Precision Farming Industry in Thailand

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Summary

Precision farming is a data-driven farm management system, combining the use of software and hardware to facilitate each stage of faming activities. Precision farming has been adopted by several countries in Asia-pacific and is expected to rapidly grow in the next 10 years.

Precision farming is an essential concept to help enhance Thailand's agricultural sector. Currently, the agricultural sector in Thailand encounters declining productivity. To increase productivity as well as efficiently allocate resources, precision farming can be one of the tools for stakeholders to achieve these goals.

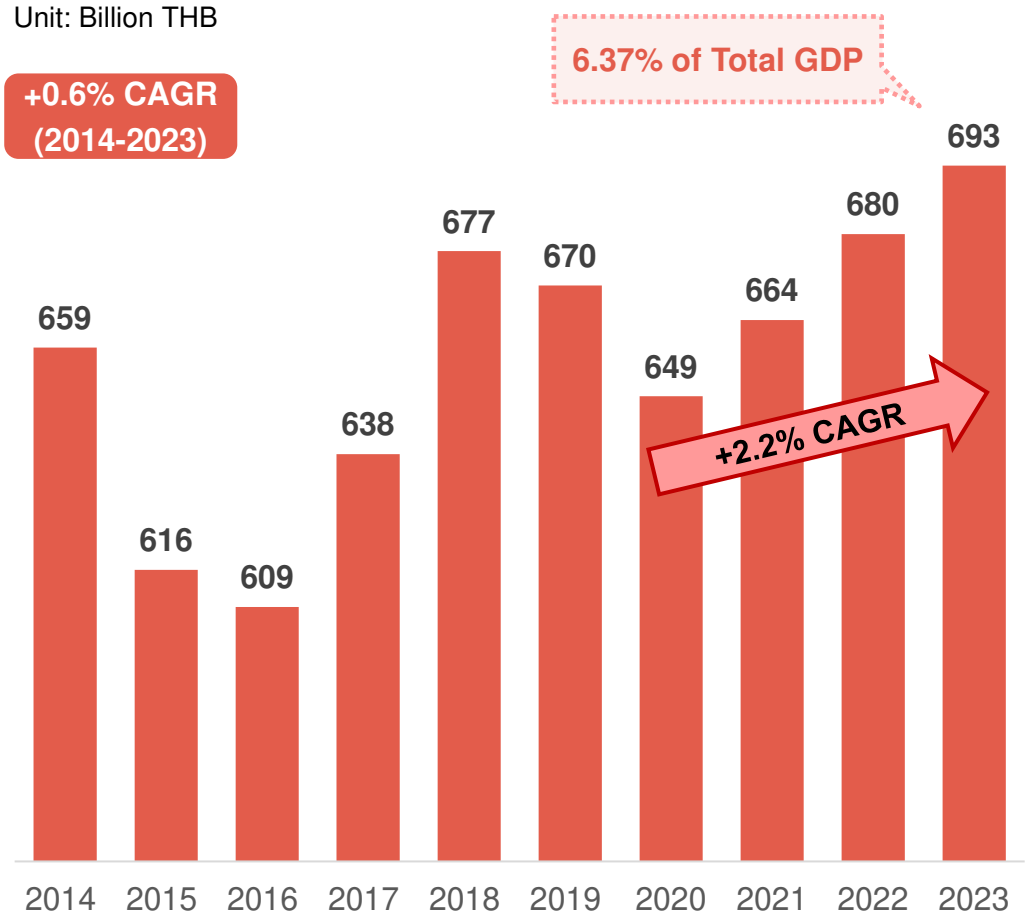
However, in Thailand, it is considered in an early adoption stage, where the main users are large farm operators with only a few players entering this market. To accelerate the adoption of precision farming, the public sector offers several incentives to attract investors. Also, related private sectors have been collaborating in research projects to develop suitable precision farming strategies for Thai agricultural conditions. Thus, there is plenty of room for investors to penetrate this market.

