Achieving Smart Agriculture Potential through Efficient Data Connectivity and Management

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SEED Practitioner Labs for Policy Prototyping

Imprint

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KEY MESSAGES

- Thailand is on track to realising a value-based, innovation-driven economy through its Agriculture 4.0 programme, calling for the uptake of digital technologies to aid farmers' transition to climate smart agriculture practices.

- Public−private partnerships can accelerate the development of smart agriculture to reach wider impact and benefit smallholder farmers in enhancing their productivity and mitigating climate risks effectively.

- ListenField's interface ecosystem prototype offers analytics of data from multiple stakeholders to benefit smallholder farmers by providing data that increases productivity. The platform faces two key challenges: i) insufficient access to data and ii) data centralisation that hinder sound analysis.

- By partnering with government, the platform can solve these bottlenecks to provide more and better information to smallholder farmers.

I. THE ISSUE

The agricultural sector employs more than 30 percent of Thailand's labour force. However, it accounts for only 10% of the gross domestic product.[1] The sector shows slow growth rates and is more fragile than other economic sectors of the country. This is because most Thai farmers are trapped in traditional farming methods that depend on rainfall and season which are now heavily affected by climate change. Farmers face high economic risks and earn low incomes due to low productivity despite significant investments in the sector and agriculture being earmarked as a priority sector in national strategies like Agriculture 4.0[2] under the Ministry of Agriculture and Cooperatives. Agriculture 4.0 aims at addressing the problem of farmers' low incomes by driving a value-based or innovation-driven economy and incorporating technology to improve traditional farming techniques. This might be using precision agriculture, climate smart agriculture, digital technology and the internet of things in the agricultural production process and value chain to adapt to climate change effects.

In achieving this policy goal, agri-tech start-ups have much to contribute. They can support in closing the gap of low productivity and added value of most agriculture yields and products leveraging the aforementioned technologies. However, the basic requirement for agri-tech start-ups is sufficient and good quality data. ListenField, an eco-inclusive enterprise with experience of working with more than 30 farmer communities throughout Thailand, has identified 1) insufficient access to data and 2) data centralisation as two main challenges that hinder them from optimising their analytical prediction ability and producing precise recommendation to farmers.

1 Bank of Thailand, 2019. "ภูมิทัศน์ภาคเกษตรไทย จะพลิกโฉมอย่างไรสู่การพัฒนาที่ยั่งยืน?" (*Thai agricultural landscape: How to change to sustainable development?*). Retrieved from *https://www.bot.or.th/Thai/ResearchAndPublications/articles/Pages/Article_26Sep2019.aspx*

2 Ministry of Agriculture & Cooperatives, 2017 "แนวคิดเกษตร 4.0 ของรัฐมนตรีว่าการกระทรวงเกษตรและสหกรณ์" (*Agricultural Concept 4.0 of the Minister of Agriculture and Cooperatives*). Retrieved from *http://survey.rid.go.th/th/images/file/circular_notice/4523-60.pdf*

II. WHY IS THIS IMPORTANT?

Although the economic impact of agriculture is less compared to manufacturing, service, and retail sectors, the agriculture industry is a vital 'social backstop' for lower income Thais[3]. It remains a source of income for the poorest 20% of the population[4]. Unfortunately, climate change effects (drought, flood, soil quality, pests and unpredictable rainfall) causing significant crop losses is threatening the livelihoods of those at the bottom of the pyramid.

The Office of the National Economic and Social Development Council (NESDC) has suggested in its 2019 Q4 and 2020 projection that one of the focus areas of Thailand's macroeconomic policy should be about strengthening smallholder farmers, the labour force, low income groups, SMEs, and local economies.

The report further recommends to focus on fostering agricultural production and income, by: (i) preventing and mitigating the impacts of natural disasters, coupled with providing the appropriate monetary, fiscal, and supply-side measures to assist farmers affected by natural disasters especially droughts; (ii) solving problems on agricultural prices of some products that face high constraints on market price,

as well as emphasising exports in key agricultural products in order to reduce price pressures from the accumulated stocks; and (iii) supporting large-scale farming, along with increasing farmers' income share from final product sales by reducing marketing processes.[5]

Agri-tech Startups like ListenField provide innovative solutions to increase farmers' productivity and income. They mitigate risk of climate change and suggest adaptation measures to smallholder farmers using a precise, scientific based technology and leveraging their connections to agro-communities to drive change in the sector.

