

Market Report: Smart agriculture

October, 2017



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Content

1. Trend of Smart Agriculture Related Business in Japan

- (1) Trend in Market Size
- (2) Issues and Solutions
- (3) Areas with Good Growth Prospects
- (4) Major Players

2. Situation of Overseas Companies Entering the Market

- (1) Situation of Major Overseas Companies Entering the Market
- (2) Case Studies of Major Overseas Companies
- (3) Partner Candidates of Overseas Companies

3. Business Environment Surrounding Smart Agriculture Related Services

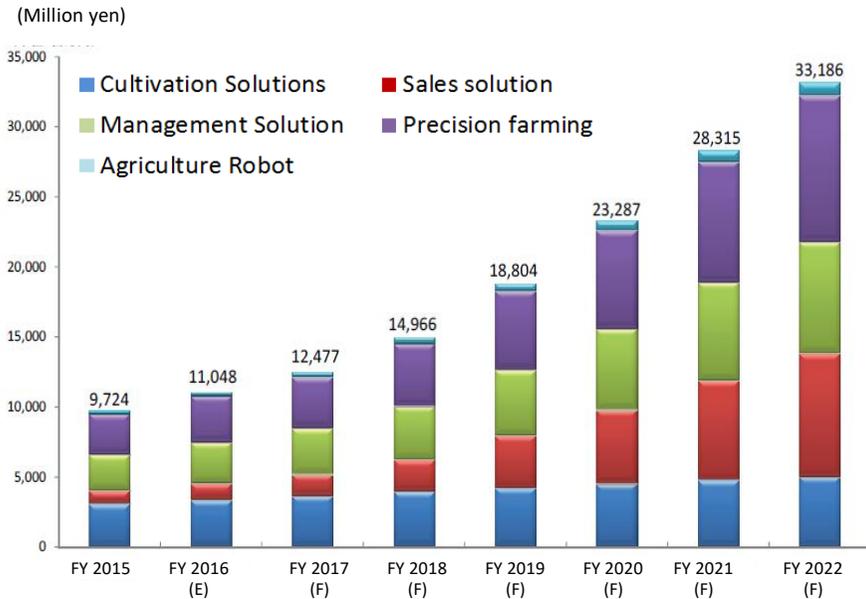
- (1) Permissions, Restrictions and Incentives etc.
- (2) Major Industry Organizations and Associations
- (3) Major Exhibitions

1.Trend of Smart Agriculture Related Business in Japan

(1) Trend in Market Size

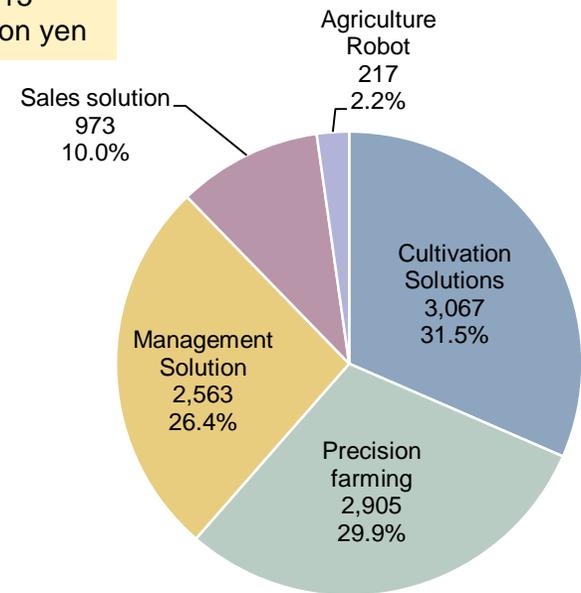
■ According to an estimate of a research company, size of the domestic market for smart agriculture was approximately 9.72 billion yen in FY2015 , 11.05 billion yen in FY 2016 and it will expand to 33.19 billion yen in FY2022. Further, until FY2017 it was primarily centered on cultivation support solutions such as production control of farm products but after FY2018, it is expected that sales and operational support solutions will increase. In addition, precision farming is expected to expand from around FY 2018, as the systems that realize interworking between manned and unmanned agricultural machineries and systems that realize unmanned operation will get popularized.

