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SMART AGRICULTURE

IN THE EMERGING

INDUSTRIAL REVOLUTION 4.0

HUMAN CAPITAL REPORT



1800-88-4800 | www.hrdcorp.gov.my | support@hrdcorp.gov.my

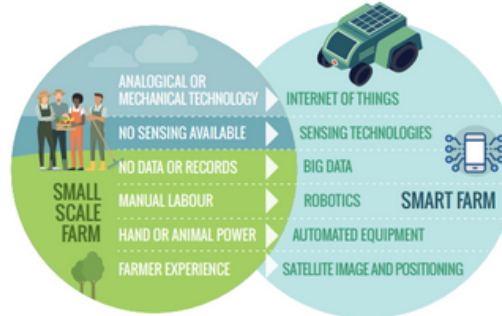
WHAT IS SMART AGRICULTURE?

Smart agriculture also referred to as "Smart Farming" or "Precision Agriculture (PA)", is a management concept that focuses on laying the groundwork for agricultural businesses to use sophisticated technologies such as **big data, the cloud, internet of things (IoT), robots and artificial intelligence (AI)** to track, monitor, automate, and analyse processes.¹ Smart farming also aims to boost the quantity and quality of products while optimising human labour production. The charts below show the technologies used to implement smart farming.²



Source: Beecham Research, Smart Farming: Agriculture Towards IoT Vision

Comparison between a smart farm (Agriculture 4.0) and a small-scale farm (conventional agriculture)

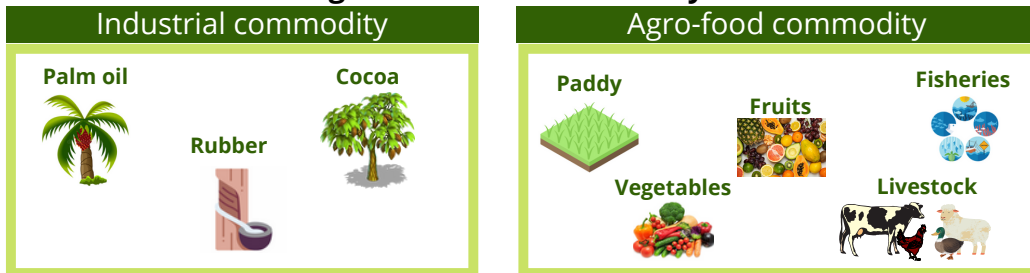


Source: Food and Agriculture Organization of United Nation (FOA), Rome 2020

AGRICULTURE IN MALAYSIA

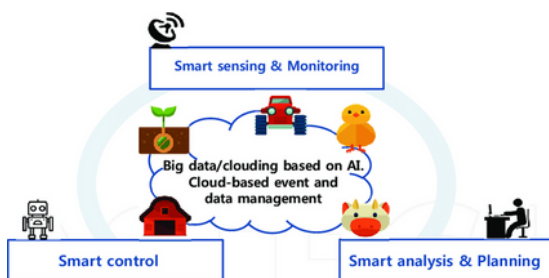
Agriculture is one of the most significant components of the National Key Economic Areas (NKEA) because of its ability to boost economic growth by producing more jobs and improving farmers' income.³ According to DOSM data in 2019, RM101.5 million or equivalent to 7.1% was contributed to the Gross Domestic Product (GDP) by the agriculture sector. Palm oil was the major contributor to the GDP of the agriculture sector at 37.7%, followed by other agriculture sectors at (25.9%), livestock (15.3%), fishery (12.0%), forestry and logging (6.3%) and rubber (3.0%).⁴

Agriculture sector in Malaysia



Source: Emerging Industry Revolution 4.0 and Its Relationship with the Agriculture Sector in Malaysia, Food and Fertilizer Technology (FFT)

As the population of Malaysia is projected to increase to more than 45 million by 2050, there will be an increase in food demand and consumption.⁵



Source: The Fourth Industrial Revolution and Future Agriculture. Rep. of Korea: Science and Technology Policy Institute; 2017

Agriculture 4.0, which incorporates precision farming, IoT, and big data, helps to enhance crop yields, improve farming efficiency, reduce demand for farmland, and limit the migration of workers to urban areas.

