SINGAPORE INSTITUTE OF INTERNATIONAL AFFAIRS

Sustainable Value Chains:

Tech and Finance for ASEAN's Smallholders

February 2025

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About the Special Report

This Special Report is based on a workshop organised by the Singapore Institute of International Affairs (SIIA) at the institute's 11th Singapore Dialogue on Sustainable World Resources (SWR), on the theme of "Reinventing Sustainable Financing for Smallholders and Future Generations".

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The authors would like to thank the following for their assistance and insights (in alphabetical order): Agridence, Bumitama Gunajaya Agro, Coordinating Ministry for Economic Affairs of the Republic of Indonesia, District Government of Siak, French Agricultural Research Centre for International Development (CIRAD), Global Environment Centre (GEC), Koltiva, Landscape Indonesia, PM Haze, Prabowo-Gibran Expert Council, Proforest Indonesia, Thailand Environment Institute (TEI), Sustainable Districts Association (LTKL), World Resources Institute (WRI) Indonesia.

Established in 1962, the SIIA is a non-profit and independent think tank committed to fostering in-depth dialogues around politics, economic policy, and sustainability in ASEAN and the wider region. The SIIA has been working on sustainability issues since 1997, when we organised Singapore's first haze dialogue in partnership with the Singapore Environment Council. Following the severe transboundary haze in 2013, the SIIA established the Singapore Dialogue on Sustainable World Resources (SWR) in 2014 which has since become a leading platform for discussion about key sustainability challenges in the region.

Executive Summary

As the demand for agricultural commodities increases, countries in the Association of Southeast Asian Nations (ASEAN) must ensure that efforts to boost agricultural output do not also result in the conversion of more natural forests and peatlands into plantations, or the use of unsustainable practices such as disposing of agricultural waste via burning. Engagement with smallholder farmers is needed to improve both productivity and sustainable land management in the region. While such farmers manage small plots of land, their numbers add up. Small producers account for over 80 per cent of the region's output in several commodity industries such as rubber, cocoa, and coffee.

In the near term, technology and digital platforms can help build capacity among farmers and ensure they have market access. In the long term, with the rise of a better connected and tech-savvy generation of "Smallholders 4.0", markets and supply chains should ideally recognise areas where smallholders have a comparative advantage and can create value, such as in low-carbon agriculture.

Multi-stakeholder collaboration between governments, the private sector, and non-governmental organisations (NGOs) is necessary to support the region's smallholders. This collaboration should include stakeholders in Singapore. While Singapore is not a major agricultural producer, it is home to agribusinesses, traders, fast moving consumer goods (FMCG) companies, financial institutions, and technology firms that can play a role in building inclusive and sustainable supply chains connecting farmers to consumers.

Recommendations

Invest in Technology to Build Capacity and Networks for Smallholders: Digital platforms should be used to give smallholder farmers access to training and information, helping them make better operational decisions. These platforms must be developed in cooperation with farmers to ensure that they meet real-world needs on the ground.

Use Technology to Connect Smallholders to Supply Chains and Markets: Governments, businesses, and NGOs should work together to include smallholders in traceability and due diligence platforms so that they are able to access high-value supply chains and export markets. This is especially important as markets like the European Union (EU) are introducing stricter sustainable trade regulations affecting the sale of agricultural commodities. In the long term, smallholder engagement platforms should also identify areas where smallholder farmers have a comparative advantage or can add value, such as in low-carbon cultivation.

Leverage Blended Finance to Accelerate Transformation for Smallholders: Financing from private sector, philanthropic, public, and multilateral sources must be combined to support smallholder engagement projects. Investors should make use of the ASEAN Investment Framework for Haze-Free Sustainable Land Management (AIF-HFSLM), which provides a breakdown of project types that support the goal of sustainable forestry and agriculture, including smallholder and community projects, and identifies the kind of funding most suitable for each area.