Content

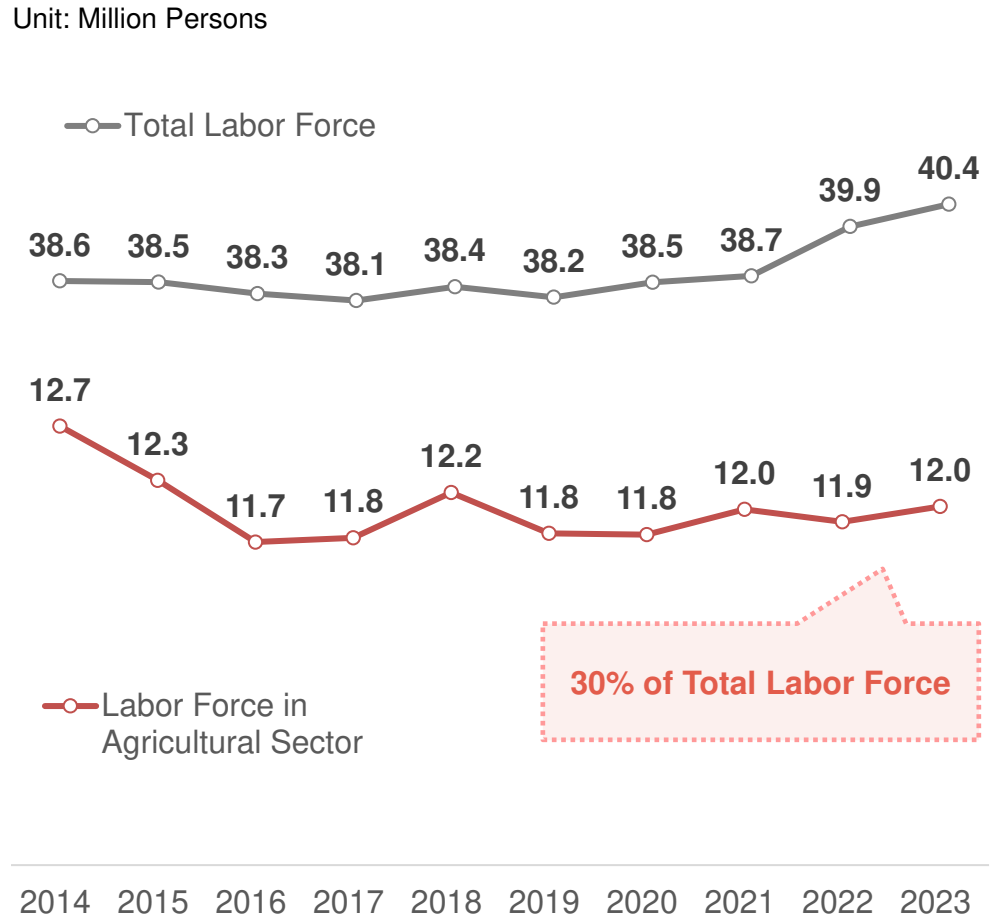
Importance of the Agriculture Sector in Thailand

- The agricultural sector has been the backbone of Thai economic development and is considered as one of the important sectors in driving Thai economic growth.
- **Economic aspect**: GDP from the agricultural sector was 693 billion baht, which accounted for 6.37 percent of total GDP in 2023.
- **Labor force aspect**: the agricultural sector provides a large number of job opportunities for Thai citizens. The total labor force in Thailand was 40.4 million in 2023, of which around 30 percent was in the agricultural sector.

GDP from the Agricultural Sector in Thailand (2014-2023)



Labor Force in the Agricultural Sector (2014-2023)