In this digital agriculture development, farmers have greater control over their operation such as the irrigation equipment, soil moisture, crop growth, and the level of livestock feeds without the need for their presence.⁵

QUICK HIGHLIGHTS AND TAKEAWAYS



7.4%

CAGR increase in 2020 for Agrofood sectors

Source: National Agrofood Policy: Scope and Priorities



Malaysia is the world's largest palm oil producer and exporter in 2020

9.1%

Production of oil & fats in 2020

19.7%

Exports of oil & fats in 2020

Source: Malaysian Palm Oil Industry (MPOC)



In 2019, there were 1,541,100 employees in agriculture sector

79.2%

Male workers

20.8%

Female workers

Source: Department of Statistics Malaysia (DOSM)

Here are several examples of smart agriculture that are implemented through IoT applications:

Agricultural Robotics - Agrobots

Autonomous machines are capable of doing various repetitive agricultural chores on the farm without the need for direct human participation, such as field preparation and harvesting.⁶

It also offers cost-saving opportunities as it decreases labour needs (weeding and harvesting), and restricts the use of inputs (pesticides).⁶



Small robot for weeding

Solar powered robot



Agriculture Drone - UAV Mapping & Spraying

Drones are used for crop spraying and planting from the air and are able to cover hundreds of acres in one flight. They are outfitted with 3D mapping equipment that provides information on soil fertility while detecting mineral deficiencies.



They are able to monitor, analyse and collect multispectral, thermal and visual imagery which provide key information to farmers on plant health, yield prediction and drainage mapping.⁷

Plant Factory with Artificial Lighting (PFAL) (Vertical Farming)

Vegetables are placed under multi-colored light-emitting diodes (LEDs) that could keep the crops free from pests and pesticides as well as maintain their hygiene. This technology has helped vegetables grow quickly and be ready for harvest within 25 to 40 days.⁹



Precision Livestock Farming

It consists of automated remote sensors detection and monitoring using individual identification methods such as radio-frequency identification (RFID) tag, smart collar and facial detection technology.



The data captured are integrated into an algorithm to provide credible information regarding animal health and welfare using real-time analysis of images, sounds, tracking data, weight, body condition and productivity.¹⁰

Narrowband Internet of Things (NB-IoT) with 5G (Grape fertigation plot cultivated under a rain shelter)

Sensors are put in place to measure soil moisture, waterpH, and ambient temperature. Data collected using NB-IoT are deposited into a cloud server for data visualisation and analysis.



Farmers monitor crop conditions remotely and receive alerts about any unfavourable environmental effects via web applications, allowing them to take preventive measures to increase the yield value of the planted crops.⁸

There are various courses related to Agriculture activities offered by local professionals or accreditation bodies in Malaysia.

Training courses offered by Malaysia's accreditation body related to Agriculture Sectors

Department of Agriculture

1. Malaysian Good Agriculture Practice
2. Crop Commodities – Malaysian Farm Good Agricultural Practice Scheme
3. Malaysian Accredited Farm Scheme
4. Malaysian Organic Scheme Certification (SOM)

Department of Veterinary Services

1. Good Animal Husbandry Practices – The Livestock Farm Accreditation Scheme (SALT)

SGS Malaysia

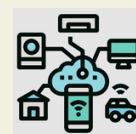
1. Feed Certification
2. Malaysian Sustainable Palm Oil (MSPO) Certification
3. Malaysian Sustainable Palm Oil Supply Chain Certification Standard
4. Non-GMO Certification
5. Roundtable on Sustainable Palm oil (RSPO) Certification
6. Roundtable on Responsible Soy (RTRS) Certification

MDEC

1. eLadang (Digital Tools and Services in Agrofood Industry)

QUICK TAKEAWAYS AND HIGHLIGHTS

Internet of Things (IoT)



A network of connected devices that generate and share data with each other. It optimises farm monitoring through smart sensors.

Cloud



A huge computing power that acts as data centers and storage for weather, irrigation practices, plant nutrients, climate and soil moisture.

Big Data



It analyses massive amounts of data and gets farmers informed of upcoming weather conditions as well as crop harvesting periods using predictive analysis.

Source: Iberdola, Smart Farming and Precision Agriculture Talent, Big Data and Agriculture: A Complete Guide

Benefits of Smart Agriculture



Cost Saving



Higher Income



Better Quality and Yield Production

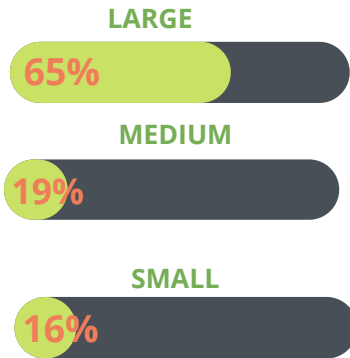


Reduce Environmental Impact

AGRICULTURE AS NEW SECTOR COVERED UNDER EXPANSION OF THE PSMB ACT 2001

HRD Corp is broadening its coverage by expanding sectors covered under the PSMB Act 2001. All industries are now covered, except for Federal and States Government & NGOs in Social Welfare Activities. According to MSIC 2008, the Agriculture, Forestry and Fishing sectors include crop and animal production, hunting and related service activities, fishing and aquaculture, and forestry and logging subsectors.