This report is based on a workshop organised by the Singapore Institute of International Affairs (SIIA) at the institute's 11th Singapore Dialogue on Sustainable World Resources (SWR), on the theme of "Reinventing Sustainable Financing for Smallholders and Future Generations". It builds on an earlier working paper by the SIIA on "Financing Indonesia's Independent Smallholders".

1. Introduction: Why Smallholders are Critical for Sustainability

The agricultural commodities industry is an important part of ASEAN's economy, meeting the needs of both the region's own consumers as well as global markets. ASEAN must ensure that demand can be met without causing environmental degradation. Ideally, the productivity of existing agricultural areas must be strengthened so that output can increase without requiring the conversion of natural ecosystems into plantations, which would result in carbon emissions and a loss of biodiversity.

To achieve a balance between development and sustainability, governments, companies, and NGOs must work together with smallholder farmers. Individual smallholder farmers manage small plots of land, much smaller than company plantations, but these plots add up. For example, in Indonesia, smallholders account for around 40 per cent of oil palm cultivation by land area,[1] 84 per cent of rubber cultivation, 96 per cent of coffee cultivation, and 98 per cent of cocoa cultivation.[2]

To achieve a balance between development and sustainability, governments, companies, and NGOs must work together with farmers

Smallholders face a range of challenges affecting their output and limiting their ability to engage with sustainable supply chains. Independent smallholders, who are not directly associated with larger businesses, face even greater difficulties. Without support, there is a risk that some farmers may engage in unsustainable practices – either due to lack of knowledge, or due to economic constraints.

The specific challenges faced by smallholder farmers vary across the ten ASEAN member countries, but in general smallholders must deal with the following issues:

Challenges Faced by Smallholder Farmers in ASEAN

Low Yields and Tight Margins: Many smallholders produce lower yields and lower-quality crops compared to large commercial plantations. Smallholders also face tight margins in their operations. These challenges may drive some farmers towards unsustainable practices.

Lack of Capacity: The lower yields of smallholder farmers are in part due to a lack of high-quality seeds, inputs, and tools, but also due to a lack of agricultural knowledge and availability of data.

Difficulty in Meeting Standards and Regulations: Smallholders face difficulty in meeting the traceability and due diligence requirements of sustainability standards, certifications, and import-export regulations. This means that smallholders may be effectively excluded from major supply chains.

Limited Access to Finance: Smallholder farmers have difficulty accessing commercial financing that could allow them to build capacity and invest in sustainability standards and certifications.

This report provides an overview of the emerging opportunities for governments, companies, and NGOs to engage with smallholder farmers and improve sustainable land management in ASEAN, with a focus on digital technology, capacity building, multi-stakeholder networks, and the financing needed to accelerate and scale transformation efforts among the region's smallholders.

Examples of smallholder engagement from Indonesia are cited in this report, given Indonesia's status as the largest agricultural producer in the region. Initiatives in Malaysia, Thailand, and at the ASEAN regional level are also discussed where appropriate, to illustrate other efforts in and across ASEAN.

2. Invest in Technology to Build Capacity and Networks for Smallholders

Digital platforms offer opportunities to address several of the challenges faced by smallholder farmers, equipping farmers with the resources to improve their productivity and sustainability, as well as providing incentives to transform their operations.

Digital platforms offer opportunities to address several of the challenges faced by smallholder farmers

How Digital Technology Can Help Smallholder Farmers

Transparency and Accountability: By sharing information on their production practices, land use, yields, and other records, smallholders will be able to better engage with buyers of their products, financial institutions, and government agencies.

Prices and Data: With the ability to access market data, smallholders can ensure they receive a fair price when selling products to middlemen and mills. Weather data and other agricultural information can also help them make better operational decisions.

Standards and Certifications: By participating in government, industry, and NGO-led digital traceability platforms, smallholders can more easily meet industry standards and gain sustainability certifications.

Supply Chains and Markets: Sustainability certifications allow smallholders to be part of higher-value supply chains. Being part of traceability and due diligence systems also helps smallholders participate in international supply chains.