Transition and forecast on the size of domestic market for smart agriculture(Million yen)



FY2015 Domestic market for smart agriculture composition ratio by segment(Million yen, %)

FY 2015
9,724 million yen



(Note 1) Numerical figures are based on business turnover basis. Since the figures have been rounded off, total value may vary at places. Cultivation Solutions include agriculture cloud, Compound Environmental Control Equipment, and production support solutions for stockbreeding etc. Precision farming includes GPS guidance system and autopilot device.

(Note 2) Figures for FY2016 are forecast and those for beyond 2017 are predictions.

(Note 3) POS system for agriculture, agricultural machinery, drone for agriculture are not included in the market size of smart agriculture.

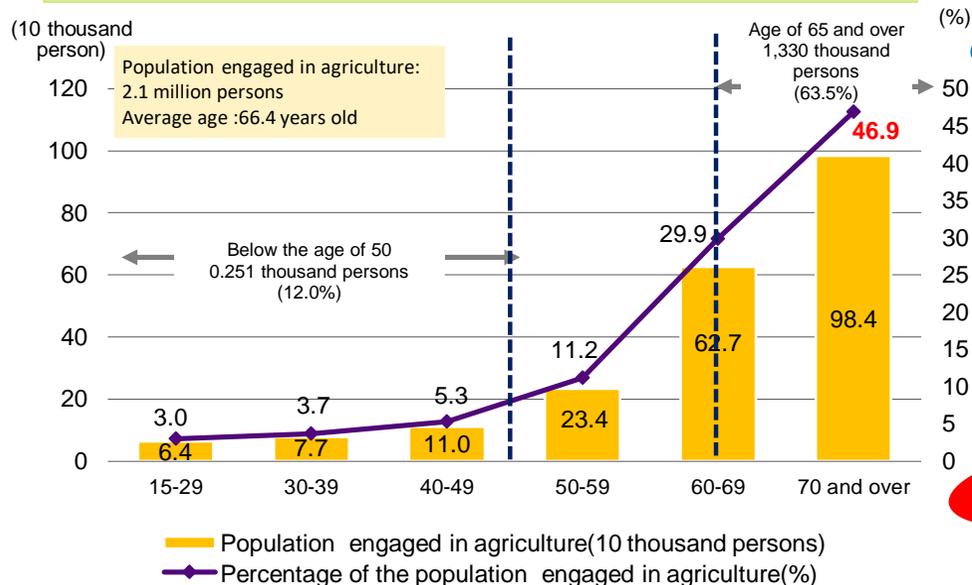
(Source) Yano Research Institute Ltd. " Research on Smart Agriculture(2016)" (Press released on 14 Nov,2016)

1. Trend of Smart Agriculture Related Business in Japan

(2) Issues and Solutions

- In Japan in the fields of agriculture, forestry and fisheries and the food industry, there is a serious shortage of labor due to decrease in farming population and progress of ageing but going forward improvement is expected due to progress of smart agriculture
 - In 2016, the average age of the population engaged in agriculture was 66.4 years and more than 60% were above the age of 65.
 - In the workplace of agriculture, forestry and fisheries operations rely more on manual work and experience and skilled workers are needed. It is important to promote labor-saving initiatives, secure workforce and reduce load.
- On the other hand, there are also many issues due to the introduction of smart agriculture. Various technologies are needed for smart agriculture but cost competitiveness is required of companies offering such solutions. For that, it is expected that by companies collaborating and competing not only within Japan but also overseas, their technology and knowhow will develop.
 - When a manufacturer develops a new product independently, it becomes difficult to offer the product at a reasonable price, resulting in difficulty in its introduction.
 - It is necessary to reduce development cost, including by pursuing standardization, to the maximum possible extent based on collaboration between industry, government and academia and using existing technologies and components.