Percentage of Employees by Industry Size

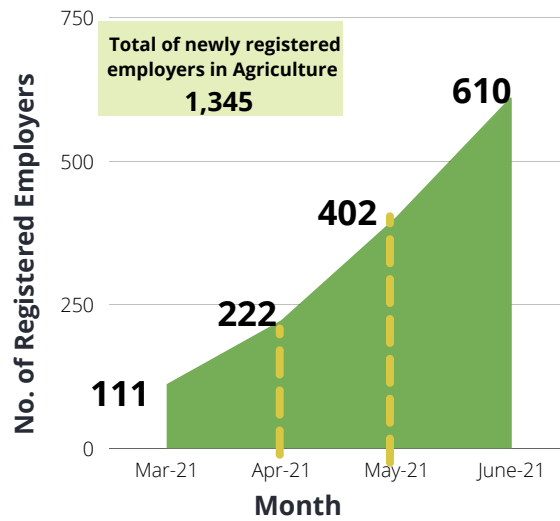
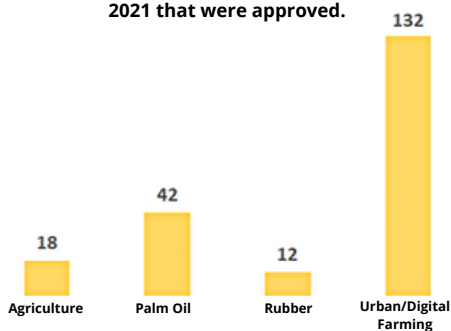


Total employees: 82,534

Based on HRD Corp's internal data for newly registered employers and employees within the agriculture sector, the numbers show a gradual increase from March 2021 to June 2021.

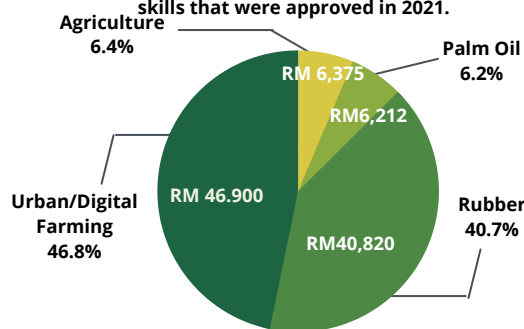
HRD Corp has developed and introduced various schemes to support the growing significance of digital agriculture in accordance with the development of Industrial Revolution (IR) 4.0 in Malaysia. For instance, the Industrial Revolution 4.0 (IREV 4.0) scheme under the PENJANA Initiative has been providing digital farming training courses, especially to the employers from the agriculture sector, that were affected the COVID-19 pandemic. From March to June 2021, Urban/Digital Farming related course had the highest training places approved.

Training Places related to agriculture skills in 2021 that were approved.



Source: HRD Corp Internal Data as of March to June 2021

Financial Assistance related to agriculture skills that were approved in 2021.



Source: HRD Corp Internal Data as of March to June 2021

CONCLUSION

In the emerging Industrial Revolution (IR) 4.0, agriculture sectors in Malaysia are currently active in starting and accelerating their digital transformation journey. Smart farming with the aid of IoT technology has a real potential to deliver a more productive and sustainable form of agriculture production for the long term.

Therefore, with the increasing number of registered employers in the first four months, it is projected that there will be more upskilling and reskilling training courses in smart agriculture to ensure that workers are able to embrace such technologies effectively.

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QUICK HIGHLIGHTS AND TAKEAWAYS

The most common grant approved from March 2021 to June 2021 in the agriculture subsectors:



4%

Growing of paddy activities

Growing of non-perennial crops



96%

Growing of plants for planting activities

Plant propagation



RM76,495

Financial assistance approved under the agriculture sector

Source: HRD Corp Internal Data as of June 2021

PENJANA

Industrial Revolution 4.0 Scheme

RM31.2 mil.

Total Disbursement

32,259

Trainees Trained

Source: HRD Corp Internal Data as of 9 April 2021