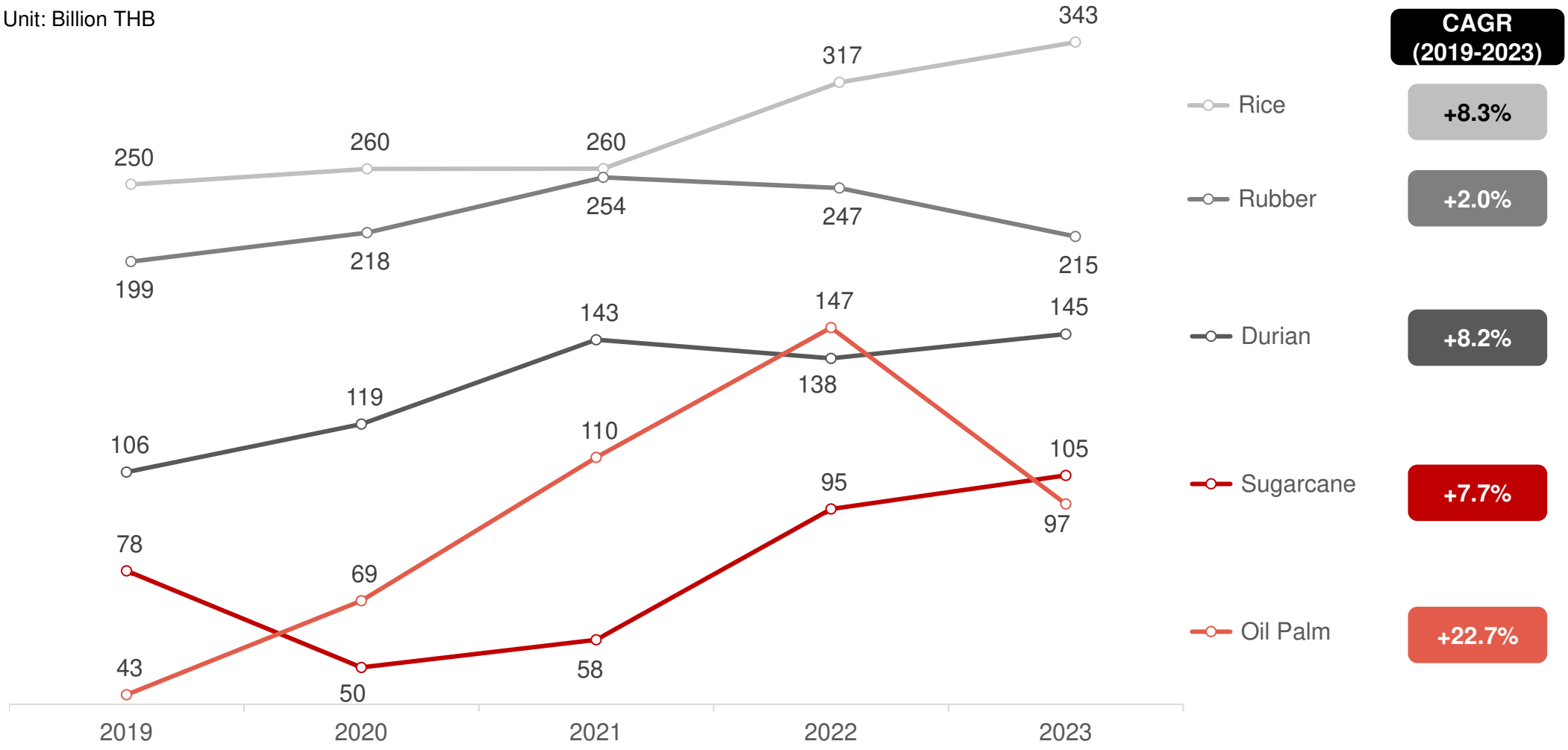


Source: Bank of Thailand

Major Agricultural Products of Thailand

- Thailand's major agricultural products by value are rice, rubber, durian, sugarcane and oil palm, respectively.
- Although the production was interrupted by the COVID-19 pandemic, production values of these products increased over the past 5 years.

Production Values of Major Agricultural Products in Thailand (2019-2023)

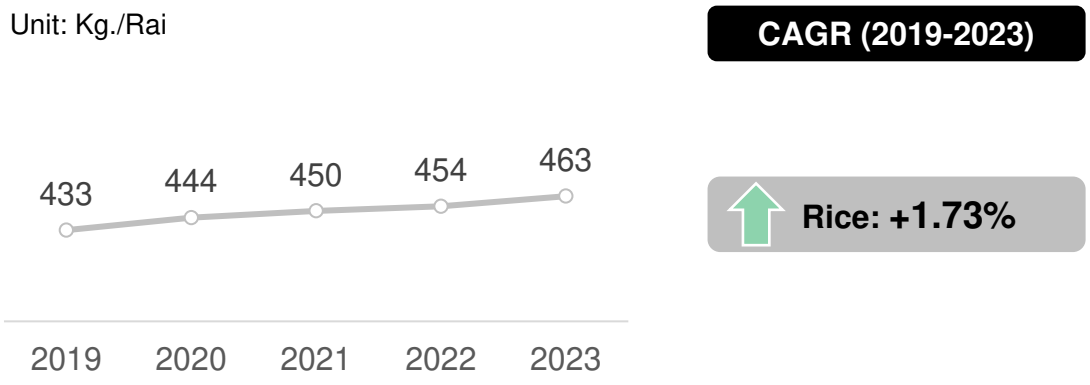


Source: Bank of Thailand

Productivity Trends of Major Agricultural Products

Productivity of Major Agricultural Products in Thailand (2019-2023)

Unit: Kg./Rai



- Although the agricultural sector is important for Thailand economic development, productivity trends of major agricultural products have not improved much over the past 5 years.
- The productivity of rice, the most significant crop driving sector growth has seen slight improvement, accounting for only 1.7 percent, while productivity of durian and oil palm have no improvement. On the other hand, rubber and sugarcane have encountered decline in productivity.
- There are various pain points that limit productivity improvements of these products. A critical point is the lack of planning and management in farming activities.

Source: Office of Agricultural Economics

Overview of Pain Points Limiting Productivity Growth of Agricultural Products in Thailand

- Major pain points that limit productivity growth of agricultural products along the supply chain are as follows;
- The most critical constraint among these is the lack of planning and management in agricultural activities.

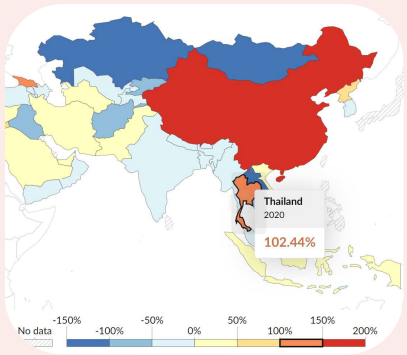
Overview of Pain Points Limiting Productivity Growth of Agricultural Products in Thailand

Farm/Field Preparation	Field Management	Harvesting	Post-Harvesting
Climate: unpredictable weather, effects of climate change			
Labor shortage			
High input, labor costs	High production costs, labor costs	Lack of storage quality	
Low resource utilization	Lack of economy of scale		

Lack of planning and management

Overapplying chemical fertilizers without gains in crop yield

- Among ASEAN countries, Thailand ranked no.1 in overapplying fertilizers without gains in crop yield (2020), which resulted in unnecessary increase in production costs.
- This was caused by the lack of planning and management of fertilizers used in crops.