3 Oxford Busines Group "Agriculture remains crucial to Thailand's economic growth". Available at https://oxfordbusinessgroup.com/overview/driving-force-agriculture-remains-integral-economic-growth

4 Suwannarat, P. "Agricultural Productivity and Poverty Reduction in Thailand", Bank of Thailand. Available at : https://www.bot.or.th/Thai/Segmentation/Student/setthatat/Doclib_Settha_BE_2554/B_Doc_Solace2_2554.pdf

5 Thai Economic Performance in Q3 and Outlook for 2019 – 2020, NESDC ECONOMIC REPORT, Macroeconomic Strategy and Planning Division, Press Release 9.30 a.m. Nov 18, 2019, https://www.nesdb.go.th/ewt_dl_link.php?nid=9658&filename=QGDP_report

Eco-inclusive SMEs

Eco-inclusive SMEs are enterprises who offer products and services, as well as operate business models that are environmentally beneficial and socially inclusive. These enterprises, often referred to as MSMEs, play a significant role in supporting a country to achieve the SDGs and their NDCs. Thai MSME ListenField (SEED Low Carbon Award Finalist 2019) provides an ecosystem that consists of three major functions. First, the Application Programming Interface (API) is deep technology that aims to produce various analytical models that help food and agribusiness with precision farming; Yield Estimation, Climate Analysis, Growth Analysis, Crop Health and Insect Analysis etc. The second part is FarmAI for smallholder farmers which includes daily activity logs, weather information that analyses climatological patterns, online community and machinery booking. And the third part is an Intelligence Dashboard for community leaders. ListenField has a vision to incorporate the technology for precise and sustainable agriculture for all farmers in Thailand.

III. ACHIEVING SMART AGRICULTURE POTENTIAL THROUGH EFFICIENT DATA CONNECTIVITY AND MANAGEMENT

Challenges in farmers' lives such as ineffective farm management (especially for smallholder farmers) and climate uncertainty is creating damage to farmland and crop losses every season. Moreover, lack of diverse market opportunities is a main barrier for farmers in emerging economies.

ListenField provides agronomic insight for sustainable and profitable farming towards solving such challenges. The technology improves crop productivity by utilising an Application Programming Interface (API), IoT integration, predictive analytics, and farm management solutions and improves farmer wellbeing by connecting actors in the Food Chain ecosystem. Listenfield's experience has shown a huge gap between government, academia and the agricultural industry. One main challenge to deep-tech solution successes is data integration from different sources in order to get quality and reliable data to produce precise analytical models.

The process of data aggregation can be costly as it involves wide range of activities from on-ground data collection to purchasing satellite information from institutions or private company. This hinders both farmers and Agri-tech Startups like ListenField from cost-effectively creating actionable data which can contribute to achieving innovation-driven economy and incorporating technology in agricultural practice, the objective of Agriculture 4.0.

ListenField's farm management tool helps smallholder farmers towards better farm management, reducing crop loss due to climate uncertainty, obtaining better support from the community and encouraging them to convert to organic farming, as well as linking them to a marketplace. The platform connects all stakeholders and delivers transparency. It calls on policy actors i) to share government data in an open source way; ii) to explore the possibility to gain access to more specific data such as soil profiles and area specific climate histories; and iii) to co-create solutions to farmers' challenges based on ListenField's Analytic Models such as climate analysis, drought/dry spell.

Figure 1: ListenField's API ecosystem prototype for climate smart agriculture

IV. FURTHER IMPLICATIONS

- Recognition of the complementarity between agri-tech startups and smallholder farmers should be further emphasized. The lab has drawn clear connection between the two actor groups that will benefit each other as well as laid out collaboration potential between the public sector, who holds relevant data, and agri-tech startups, who hold technology. A pilot project can be considered to test these public-private partnership in data connection.

- Being aware of government regulations and confidentiality legislations that prevent total open source data from public sector, it is worthwhile exploring options on how SMEs and similar agri-tech startups can access up to date data.

- Agri-tech start-ups are key stakeholders in contributing to Thailand's national policy agendas. ListenField's data management model serves as a good practice for potential replication and scale.

- While this brief focused on ListenField's case, there is still a need to assemble other agri-tech startups together in a consortium to streamline cross-sharing of resources between public sectors and among agri-tech start-ups. A good starting point can be replicating existing infrastructure in other sectors, such as DEPA's[6] registration platform for digital start-ups, and SMEONE, a one-stop shop for SME related information and services in Thailand.

- SEED continues to support ListenField in utilising SEED platforms to promote the enterprise's good work and ideas to relevant stakeholders and prototype solution ideas based on good examples initiated and implemented by ListenField, currently in 30 farmer communities.

V. REFERENCES

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6 Digital Economy Promotion Agency, Thailand

About the SEED Practitioner Labs for Policy Prototyping

SEED Practitioner Labs for Policy Prototyping work with policymakers and intermediaries over a multi-step collaborative process to design policy instruments which increase access to and improve the quality of support mechanisms for socially inclusive and environmentally sustainable enterprises looking to scale their environmental, social and economic impacts.

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