Finance: Smallholders with transparent digital records will be seen as lower risk by financial institutions, improving their access to loans and insurance products. Mobile banking systems can serve farmers even in rural areas.

Inputs: Once registered in government systems, smallholders can better tap on public funding and material support, for instance gaining access to better planting material such as seeds that have been tested to ensure they are the proper varieties.

A long-standing obstacle to the adoption of digital tools among smallholders has been poor internet connectivity in rural areas. Technology is addressing this issue, particularly with the advent of better and more reliable satellite internet services. In principle, current internet technology is up to the task of reaching all of ASEAN. The challenge lies in funding that connectivity and bringing costs down. Similarly, the current generation of digital platforms, mobile applications, and phone services have proven that they are able to address the problems faced by smallholder farmers. Investment is needed to scale up the provision of such services and accelerate their adoption. Capacity building is also required to enhance digital literacy among smallholders so they can make use of these services.

Technology should be coupled with the creation of multi-stakeholder networks to connect smallholders to the green economy

The use of technology should be coupled with the creation of multi-stakeholder networks to bring opportunities to connect smallholders to the green economy. In line with the popular discourse on Industry 4.0, policymakers and experts see potential in the emerging generation of "Smallholders 4.0", where digitally literate farmers can be better connected with the buyers of their products.

Services and Capacity Building for Smallholders: Global and Regional Examples

Blueprint for Digital Climate-Informed Advisory Services (DCAS): Created by the World Resources Institute (WRI) and the Global Commission on Adaptation, the blueprint suggests that integrating climate data into the decision-making of smallholders could boost productivity and incomes by 25 to 30 per cent.

Koltiva: An Indonesian-based company, Koltiva has a range of software platforms and boots-on-the-ground services for palm oil, cocoa, and seaweed smallholders, covering over 1 million producers in 66 countries. Their solutions include KoltiTrace, a traceability ecosystem for web and mobile that connects farmers, buyers, and brands, KoltiSkills, which offers professional services to farmers like risk assessment and training, and KoltiHub, a business centre service that provides micro-loans, insurance, and market facilitation to rural communities.

Agridence: Agridence is a Singapore-based company that has developed several compliance and traceability solutions for the rubber, cocoa, and palm oil industries. In the rubber industry, Agridence Rubber's mobile app allows farmers to track their transactions and traceability, and the Agridence RubberGrow platform gives smallholders access to training videos, a helpline, and crop insurance.

PM Haze Peatland Restoration Programme: Singaporean volunteer group PM Haze, a partner of the SIIA, has four village projects in Indonesia's Riau and West Kalimantan provinces in partnership with local NGOs. The programme builds the community's capacity to rehabilitate degraded peatlands while supporting alternative peat-friendly livelihoods.

Sources: World Resources Institute (2021)[3], Koltiva (2024)[4], Agridence (2021)[5], PM Haze (2023)[6]

Sustainable District Association (*Lingkar Temu Kabupaten Lestari*, LTKL)

LTKL is an association of Indonesian district governments that promotes sustainable economic development LTKL has nine district members across six provinces, and is endorsed by the wider Association of Indonesian District Governments (APKASI).

298
young people connected to green jobs

243
joint programmes produced by multi-stakeholder partnership centres

91
sustainable SMEs assisted through incubation programmes

56
partners connected in multi-stakeholder collaborations

2
joint programmes with national ministries and agencies

Source: LTKL (2024)[7]

Sustainable Agricultural Landscapes in South East Asia (SALSA)

SALSA is a research network established in October 2024 by the French Agricultural Research Centre for International Development (*Centre de coopération internationale en recherche agronomique pour le développement*, CIRAD) and partners in Indonesia, Malaysia, the Philippines, and Thailand. Its aims include:

Understanding Smallholders 4.0: Understanding the dynamics of the emerging generation of smallholders, their connection with value chains, and what capacity building they need.

Anticipating Risks: Monitoring the impact of Smallholders 4.0 on production systems, anticipating any undesirable changes, and enabling innovations for more efficient farm management.