Inefficient water usage

- The proportion of water usage varies depending on the type of crop, stage of plantation and crop conditions. Without tools and knowledge, many farmers encounter mismatch crop water requirements and irrigation causing unnecessary productivity loss.

Source: IBM, Digital Economy Promotion Agency, Our World in Data, Crop Yield (2020)

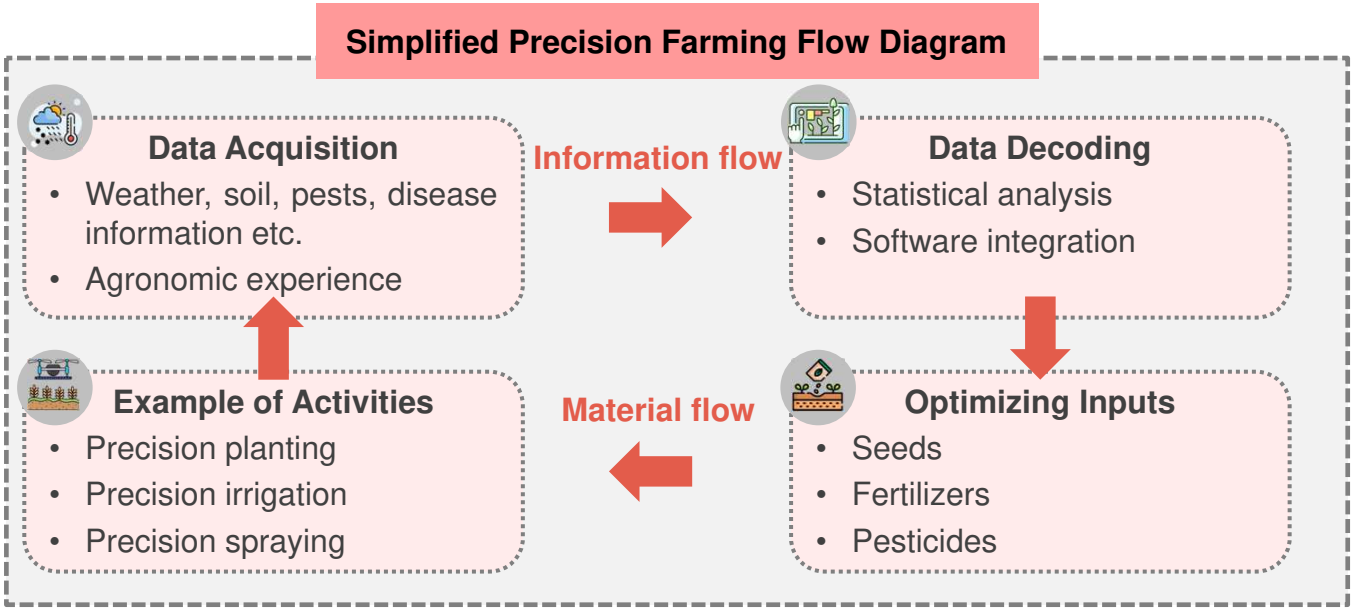
Introduction of Precision Farming, a Solution to Increase Productivity

- The problem of declining agricultural productivity in Thailand can be solved by adopting the precision farming concept, a farming management which uses technology and data to optimize resources and increase crop productivity.

Precision Farming Concept

- **Precision farming** is a data-driven farming management, utilizing systems and automation to precisely optimize plantation.
- Data is the key factor that will drive the success of precision farming. By analyzing both internal data (e.g., soil and plant conditions) and external data (weather, market conditions), different strategies can be implemented, which **aims to optimize crop productivity.**

Simplified Precision Farming Flow Diagram



Precision Farming Segmentation By Application

Crop Monitoring	Precision Planting	Precision Spraying	Precision Fertilization	Precision Irrigation	Farm Management
Farmers can monitor crops (e.g. detecting moisture, nutrients) using technologies such as moisture sensors, yield monitors.	Farmers can precisely plant crops using technologies such as seed delivery, data driven decision for each step of the crop cycle.	Farmers can precisely adjust quantity of crop protection substances, such as insecticides	Farmer can precisely adjust the amount of fertilizer using sensors and automated fertilizer application systems on tractors	Farmer can optimize the amount of water used in the fields	Farm recordkeeping system integrating factors of production, land, labor, and financial resources

