

## EIC recommends uplifting Thailand's agricultural sector with Agritech

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- Today, various developed countries, for instance, the US, Australia, and Germany adopt Agritech as an aid to farming on a wide scale. Such Agritech applications are, for example, robots that can detect and sort crops based on the size in addition to machines that collect farming data, survey land, control pests, and harvest agricultural products. The implementation of Agritech solutions can effectively improve cultivation efficiency as well as lower farming costs.

- EIC views that Thailand should start to adapt as traditional farming will likely be disrupted by Agritech. Despite Thailand somewhat adopting Agritech via agricultural drones and indoor farming, the adoption is still not widespread to date. The obstacles for Agritech adoption among small family farmers are the lack of capital readiness and small crop fields, thereby causing investments to be unprofitable. Thus, government support and assistance for capital, knowledge, and research and development to lower costs as well as the promotion of crop field integration are required.

- With regards to exports, Thailand's position as a base for production and export of agricultural machinery and parts could be leveraged by expanding to produce and export higher value-add Agritech solutions. An example could be to manufacture automation systems for tractors and harvesters that already are Thailand's key export items. Furthermore, the key markets that Thailand exports tractor parts to are the US and Australia, which already installed automation systems on agricultural machinery.

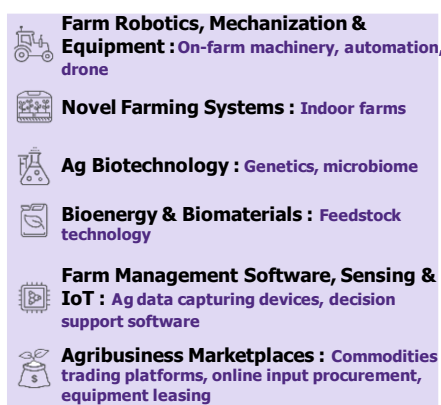
**Motivated by the need to improve cultivation efficiency to support the growing population as well as to reduce anticipated labor scarcity in the agricultural sector arising from the aging society, many countries adopted the use of Agritech.** The current development of Agritech is wide-ranging from applications that focus on cultivation, such as agricultural drones and machinery and systems that automate cultivation to applications that facilitate marketing, such as online trading, online material sourcing, and online agricultural machinery leasing. The adoption of Agritech among farmers will increase yield and improve crop quality. Furthermore, with Agritech, farmers can better allocate and effectively manage inputs such as water, fertilizer, crop field, and labor, especially when compared to traditional farming. With such regards, Agritech will help farmers reduce costs. Moreover, the growing popularity of Agritech is also driven by the aging society, as many countries are entering the aging society and anticipate labor scarcity in the agricultural sector.

**Today, various countries, especially developed countries such as the US, Australia, and Germany are using Agritech on a wide scale.** A case in point is the US and the application of Agrobot, a robot that uses image capturing sensors to detect and sort crop size to identify harvest readiness. Once ready for harvest, the robots will automatically harvest the crops using their robotic arms. Furthermore, the US also uses other applications, for example, pest control robots. Another innovative application is Australia’s use of Ladybird, a solar-powered machine that is equipped with sensors to collect cultivation data, survey fields, and control pests and weeds in addition to harvest. Meanwhile, Germany transforms traditional agriculture into artificial intelligence (AI) driven agriculture. The country collected farming-related data in differing environments and process the data via machine learning and predictive analytics.

The mentioned advanced technologies are detrimental to improving cultivation efficiency and lowering costs. The growing popularity of Agritech applications resulted in leapfrogging Agritech investments on a global scale. In 2018, the global Agritech investment value reached USD 6,900 million, representing a 44% growth from 2017. The Agritech sector that received most interest according to high investment value and outstanding growth were ones relating to genetic technologies, farm management software, detection machines, and IoT.