Understanding Governance: Understanding the policies in place to govern ecosystems and rural development, identifying potential investments, and empowering communities through education.

Source: CIRAD (2024)[8]

3. Use Technology to Connect Smallholders to Supply Chains and Markets

In addition to the use of digital platforms to improve the skills and productivity of farmers, it is also crucial for smallholder farmers to be included in traceability and due diligence platforms so that they can access high-value supply chains and export markets.

It is crucial for smallholders to be included in traceability platforms so that they can access high-value supply chains and export markets

Case Study: Registering Indonesia's Smallholders, Accessing Global Markets

e-Plantation Cultivation Registration Letter (*e-Surat Tanda Daftar Budidaya*, e-STDB)

Indonesia's e-STDB certificate is a new digital form of the country's older STDB registry system. It is a certificate issued to farmers managing less than 25 hectares of land, including information about farmers' plots and their productivity. The Indonesian Ministry of Agriculture is working with local governments, the plantation industry, and NGOs to register farmers under the e-STDB system.

President Joko Widodo's administration set the goal of getting at least 1 million smallholders signed up to the e-STDB, and this effort is expected to continue under the Prabowo administration. As of November 2024, some 114,473 smallholders have received e-STDB certificates.[9] The e-STDB supports Indonesia's own sustainable agriculture goals, as the system makes it easier for the authorities to extend support services like replanting funds to farmers, and the e-STDB is a prerequisite for a farmer to get the Indonesian Sustainable Palm Oil (ISPO) certification. ISPO is now mandatory for all palm oil producers. In addition to meeting Indonesia's own targets, the e-STDB is also playing a role in helping farmers meet the requirements of international trade regulations.

National Dashboard

Indonesia's e-STDB system is feeding into a broader digital National Dashboard initiative spearheaded by Indonesia's Coordinating Ministry for Economic Affairs and the Ministry of Agriculture. The National Dashboard combines data from smallholders with comparable information from the government's plantation licensing system and private sector systems.[10] The National Dashboard will allow buyers and traders to trace goods from their production to point-of-sale, and is intended to help businesses meet the traceability and due diligence requirements when bringing products originating in Indonesia into markets with stringent import-export regulations, such as the EU.

European Union Regulation on Deforestation-free products (EUDR)

Under the EU's new anti-deforestation regulation, businesses bringing seven product types (cattle, cocoa, coffee, natural rubber, palm oil, soy, and wood) into the EU will be required to show due diligence in confirming that these goods were not produced on recently deforested land.[11] The EUDR is now expected to take effect for large companies from 30 December 2025 onwards, and for micro and small enterprises from 30 June 2026. There is concern that smallholder farmers will be particularly affected by the EUDR, as they may have difficulty dealing with the administrative requirements. The EU, Indonesia, and Malaysia have convened an Ad Hoc Joint Task Force on the regulation, and the task force is currently developing a practical guide to help smallholder farmers understand the new rules.

Indonesia's effort to get smallholders registered with the e-STDB system and to integrate the e-STDB registry with its National Dashboard platform are very promising. However, Indonesia's experience also demonstrates the challenges involved in engaging with smallholder farmers. For example, some smallholders are reluctant to register with the e-STDB programme, as they believe that giving the authorities better information about their farm locations and socio-economic situation will increase their tax burden. Outreach efforts to bring farmers on board have also varied across Indonesia, depending on the capacity of local governments. Companies and NGOs that work with smallholders have begun working with Indonesian authorities to register the farmers in their networks but concerted multi-stakeholder efforts are still needed in order to reach all parts of Indonesia.

Many current initiatives to reach out to smallholders are geared towards ensuring that they meet sustainability standards or comply with regulations. Moving forward, many policymakers and industry experts are hoping that smallholder engagement platforms can not only identify areas where farmers are lacking but also positively highlight areas where they are adding value.

For instance, smallholders may have a comparative advantage in growing certain labour-intensive high-value products. Smallholder farmers may also have a comparative advantage in terms of producing less greenhouse gas emissions in their operations versus large commercial plantations. Ideally, markets will be able to acknowledge such value when it is created by smallholders.