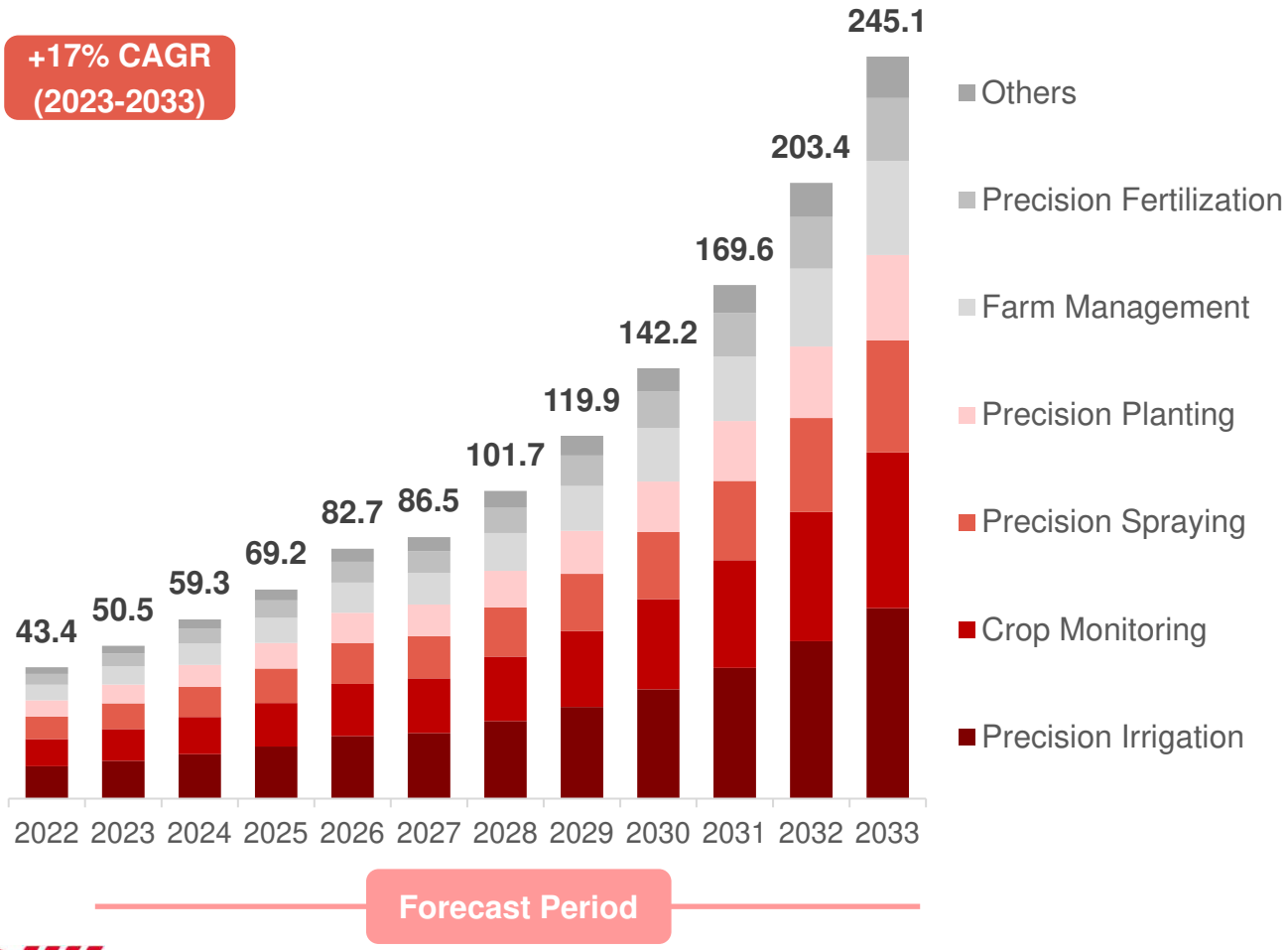
Source: BIS Research, National Science Technology and Innovation Policy Office, Agropages Market Insight

Selected Asia-Pacific Precision Farming Markets

- The precision farming market in selected Asia Pacific regions(1) was forecasted to be 50.5 million USD in 2023 and is expected to grow rapidly with 17 percent CAGR from 2023-2033.
- The precision farming market's segmentation by application is mainly categorized into 6 segments, of which precision irrigation holds the highest market share, accounting for around 25 percent of the total market.

Selected Asia-Pacific Precision Farming Markets(1) (2022-2033F)

Unit: Million USD



Application (%)	2023	2033	CAGR (2023-33)
Precision Irrigation	24.8%	25.7%	17.5%
Crop Monitoring	20.8%	21.0%	17.3%
Precision Spraying	16.8%	15.1%	15.8%
Precision Planting	12.3%	11.5%	16.3%
Farm Management	11.9%	12.7%	18.0%
Precision Fertilization	8.3%	8.4%	17.3%
Others	5.1%	5.6%	18.3%

Note: (1) Precision farming market values in selected Asia-Pacific regions exclude China, Japan, Australia and India.

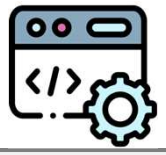
Source: BIS Research

Precision Farming Value Chain

- The precision farming value chain is divided into 5 stakeholders. Precision farming providers are categorized as software/service providers, device/component manufacturers and vehicle/machinery manufacturers.