**Figure 1: Today, the formats of Agritech development are widespread**

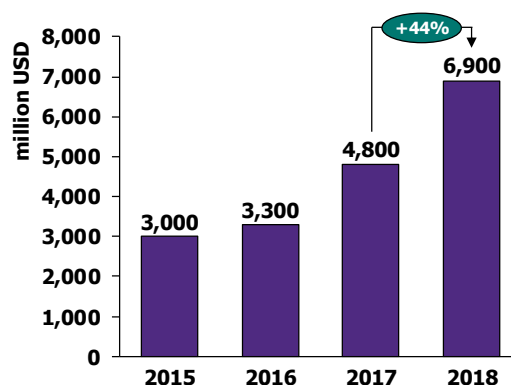
**Examples of Agritech**



Source: EIC analysis based on data from AgFunder

**Figure 2: The value of Agritech investment leapfrogged**

**The value of global Agritech investment**

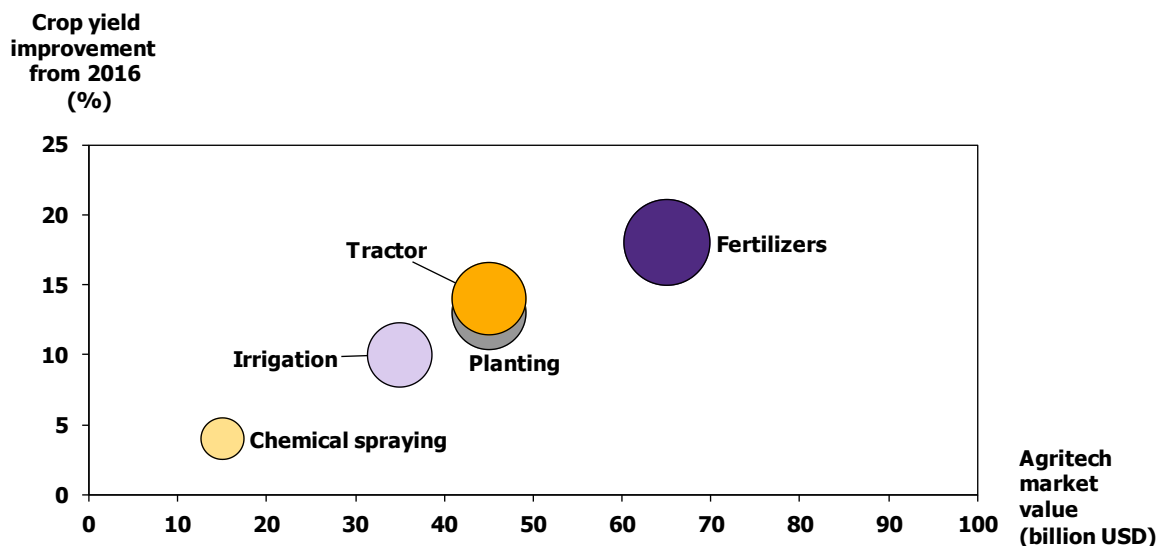


Source: EIC analysis based on data from AgFunder

Nonetheless, the Goldman Sachs Group forecasted that the value of the Agritech industry in 2050 should increase to USD 240,000 million. According to the forecasted Agritech market value, the top categories were fertilizers 27%, planting 19%, tractor 19%, irrigation 15%, chemical spraying 6%, and other areas, such as field monitoring and data management 14%. The mentioned Agritech applications can improve the overall efficiency in the agriculture sector, especially regarding crop output and value-add creation.

**Figure 3: Agritech applications for fertilizers have the highest potential due to market value and crop yield improvements in addition to creating value-add from Agritech implementation**

The global market value of Agritech, crop yield improvement, and value-add creation from agricultural products from using Agritech to aid farming in 2050



Remarks: The size of the bubble represents the value-add created from implementing Agritech to aid farming  
 Source: EIC analysis based on data from the Goldman Sachs Group

**Despite Thailand already adopting drone and indoor farming Agritech applications, the use is still not as widespread.** Today, Thai farmers are increasingly using agricultural drones to sow seeds, spray fertilizers and pesticides, and survey fields. One of the drivers for growth is the lower Agritech price. Thai companies can produce and sell drones for farming use at a minimum price of THB 200,000 per device, a price significantly lower than in the past. Even though the prices of drones are significantly lower, the prices are still not feasible for investment, especially for small family farmers with small crop fields. As such, the adoption of drones for agriculture use is not as widespread. Furthermore, the prices of most agricultural products in Thailand have remained low, thereby disincentivizing farmers to further invest in drones for agriculture use.