Age profile of population engaged in agriculture(2016)



Issues facing agriculture, forestry and fisheries and food industry on the work front and their solution

Issues

- It is difficult to mechanize the work place of agriculture, forestry and fisheries and still there are many jobs that are manual, dangerous and stiff.
- Fruit sorting and manufacturing of boxed lunches etc. rely on hired labor in large numbers but it is difficult to secure labor.
- Amidst decreasing number of farmers, there is a demand to break the barrier of work area per person.
- There are many operations that only skilled workers can do, such as cultivating crops, which is a hindrance to newcomers in the field.

Countermeasures

Aim at offering smart agriculture at reasonable price and reduce labor and load on human beings.

(Source) "Census of Agriculture and Forestry 2015", "Promotion of utilization of advanced technologies such as ICT in agriculture" (February, 2017)

(http://www.kantei.go.jp/jp/singi/keizaisaisei/miraitoshikaigi/suishinkaigo_dai5/siryou6.pdf)(JPN only),

Yano Research Institute Ltd. "Research on Smart Agriculture(2016)" (Press released on 14 Nov. 2016)

1.Trend of Smart Agriculture Related Business in Japan

(3) Areas with Good Growth Prospects

- Amidst increasingly ageing of population engaged in agriculture and shortage of labor, enormous time is required by new farmers to master the knowhow, as agriculture is an occupation that has many operations that require long experience and instinct. In addition, in agriculture there is lack of coordination between entities such as production and distribution and compared to other fields, it has many inefficiencies and the increase in productivity such as yield is sluggish.
- The Ministry of Agriculture, Forestry and Fisheries instituted "The Study group for the realization of smart agriculture" in November 2013. It has announced the future image of "New agriculture for the realization of ultra-labor saving and high quality production" utilizing artificial intelligence (AI), IoT, big data, robot technology etc. and the government is also backing it.
- Going forward, many initiatives for full utilization of data, building of big data, condition setting to ensure safe use of robot technology, and human resource development who can handle AI in the field of agriculture are being taken.

Future image of smart agriculture

Realization of ultra-labor saving and large-scale production

- Overcoming the limitations of work capacity of agricultural machinery, such as night operation, multiple operations, automatic operation etc. based on induction of GPS automatic operation system

Maximize the capability of crops

- Realization of high yield and high quality by maximizing the potential of crops based on sensing technology and minute cultivation based on past data (Precision agriculture)

Liberation from stiff and dangerous jobs

- Labor saving based on assist suit such as loading-unloading of harvest.
- Automation of operations based on use of weeding robot etc.

Realization of agriculture that anyone can undertake

- In addition to inexperienced workers being able to perform high precision jobs based on assist device of agricultural machinery, it promotes participation of young people in agriculture based on conversion of knowhow into data

Offer peace of mind and trust to consumers and users

- It delivers peace of mind and trust by directly connecting detailed information on production with the consumers/actual users based on cloud system.

1.Trend of Smart Agriculture Related Business in Japan

(4)Major Players① Agricultural machinery manufacturer

- All the agricultural machinery OEMs are pursuing initiatives for manufacturing ‘smart agri machinery’ based on induction of robots or integration with drone and system.

Name of company	Business in Smart Agriculture Field	Net Sales (M yen)	Note
YANMAR Co., Ltd.	<ul style="list-style-type: none"> Using Global navigation system, all types of sensors and communication technology, it has developed the Robot tractor equipped with auto-driving function that can work on a farmland under the supervision of manned tractor. It entered the drone market based on agreement with Konica Minolta, Inc. It carried out the demonstration experiment for the realization of robot tractor in Hokkaido, Fukui prefecture and Nagasaki prefecture (Project to demonstrate robot technology development in the agriculture, forestry and fishery industry and R&D). 	341,026	FY Mar' 16, Non-consol.
ISEKI & Co., Ltd.	<ul style="list-style-type: none"> It offers “GPS Guidance System Lead eye” as agri-support option for tractors. In addition, it has commercialized the system where the unit reads the information from the body sensor and communicates it to the operator on the tablet. It offers “ISEKI AGRI SUPPORT” that manages fertilizer and spraying of chemicals and field work, records the job process, manages machinery information and alert information and alert generation. It sells tractors, rice planter, combine etc. that are compatible with “ISEKI AGRI SUPPORT”. 	153,097	FY Dec' 16, Consol.
KUBOTA Corporation	<ul style="list-style-type: none"> It is the leading Japanese manufacturer of agricultural machinery. It has developed self-driven tractor. It has developed assist suit “RAKU VESTO” that supports the arm during grape farming work where the farmer has to keep the arm raised for a long time. It has launched combine which is farming-service support system “Kubota Smart Agri System (KSAS)”, rice planter with electric adjustment function for spray quantity of fertilizer and tractor with wireless LAN as a standard fitment. It has developed drone for agricultural use aimed at exterminating and protecting against harmful insects and has integrated with KSAS. 	1,596,091	FY Dec' 16, Consol.