Precision Farming Value Chain

Precision Farming Providers

Service/Software Providers	Device/Component Manufacturers	Vehicle/Machinery Manufacturers	Distributors	End Users
				
Software Providers ▪ Digital Mapping software ▪ Navigation software ▪ Device interconnecting software ▪ AI-powered robotics Software ▪ Field analysis software	**Hardware Manufacturers** ▪ Sensors ▪ Controllers ▪ Displays ▪ Actuators ▪ Receivers ▪ Others	▪ Applicators ▪ Harvesters ▪ Tractors	▪ Direct sales ▪ Wholesalers ▪ Retailers ▪ Distribution through Partnerships	▪ Farmers ▪ Agricultural contractors ▪ Agricultural companies ▪ Agricultural consultants ▪ Government agencies ▪ Research organizations

Source: BIS Research

Precision Farming Adoption Status and Level of Competition in Thailand

- Precision farming in Thailand is in an early adoption stage, where there are small groups of users and players in the market.
- Several players from different sectors have entered the market, such as agricultural machinery, telecommunication sectors etc.
- Precision farming providers in Thailand mainly offer both hardware and software products as end-to-end solutions.

Product Adoption Life Cycle

1 Introduction	2 Growth
3 Maturity	4 Decline

- From the production adoption life cycle concept, precision farming is considered in the introductory stage, which is an early adoption stage.
- In terms of users, there are only small groups of people called “early adopters” who acknowledge and are interested in this solution.
- In terms of players, various players in different sectors see potential growth in the precision farming market. Thus, these players have been researching and developing their solutions to suit Thai farmers.
- The market is quite fragmented. Players in this market include agricultural machinery companies (e.g., Kubota), Telecommunication companies (TRUE, AIS, DTAC), IT consulting companies, tech companies etc.
- Common business models are ① providing only software/service, ② providing only hardware, ③ providing both hardware and software as end-to-end solutions.

Examples of Precision Farming Providers

Company	Nature of Business	Precision Farming Products		
		Only Software/Service	Only Hardware	Software & Hardware
True/AIS/DTAC	Telecommunications	-	-	✓
Siam Kubota Corporation Co., Ltd.	Agricultural machinery manufacturer	-	-	✓
IBM Thailand Co., Ltd.	Technology consulting & service provider	✓(1)	-	-
PRIMUS CO.,LTD.	Electronics devices manufacturer & distributor	-	✓	-

Source: Digital Economy Promotion Agency, companies’ websites, public news

Note: (1) For pilot project with Mitr Phol Group

Players' Case Study: Telecommunication Providers (TRUE, DTAC, AIS)

- The telecommunications industry in Thailand has 3 major players, TRUE, DTAC, and AIS. As telecommunication providers have been granted telecommunications network concessions, they can easily penetrate the market and offer end to end precision farming services to customers.

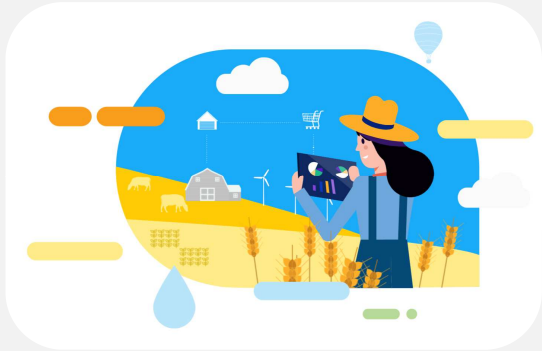
True Farm

- **True Farm Grow:** end-to-end irrigation system, precise irrigation scheduling is facilitated by the integration of monitoring and controlling compartments within a single easy-to-use platform.

- **True Farm Drone:** True Drone serves as a platform which allows users (i.e., farmers) to acquire drone spraying services by third party providers (e.g., Drone pilot).

DTAC Farm Man Yum

- **Local weather forecasts**
- **Crop planning**
- **Real-time monitoring sensors for plants status and conditions**

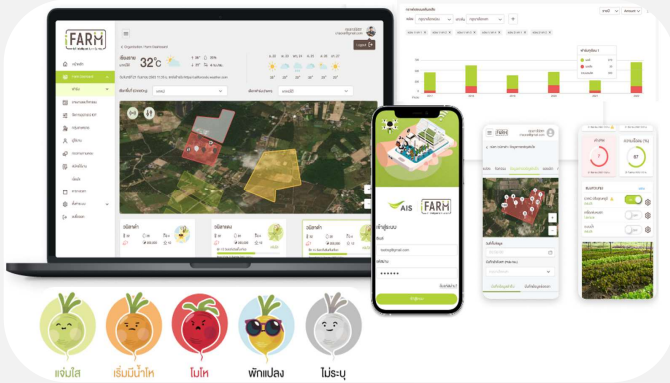


Telecommunication Providers TRUE VS DTAC VS AIS

AIS iFarm

Highlight Features

- **Farm dashboard:** Farmers can check plant status from the plant emotion icon.
- **Field sensor real-time monitoring:** Displays data from sensors in real-time.
- **Remote control & automation:** setting devices to operate when sensors reach desired points (e.g., water plants when soil moisture is less than 70%).
- **Farm planner & activity record:** record farm activities, crop planning
- **Field sensor data summary:** summarize data and export in CSV, Excel or PDF