Indoor farming is receiving growing interest in Thailand. This type of farming, like its name, is conducted indoors with various types of environmental control features relating to cultivation, such as temperature, lighting, moisture, water quantity, and fertilizer. There are many types of indoor farming solution providers,

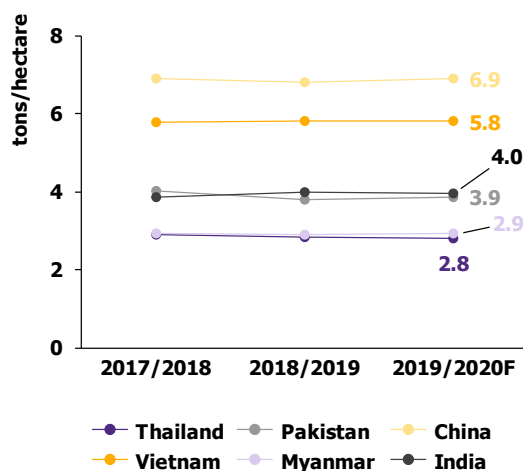
for example, plant factory systems, LED lightings, irrigation systems, temperature adjustment systems, and turnkey indoor farming providers. In this regard, indoor farming requires higher investments than traditional farming from investments in various systems and technologies. Therefore, most farmers use indoor farming only to cultivate high-profit crops. Furthermore, indoor farming is only suitable for the cultivation of certain crops and fruits. As such, the range of indoor farming products in Thailand is not as diverse with limited numbers of Thai indoor farming farmers.

Many challenges loom Thailand's agriculture sector. The most common format of farming in Thailand is traditional farming. Though basic machinery such as tractors, plows, irrigation pumps, combine harvesters, fertilizer and pesticide sprayers, and weeders are used, Thailand's farming still has a high dependency on human labor. Moreover, the agriculture sector faces many structural challenges, for example, small family farmers with small crop fields, high labor costs, and low efficiency in managing water resources and production inputs, such as fertilizers and pesticides, as well as the lack of the capability to cope with weather fluctuations. Therefore, Thailand's agricultural product quantity and quality tend to be inconsistent, meanwhile, the cost of farming cannot be reduced by as much.

A great example is Thailand's rice production efficiency. Even though Thailand is one of the world's key rice exporters, the efficiency of Thai rice production is found to be significantly lower than other rice exporting countries including Vietnam, Pakistan, Myanmar, China, and India. Meanwhile, the farming costs of other agricultural products that Thailand is a major exporter, such as rubber and sugar, are higher than the average price sold by farmers. Furthermore, the cultivation of other crops, for example, white rice paddy, cassava, and oil palm did not receive high profits.

**Figure 4: Thailand's rice cultivation efficiency is lower than in other countries**

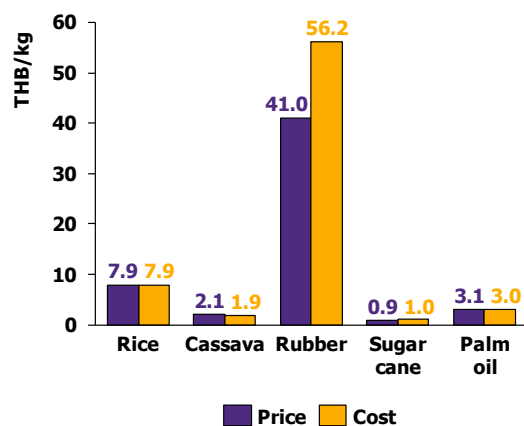
A comparison of rice cultivation efficiency in different countries



Source: The United States Department of Agriculture (USDA)

**Figure 5: Thai rubber and sugarcane farmers still suffer from negative profits**

A comparison of average price sold and average costs of different crops in Thailand in 2018



Source: The Office of Agricultural Economics

EIC views that domestic promotion for Agritech adoption is an alternative that can uplift Thailand's farming efficiency. Agritech can somewhat help resolve structural issues in Thailand's agricultural sector, such as reduce labor costs, while increasing water resource management and input management, for example, fertilizers and pesticides. In the meantime, other structural issues need to be resolved in parallel, such as small crop fields owned by small family farmers and the lack of capability to withstand weather fluctuations. The improving conditions will allow Thailand's agricultural sector to maintain its competitiveness in the world market, in addition to sustainably reducing costs for Thai farmers.