1.Trend of Smart Agriculture Related Business in Japan

(4)Major Players ②Supplier of agriculture related products

- In anticipation of expansion of market for smart agricultural appliances, all the companies are applying the technologies owned by them in the field of agriculture.

Name of company	Business in Smart Agriculture Field	Net Sales (M yen)	Note
Activelink Co., Ltd.	<ul style="list-style-type: none"> • It was established in 2003 as a start up of Panasonic. • It markets " Power Assist Suit AWN03B" that reduces load on waist and arms. • It complies with the Standard IP55 on dust and water proofing and can also be used for farming during rain. 	270	FY Mar' 16, Non-consol.
Nikkari Co.Ltd.	<ul style="list-style-type: none"> • It is a pioneer for lawn mower in Japan. It is engaged in manufacture and sale of agricultural and forestry civil engineering machinery mainly string trimmer and rail hauling equipment. • In addition to Power Assist Suit "Buddy" that reduces load on the farmer by supporting waist, it also markets appliance that supports raised-arm farm work that can be adjusted according to body shape and the angle of working and can be easily removed. 	3,626	FY May' 16, Non-consol.
INNOPHYS Co. ,Ltd.	<ul style="list-style-type: none"> • It has jointly developed in collaboration with Tokyo University of Science and merchandized "Muscle Suit" that can assist lifting of heavy objects by using compressed air generated by a compressor as motive power. • It has also successfully developed stand-alone type product without the compressor. • It is currently in the process of developing a further improved product under the Project Nagasaki Smart Agriculture Demonstration Project. 	NA	-
Futureagri Inc.	<ul style="list-style-type: none"> • In 2013 it developed the first-ever robot to gather information on tomato cultivation. It is working on technology development aimed at realization of high productivity based on collaborative work between man and robot and is engaged in development of General-purpose mobile robot (walking on 4 legs, 2-wheel drive), robot for tomato farming (pollination robot, tomato harvesting robot), robot for harvesting fragile vegetables, farm field management robot etc. • It is carrying out development and proving of platform (RDCCS: Robot Distributed Cooperative System) where various organizational activities can be carried out together by man and multiple robots. 	NA	-

1.Trend of Smart Agriculture Related Business in Japan

(4)Major Players ③ICT related company

- Suitable production management of crops and collaboration between distributors, users and consumers is being pursued based on building of system by ICT related companies.