Source: TRUE's, DTAC's, AIS's official websites

Player's Case Study: Agricultural Machinery Provider, Kubota

- Kubota is one of the major players in the agricultural machinery market. With agricultural expertise, Kubota can expand its business to precision farming efficiently and launched services as follows;

Kubota Farm

- Kubota Farm, established in Baan Bun, Chonburi province in 2020, is a comprehensive experiential modern farm that demonstrates Kubota Agri Solutions (KAS), which aims to maximize crop productivity through precision farming.

Kubota Farm comprises of 9 zones, including;

- Zone 1: Kubota Agri-Solutions Consultant Zone
- **Zone 2: Precision Rice Cultivation and Crop Rotation Zone: precision rice farming is demonstrated with various innovations**
- Zone 3: New Theoretical Agriculture Zone
- Zone 4: Rubber, Oil Palm and Fruit Tree Zone
- Zone 5: Construction Machinery Zone
- Zone 6: Field Crops Zone
- Zone 7-9 : KAS Research Zone, KAS Training Zone, Innovation Experience Zone

Kubota Agri Solutions (KAS) Crop Calendar Application

- The application utilizes Kubota's agricultural knowledge to maximize rice cultivation efficiency.

Key Features

- Crop calendar
- Notifications for different tasks in the crop calendar
- Income and expense accounts
- Summary reports, weather forecast
- Agricultural risks warning, price of crops
- Agricultural machinery management

Kasetinno: Agricultural Services & Solutions Provider

- In 2022, SCG, SIAM KUBOTA and Kubota Corporation jointly established Kasetinno Co., Ltd. to operate agricultural services.
- The agricultural services and solutions including;
  - Farm Design, farm Development, and farm care consulting services
  - Farm management application etc.

K-iField: Farm management system

Source: Asia Business Creation Platform

User's Case Study: Mitr Phol Group, Leading Sugar Producer in Thailand

- Mitr Phol group, a world-leading sugar producer, acknowledged the need of precision farming adoption to enhance the agricultural sector. Thus, the group participated in several projects with both private and public sectors to accelerate the adoption among farmers and agricultural companies.

MITR PHOL ModernFarm

- Mitr Phol Group, a world-leading sugar producer, collaborated with various organizations and projects promoting precision farming to strengthen Thailand's agricultural sector, especially in the sugarcane industry.

Mitr Phol ModernFarm program

Ultimate Goals	▪ To promote advanced farming methods and the usage of machinery in every part of the process to increase yields, ▪ To improve cane quality and alleviate problems with labor shortages.

Watson Decision Platform for Agriculture Pilot Project

Project Organizer	▪ National Science and Technology Development Agency (NSTDA) ▪ IBM, Mitr Phol Group
Project Detail	▪ Using AI, distant exploration via satellites and IBM's Watson Decision Platform to improve the efficiency of large-scale sugar cane farming. ▪ Mitr Phol group allocated 2,000 rai of sugarcane farming for this pilot project.
Project Result	**Increased in sugarcane productivity per rai from 7-8 tons to 10-15 tons**

Field Practice Solution (FPS) Service Platform Project

Project Organizer	▪ Department of Industry Promotion, Khon Kaen University, Private companies (e.g. Mitr Phol group, HG Robotics)
Problem	▪ The inability to control the quality and quantity of harvests ▪ The quality of sugarcane is below accepted standard ▪ Unstable sugar content
Result	▪ **High production cost**: cost of sugarcane production (e.g., labor cost, machinery, fertilizers etc.) is around 30% - 40% per ton. This causes the competitiveness of the sugarcane industry to decline.
Goal	**Using Precision farming concepts to:** ✓ **Reduce production costs** ✓ **Increase productivity yields**

Field Practice Solution (FPS)

- Data analytic systems using drone-based multispectral imagery, combined with weather and sugarcane physiological information to predict Brix content in sugarcane fields. Thus, crops can be harvested at the right time for maximum yield at the lowest cost.
- The project signed an MOU with Mitr Phol group, a world-leading sugarcane producer, to collect and analyze data from over 27,000 rai of sugarcane fields in the development phase.