**EIC sees that traditional farming methods could be disrupted by Agritech. As such, Thailand's agricultural sector needs to adapt to prepare for changes in the future. An efficient solution is to promote the use of Agritech domestically to increase efficiency in the agricultural sector.** Agritech applications with high potential for adoption in Thailand are agricultural drones to sow seeds, spray fertilizers, spray pesticides, and survey crop fields, as well as automation systems for tractors, weeders, and GPS controlled harvesters. The group of potential farmers that will start to adopt Agritech first should be large scale farmers due to their investment readiness and benefits received from economies of scale, in addition to young farmers and heirs of farmers who want to convert traditional farming to Agritech.

**The use of Agritech among small family farmers was found to be challenging as the farmers have low investment readiness and possess small crop fields, a factor that impacts investment feasibility.** With such regards, small family farmers require support and assistance from the government, especially for capital, knowledge, and research and development to lower prices, as well as promoting crop field integration so that farmers can gain benefits from economies of scale. Such measures will allow small family farmers to use Agritech as an aid for farming and expand the use of Agritech on a wide scale. Meanwhile, Agritech companies could promote the use of Agritech to small family farmers via the agricultural machinery rental companies.

**Thailand is one of the production and export bases for agricultural machinery and parts. Thailand could leverage this position and expand to producing and exporting Agritech solutions that cater to global agricultural trends.** Today, Thailand is one of the world's key exporters of agricultural machinery and parts with an export value of approximately USD 1,000 million per year. Of the mentioned export value, nearly half is contributed by tractors and parts, while the remaining is from other products, such as harvesters, threshing machines, irrigation pumps, plows, harrows, seeders, sprayers, dryers, and machines that clean, grade, lift, and sort, in addition to agricultural machinery parts. The main export destinations for Thai agricultural machinery are ASEAN and India, meanwhile, the main export destinations for Thai agricultural machinery parts are the US and Australia.

EIC views that Thailand's position as a key global exporter of agricultural machinery and parts could be leveraged by Thai agricultural machinery companies. Thailand could add value to its existing production and export base for agricultural machinery and parts by extending to produce and export Agritech solutions that cater to global agricultural trends. The types of Agritech solutions with high potential for development among Thai entrepreneurs are automation systems for tractors and harvesters, which are Thai products

that are mainly meant for exports. Furthermore, such Agritech products could be exported to the US and Australia, which are Thailand's main destination for tractor parts exports and the mentioned countries already installed automation systems on agricultural machinery.

The use of Agritech to uplift agricultural machinery efficiency will also increase the mentioned companies' revenue from exporting higher value-add products. Furthermore, exporters could expand to target new destinations with high potentials since the current export markets are clustered in ASEAN and India. The new source of income from Agritech exports could also act as a buffer to stabilize the total revenue gained. This is because revenue from domestic sales could drop if the prices of crops declined. In such conditions, most farmers could decide to delay new agricultural machinery purchase, also, farmers could choose to repair damaged agricultural machinery or buy second-hand agricultural machinery instead.

**Going forward, agricultural machinery companies could cooperate with Agritech startups to develop advanced Agritech solutions.** Interesting developments include electronic nose technology that measures and sorts crops by smell, radar technology, weather monitoring sensors, crop health and disease forecasts, and applications that control water, soil conditions, temperatures, and moisture levels. The move will broaden the scope of the agricultural machinery companies and turn the companies to be solution providers that cater to the trends of global smart farming. Furthermore, the move will diversify the company's risk of relying mainly on the income from the sales of agricultural machinery.

In the present, various Thai startups are collaborating with foreigners to develop advanced Agritech solutions. An example is Ricult, a platform that provides credit risk assessments for smallholder farmers. Part of Ricult's credit score is calculated by predicting the smallholder farmer's income based on the platform's forecasted production data for the smallholder farmer. Ricult will be the intermediary between the farmers and the lenders, such as banks and suppliers of agricultural products. Furthermore, Ricult uses machine learning technology and satellite images to analyze farming conditions and nutrients or minerals in the soil, also, the company offers weather forecasts.

Moreover, various Agritech marketing platforms are being developed. These platforms facilitate the trade of agricultural products in the form of B2C and B2B, but the platforms still need further development for broader commercial use.

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