Name of company	Business in Smart Agriculture Field	Net Sales (M yen)	Note
NTT DOCOMO, INC.	<ul style="list-style-type: none"> • It, along with Vegetalia Co. that is engaged in the project to support agriculture based on IT for Niigata city, offered paddy field sensor system to 22 large-sized rice farmers in Niigata city in May 2015 and has commenced the project to demonstrate its effectiveness. • Paddy field sensor system was developed by Elab Experience, a subsidiary of Vegetalia. In this system, sensors are placed at the bottom of the paddy field and in mid air near the water surface and depth of water is calculated from the pressure difference between the two. Measured water level and water temperature can be confirmed from the handset and if the environment is not suitable for nurturing, alert is sent to the operator to ensure efficiency. 	4,584,552	FY Mar' 17, Consol.
FUJITSU Limited	<ul style="list-style-type: none"> • It offers Food and Agriculture Cloud "Akisai" wherein services to link distribution, region and consumers with the production site based on use of ICT are offered. It is cloud-based service that covers open field cultivation, greenhouse farming and animal husbandry and supports corporate agriculture management from production to management and sales. • It established "SAC IWATA" in collaboration with Orix and Masuda Seeds in 2016 and began its operations in Iwata city in Shizuoka prefecture. 	4,509,694	FY Mar' 17, Consol.
Daiwa Computer Corporation	<ul style="list-style-type: none"> • Aiming at agriculture utilizing IT, it started melon cultivation in Fukuroi-city in 2009. And in June 2012 it secured agricultural land and production equipment to start full-fledged agri business in Fukuroi-city. It mainly cultivates melon and tomato based on hydroponic cultivation method using small pot without using any soil. In addition, it started building "Integrated Environment Control System" for automation of cultivation. • It established its subsidiary Roots in 2017 and it produces, processes and markets agricultural products. 	2,124	FY Jul' 16, Non-consol.

(Source)Websites of each company and press release materials

1.Trend of Smart Agriculture Related Business in Japan

(4)Major Players ④Start up company

- There are many start ups entering this field, as smart agriculture is grabbing attention as a new field.
- Each company while utilizing its indigenous technologies is trying to expand its market presence based on collaboration with other companies.

Name of company	Core product	Business in Smart Agriculture Field
CYBERDYNE Inc.	Assist Suit	<ul style="list-style-type: none"> • It was established in 2004 to put the results of research of the Director of Center for Cybernetics Research, Department of Intelligent Interaction Technologies, University of Tsukuba • It offers “Assist Suit” that reduces hard labor in farm work. It reduces load on waist during farm work such as lifting of heavy objects and working in half-sitting posture by using the power of motor, air pressure, FRP and rubber etc.
Remote, Inc.	Monitoring system for livestock	<ul style="list-style-type: none"> • It developed “Mobile Gyuonkei” the system to monitor and discover delivery by a cow and the same has been deployed across the country by NTT Docomo, Inc. and National Federation of Agricultural Cooperative Associations and at the end of 2015 nearly 600 livestock farmers have inducted this system. • Temperature sensor is inserted inside the body of parent cattle and body temperature data is sent to the handset of the producer at an interval of 5 minutes through the network. When there are signs of delivery within 24 hours of change in body temperature of the parent cattle, system sends alert mail to the producer. This system enabled predicting delivery highly accurately and reduced the death rate of cows.
GRANPA Co. Ltd.	Production management system for plant factories	<ul style="list-style-type: none"> • It has undertaken setting up dome-shaped plant factories. It remotely carried out centralized management of the status of multiple plant factories and controls them in a manner that the growth environment such as temperature and humidity is maintained at a suitable level. Using “Plant Factory Production Support Cloud Service” of Hitachi, Ltd. data is collected from sensors installed in plant factories and is analyzed in the cloud and control of air conditioning and lighting is carried out remotely. It realized production of leafy vegetables mainly lettuce and celery etc., and secured stable “quality” and “quantity” based on indoor production and ‘safety and security’ based on thorough production control.
SenSprout Inc.	Production management system	<ul style="list-style-type: none"> • It plans and develops soil sensors and solutions applying technologies developed by the University of Tokyo and using the technology to print the electronic circuit and printed electronics. It began selling “SenSprout Pro” a package containing “soil sensors”, “gateway” and “cloud service” to agricultural corporations, farmers and research institutes since April 2017. • It has been introduced in agriculture in combination with “Energy harvesting” technology that converts weak energies like vibration, light and heat etc. into electricity. It collects information like working time of the farmer, positional data, fertilizer distribution amount and yield etc. from the tablet and sensors.

2.Situation of Overseas Companies Entering the Market

(1)Situation of Major Overseas Companies Entering the Market

- Examples of entry in Japanese market by foreign companies engaged in smart agriculture related services.