Services Offerings

1. **Farm monitoring & mapping service**
2. **Farm robotic solution service**
3. **Farm business intelligence service**

Cost of Production by 20%

Source: Companies' websites, Krung Thai Compass, Public news

BOI Incentives

- There are various incentives, both tax and non-tax, for precision farming related businesses as follows;

Eligible Activities and Conditions	CIT Exemption
1. Manufacture or service of machinery and equipment of modern agricultural and modern agricultural system with own system or platform design and manufacture machinery and equipment in the project*	**8 Years**
2. Manufacture or service of machinery and equipment of modern agricultural and modern agricultural system with own system or platform design	
• Project must manufacture modern agricultural systems, such as detection system, tracking system or relevant resources (water, fertilizers, medicines) management systems and smart greenhouse systems.	
• Project must design its own systems or software or platform for relevant resources management in a system integration manner by collecting, interpreting, and analyzing data. In case project does not design its own systems or software or platform, project must have expenses on systems or software or platform development by local developer of at least 10 million baht within the full operation deadline.	
• The project must manufacture machinery or equipment for modern agricultural systems with a part-forming process, part-assembling process and/or engineering designs as approved by the Board.	
• Project must have expenses on salary for IT development and engineering personnel of at least 1,500,000 baht per year and it must be new employment, or capital investment (excluding cost of land, working capital and vehicle) of at least 1 million baht	
3. Services related to modern agriculture	**3 Years**
• The activity must involve the provision of services for modern agricultural systems, such as detection system, tracking system, or relevant resources (water, fertilizers, medicines) management system and smart greenhouse systems as approved by the Board	

- Investors investing in eligible activities mentioned above will also obtain tax incentives including exemption of import duties on machinery, raw materials used in R&D, and raw materials used in production for export.
- In addition, investors will obtain non-tax incentives including permit to own land, permit to bring into the Kingdom skilled workers and experts to work in investment promoted activities, permit for foreign nationals to enter the Kingdom for the purpose of studying investment opportunities, permit to take out or remit money abroad in foreign currency.

Source: BOI (2023)

DEPA Incentives

- Aside from normal BOI incentives, the Digital Economy Promotion Agency also provides funding for investors and users to increase digital investment in the agricultural sector.

For Providers (e.g. Tech Developers)

DEPA Digital Startup Fund

- AgriTech can apply to this package for developing conceptual plans, starting businesses or financing to support growth

	Incentive	Duration
S1:Conceptual Plan	≤ 50,000 THB	1 year
S2: Launch	≤ 1 M THB	3 years
S3: Growth	≤ 5 M THB	3 years

For Private & Public Investments

DEPA Digital R&D and Innovation Fund

- Private and public companies can apply to this package for research and development in technology and digital innovation.
- Example case: Farm feed, data platform, Infuse Co., Ltd.

	Incentive	Duration
R1: Private/Public investment	≤ 3 MTHB	3 year

For Private & Public Investments

DEPA Digital Infrastructure Fund

- Agricultural private companies or government and public organizations relating to agricultural activities can apply to this package for construction of facilities for agricultural activities.
- Example case: Agriculture Business Cloud Data Platform (ABCD), Kasetsart University

	Incentive	Duration
I1:Private investment	≤ 50 M THB	3 years
I2:Public investment	≤ 200 M THB	5 years

For Users (e.g. Farm Operators)

DEPA Digital Transformation Fund

- Agricultural companies that want to transform their businesses with digital technology can apply to this package.
- Example case: precision irrigation installation

	Incentive	Duration
T1:Conceptual plan	≤ 50,000 THB	1 year
T2: Digital Transformation	≤ 1 M THB	3 years

Source: Digital Economy Promotion Agency

Future Trends, Opportunities, Challenges and Recommendation

Future Trends

Overall Market:

- Labor shortage, climate change and governmental support are the main factors driving market demand.
- With the current boost from government subsidies and incentives, along with collaboration with private sectors, the adoption of precision farming will increase.

Segmentation by Application

- Precision Irrigation, crop monitoring and precision spraying are the major precision farming applications in terms of market value.

Opportunities

Low Level of Competition

- Currently, the precision farming market is considered “blue ocean”, as there are only a few players. Thus, there is room for investors to penetrate during this period.

Potential Precision Farming Applications

Investors can invest in major precision farming segments to attract major customers.

Potential Customer Segments

- Large farm operators, having high investment capital are more likely to adopt precision farming.
- The durian market is one of the potential customers for precision farming because:
  - Durian consumption trend has been rapidly growing both domestic and overseas.
  - Price of durian is relatively high, so durian farmers have more purchasing power compared to other crop farmers.

Challenges

Strong Existing Competitors in the Market

- There are large players who have penetrated the market and is gaining strong reputation as precision farming providers. This could be a challenge for new entrants.

Limited Demand

- As precision farming is in the early adoption stage, potential users might have insufficient knowledge towards the usefulness and importance of this concept.
- High initial investment costs for small farm operators
  - Potential customers must invest in equipment and systems. Thus, small farm operators may be afraid to adopt precision farming due to low purchasing power.

Recommendations

- Offering end-to-end solutions by integrating both hardware and software, providing seamless digital transformation for customers.
- Know-how is one of the key competitive advantages to penetrate this market. To effectively penetrate this market, potential new entrants can partner with companies that are specialized in IT or have agricultural expertise.
- For foreign investors, partnering with Thais having local known-how is easier to establish this business in Thailand as well as implement suitable strategies.