4. Leverage Blended Finance to Accelerate Transformation for Smallholders

In theory, the tools and systems that can increase the productivity and sustainability of smallholders already exist. Financing is needed to accelerate the adoption of these technologies and models. However, it is difficult for commercial banks to directly finance smallholders, meaning that other sources of financing must also be leveraged.

Why Smallholders Face Difficulty in Borrowing from Commercial Banks

High Administrative Costs: For most commercial banks, working with smallholders involves high acquisition and servicing costs due to their rural location and the specialised expertise needed to deal with such clients.

Lack of Cashflow Information: Many smallholders do not keep financial or agricultural production records, making it difficult for banks to evaluate their cashflow and creditworthiness.

Exposure to Production Risk: Smallholders often plant on small, non-contiguous plots, making it difficult for communities to share risks. Smallholders are also vulnerable to production losses, and crop insurance may not be readily available in their areas.

Lack of Formal Land Rights: Commercial banks generally require farmers to produce their land title for use as collateral. Smallholders may lack official paperwork or up-to-date licenses and certificates, making this process difficult.

Lack of Guarantors: Smallholders that are associated with mills or large off-taking companies can have their partners serve as a guarantor for loans, but it is more challenging for independent smallholders to secure a guarantor.

Irregular Earnings: Due to fluctuations in yields between harvests, the earnings received by smallholders are often irregular. This makes it hard for banks to calculate an appropriate loan repayment schedule.

Source: SIIA, "Financing Indonesia's Independent Smallholders" (2018)[12]

Blended Finance and Multi-stakeholder Collaborations

Given these limitations, support for smallholder projects must come from a range of stakeholders, combining capital in a blended finance approach. Government, multilateral development bank, and philanthropic funding can be used to support smallholder engagement projects in their initial stages, so projects can demonstrate that their models are feasible and scalable. Commercial banks and financial institutions could come in once better risk-return ratios have been achieved.

Partnership for Indonesia's Sustainable Agriculture (PISAgro) — Established in 2012 by the Indonesian government in partnership with seven private companies, PISAgro now has 29 members including companies and NGOs. PISAgro helps smallholder farmers access financing and training.

Source: PISAgro (2019)[13]

Climate Village Programme (*Program Kampung Iklim*, ProKlim) — Originally initiated in 2012 by the Indonesian Ministry of Environment and Forestry. In September 2024, the Ministry launched a ProKlim project in South Sumatra to reduce emissions for 100 villages in the province, funded by Temasek Foundation and supported by the UN Office for Project Services (UNOPS).

Source: United Nations Indonesia (2024)[14]

Smallholder Palm Oil Replanting Financing Incentive Scheme (*Tanam Semula Pekebun Kecil Sawit 2.0*, TSPKS 2.0) — Established in January 2024 by the Malaysian Ministry of Plantation and Commodities and Ministry of Finance, TSKPS helps palm oil smallholders replace aging trees to maintain productivity. RM100 million has been allocated in a half-loan, half-grant model.

Source: Ministry of Plantation and Commodities, Malaysia (2024)[15]

Thai Rice: Strengthening Climate-Smart Rice Farming — In 2023, the international Green Climate Fund (GCF) and German development agency GIZ approved a €38 million project to promote low-emissions farming in Thailand and enable their access to smart farming technologies.

Source: Thai-German Cooperation (2023)[16]

ASEAN's Role in Guiding Investment

To facilitate the mobilisation of capital from different stakeholder groups, ASEAN's member governments and institutions can work together with the region's think tanks in guiding investment. The ASEAN Investment Framework for Haze-Free Sustainable Land Management (AIF-HFSLM) is an example of such cooperation. Endorsed by ASEAN leaders in 2023, the framework outlines categories of sustainable forestry and agriculture projects where financing is needed and identifies the kind of funding that is most suitable for each project – for instance suggesting where green bonds are best used, or where commercial banks can play a role.

