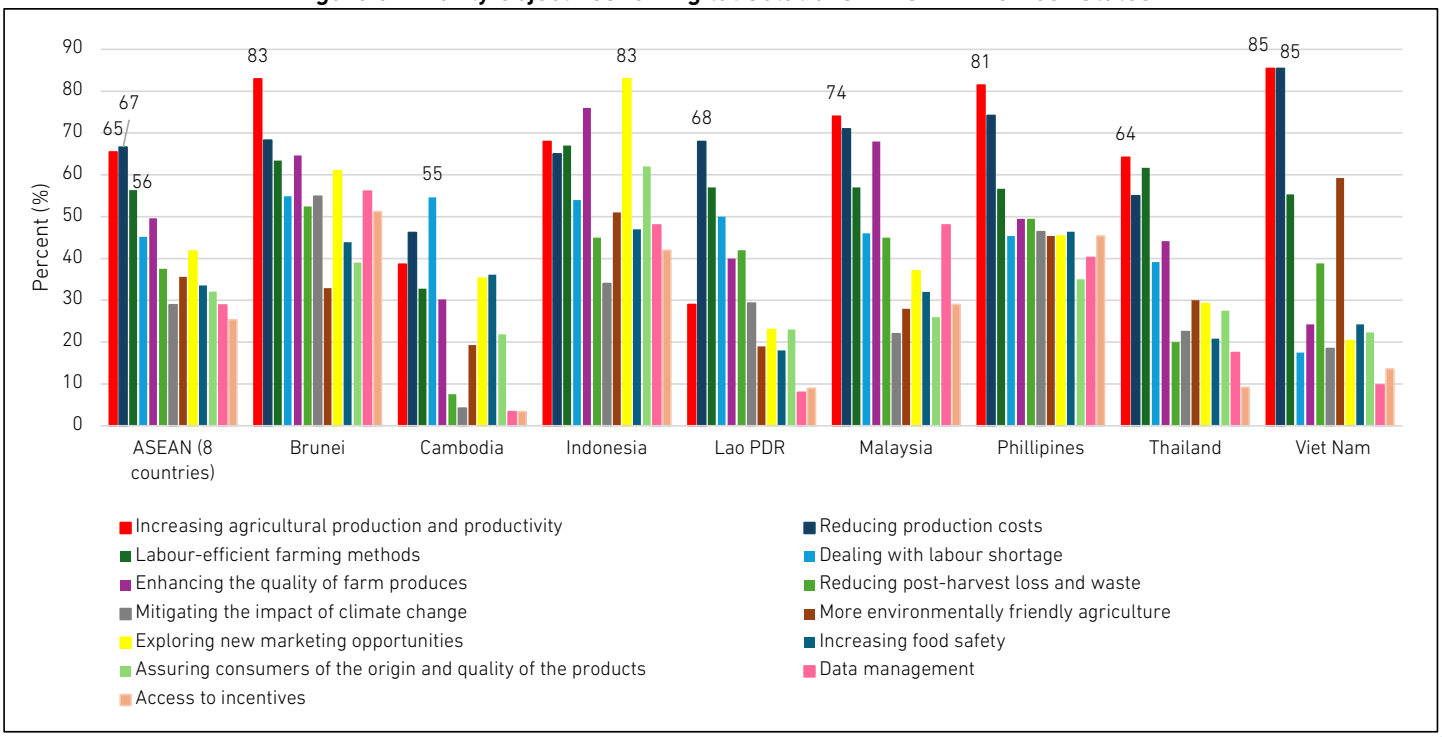
These findings underscore the need for stronger government facilitation, including blended financing mechanisms and greater private-sector engagement to scale technology adoption and investment.

Figure 2. Challenges in Accelerating Digital Agriculture in ASEAN



Source: Authors.

Figure 3. Priority Objectives for Digital Solutions in ASEAN Member States



Source: Authors.

5. Emerging and Future Technologies

Respondents identified drones and digital marketplaces as the most desired technologies for future adoption. In Viet Nam and Cambodia, drones are particularly valued for their efficiency in monitoring and precision farming. In Lao PDR and the Philippines, digital marketplaces are seen as key tools for expanding market access. Brunei Darussalam stands out, with 76% of respondents anticipating increased demand for automation technologies. These differences indicate that while ASEAN shares common priorities, national strategies must be tailored to local conditions and sectoral needs.

Recommendations

Drawing on the findings, this policy brief proposes six key policy strategies to accelerate digitalisation in ASEAN's agriculture and food systems while ensuring inclusiveness and sustainability.

1. **Invest in Digital Infrastructure and Connectivity**

   Most AMS face significant gaps in rural broadband and ICT infrastructure, especially in remote farming areas. Governments should prioritise investments in digital connectivity and data infrastructure tailored to rural needs, supported by incentives for private sector participation. Strengthening broadband access and mechanisation facilities will enable wider and more equitable technology adoption.

2. **Enhance Digital Skills and Capacity Building**

   Human capital is central to successful digital transformation. Governments should integrate digital literacy and technology management training into national agricultural extension programmes. Tailored curricula and continuous learning models can help farmers gain confidence in using digital tools and foster peer-to-peer knowledge exchange.

3. **Expand Access to Finance and Reduce Adoption Costs**

   The high upfront cost of digital tools remains a critical barrier for smallholders. Governments, in collaboration with financial institutions, should establish financing platforms that provide flexible credit schemes – such as post-harvest repayment systems – while ensuring appropriate risk safeguards. Promoting inclusive and innovative financing models can unlock adoption at scale.

4. **Promote Public–Private Partnerships and Innovation Ecosystems**

   Governments should facilitate partnerships amongst technology providers, start-ups, investors, and research institutions. Public–private collaboration can drive research and development, improve technology reliability, and attract investments in scalable digital solutions. ASEAN can also explore regional innovation hubs to support start-up collaboration and knowledge sharing.

5. **Develop Integrated Agricultural Data Systems**

   Strengthening data infrastructure is essential for effective digital agriculture. Governments should establish secure, interoperable agricultural data centres that consolidate farm-level and environmental data. Such systems enable precision agriculture, climate risk modelling, and informed policy design while ensuring data protection and interoperability across borders.

6. **Align National and Regional Frameworks for Coherent Implementation**

   Digital agriculture in ASEAN is currently governed under broad policy umbrellas, resulting in fragmented regulations. ASEAN Member States should develop dedicated national digital agriculture strategies aligned with the *ASEAN Guidelines on Promoting the Utilisation of Digital Technologies for ASEAN Food and Agricultural Sector*. These strategies should provide clear implementation roadmaps covering data governance, financing, and inclusion of smallholders.

   At the regional level, ASEAN should strengthen co-operation in priority areas such as technology transfer, data-sharing platforms, and digital ecosystems. Translating the regional guidelines into country-specific action plans will ensure coherent, context-appropriate implementation across the region.

Conclusion

Digitalisation holds transformative potential to enhance productivity, inclusivity, and sustainability in ASEAN's agriculture and food systems. However, progress remains uneven, constrained by limited infrastructure, low digital literacy, and financial barriers. Accelerating this transformation requires coordinated national and regional action – anchored in strong institutions, supportive financing, skilled human resources, and reliable data ecosystems.

By aligning national policies with ASEAN's collective frameworks and investing in inclusive digital ecosystems, the region can harness technology not only to drive growth but also to build resilient, climate-smart, and sustainable food systems for the future.

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Sentral Senayan II, 5th, 6th, 15th floors
Jalan Asia Afrika No. 8
Senayan, Central Jakarta 10270, Indonesia
Tel: (62-21) 57974460
E-mail: contactus@eria.org