ASEAN Investment Framework for Haze-Free Sustainable Land Management (AIF-HFSLM): The framework was developed by Malaysian think tank Global Environment Centre (GEC) with support from the ASEAN Secretariat and International Fund for Agricultural Development (IFAD), in consultation with experts, NGOs, and think tanks including the SIIA. The framework aims to prevent large scale burning of forests and agricultural waste by fostering investment in better land management practices. This includes supporting capacity building and zero-burning schemes for smallholder farmers. The framework aims to leverage US$1.5 billion in funding by 2030.

Source: ASEAN Secretariat (2023)[17]

5. Conclusion

ASEAN's smallholder farmers face a wide range of challenges. Cooperation between stakeholder groups is needed to finance, develop, and disseminate the digital platforms and other tools that can improve livelihoods and productivity among the region's smallholders.

This cooperation should include countries like Singapore, which, although not a significant agricultural producer itself, is strategically positioned as a regional hub for agricultural commodity traders and businesses, fast-moving consumer goods (FMCG) firms, financial institutions, and technology providers. Organisations in Singapore can play a role in creating innovative financial products and incentives to encourage smallholders to adopt sustainable practices. Companies in Singapore can help in developing technological platforms for traceability and smallholder engagement. In this way, stakeholders in Singapore can support the efforts already underway in ASEAN.

By working together, all stakeholders across ASEAN can ensure that smallholder farmers are connected to the emerging digital economy and integrated into global value chains, improving both their livelihoods and ASEAN's sustainability as a region.

Recommendations

Invest in Technology to Build Capacity and Networks for Smallholders: Digital platforms should be used to give smallholder farmers access to training and information, helping them make better operational decisions. These platforms must be developed in cooperation with farmers to ensure that they meet real-world needs on the ground.

Use Technology to Connect Smallholders to Supply Chains and Markets: Governments, businesses, and NGOs should work together to include smallholders in traceability and due diligence platforms so that they are able to access high-value supply chains and export markets. This is especially important as markets like the European Union (EU) are introducing stricter sustainable trade regulations affecting the sale of agricultural commodities. In the long term, smallholder engagement platforms should also identify areas where smallholder farmers have a comparative advantage or can add value, such as in low-carbon cultivation.

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About the Singapore Institute of International Affairs (SIIA)

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Established in 1962, the Singapore Institute of International Affairs (SIIA) is a non-profit, independent think-tank committed to policy-relevant research, analysis, and discussions on regional and international politics, economic policy, and sustainability. Our work serves as a bridge between policymakers, business leaders, and other stakeholders to nudge policy change through dialogue and collective action.

We provide insights and perspectives for businesses in navigating a complex world and help Singaporeans with sense-making and responding to issues they care about. We aim to contribute to a region that is inclusive, peaceful, and prosperous – An integrated, sustainable, and globally competitive ASEAN and a Singapore that is an open, dynamic hub and responsive node.

We have been consistently ranked as one of the leading think tanks in Southeast Asia and the Pacific, in the Global Go-To Think Tank Index by the University of Pennsylvania. Since 2017, the SIIA was ranked the No. 1 independent think tank in Asia. We were recognised as one of the top 50 think tanks globally, excluding the United States of America. In 2019, we were recognised as the No. 1 think tank in South Asia, Southeast Asia, and the Pacific (excluding India). In 2020, we were also recognised as one of the think tanks with the best policy and institutional response to the COVID-19 pandemic.

About the SIIA's Sustainability Programme

Our Sustainability Programme began in 1997 when we organized Singapore's first haze dialogue with the Singapore Environment Council on the critical haze problem. The programme has evolved to address a broader range of sustainability issues like agribusiness and forestry supply chains as well as the leveraging of green finance to advance ASEAN's climate action and carbon neutrality goals. Since 2014, the Singapore Dialogue on Sustainable World Resources (SWR), our annual flagship conference, provides a platform for discussion in the region about key sustainability challenges.

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