Name of overseas company	Core product	Home country	Business in Smart Agriculture Field
Mahindra & Mahindra	Smart agricultural machinery	India	<ul style="list-style-type: none"> • Mitsubishi Mahindra Agricultural Machinery Co.,Ltd. was established following equity participation by Mahindra & Mahindra in 2015 in Mitsubishi Agricultural Machinery Co., Ltd. It is the only foreign company present in the domestic agricultural machinery sector. • Engaged in development of robot tractors that can carry out high precision jobs even if skilled operator is not available.
NVIDIA	Robot	US	<ul style="list-style-type: none"> • It tied up with about 10 companies and organizations such as Utsunomiya University and Tochigi-prefecture and DAIHEN Corporation etc. in February 2017 and developed robot for agriculture used inside the greenhouse. It has developed a dedicated farm inside the Youtou campus, University of Utsunomiya where it demonstrates robot and man working together. • With 'module distributed collaborative robot' for strawberry farmers being developed by Utsunomiya University as the base, NVIDIA is engaged in development of robot for vegetables and fruits and conducting joint research and experimental study with the university to develop the AI processor needed for confirming the growth status and individual recognition. • It has office in Tokyo.
Edyn Garden Sensor	Sensor	US	<ul style="list-style-type: none"> • Soil sensors of Edyn Corp can collect data on nutritional status of soil and the moisture content, atmospheric radiation, temperature and humidity by directly placing the sensors in the soil. Collected data is connected to the network through Wi-Fi function built in the sensor and is accumulated in the server. User can confirm the status of soil on the smartphone etc. in a timely manner.
GoPro	Camera	US	<ul style="list-style-type: none"> • It opened its first office in Japan in 2015. GoPro announced the launch of the drone "Karma" on 24 April in Japan. It comes with voice-compatible action camera "HERO5" and hand-held stabilizer "Karma Grip". Sale of drone only is also being planned.
Philips Lighting	Lighting system	Netherlands	<ul style="list-style-type: none"> • In close-type plant factory and plant factory where solar power can also be used, it offers improvement in efficiency of cultivation based on LED lighting solution in line with the type and state of plant..
Bosch	Predict disease system	Germany	<ul style="list-style-type: none"> • It has launched in Japan "Plantect", which in addition to monitoring the status of crops in the hothouse since June 2017, also has the function to predict disease in tomato cultivation in a hothouse developed indigenously by Bosch based on algorithm.

(Source)Websites of each company

2.Situation of Overseas Companies Entering the Market

(2) Case Studies of Major Overseas Companies ① Bosch Corporation

- Bosch launched “Plantect” in June 2017 which can monitor the status of crops in a hothouse in real time and is equipped with the disease prediction system based on algorithm utilizing artificial intelligence (AI). Based on accumulation of measured data in the cloud with the help of sensors, user can confirm the status inside a hothouse and carry out suitable crop control. Moreover, prediction of disease in tomato cultivated in a hothouse can also be made based on algorithm developed by Bosch.

Company outline		Conditions of entry to smart agriculture field in Japan	
Name of company	Bosch Corporation	Major efforts	<ul style="list-style-type: none"> • Launched disease prediction system “Plantect” for hothouse cultivated tomatoes using AI in June 2017 in Japan. • “Plantect” has 2 functions namely, monitoring and disease prediction. • Monitoring function has sensors that measure temperature, humidity, intensity of solar radiation, CO2 inside the hothouse and by accumulating the measured data on the cloud, and the user can confirm the environment inside the hothouse in real time on the mobile handset. And the disease prediction function can predict the disease in crops customized for each user at 92% accuracy based on algorithm indigenously developed by Bosch. • Disease prediction system presently targets only tomato cultivation but going forward it is planned to be deployed for other crops such as strawberry and cucumber.
Head office	3-6-7, Shibuya, Shibuya-ku, Tokyo, 150-0002		
TEL	03-3400-1551		
Representative	Klaus Meder		
Establishment	1939		
URL	http://www.bosch.co.jp/corporate/en/jp/startpage_6/country-landingpage.php		
Investor	Robert Bosch Investment Nederland B.V.(89.66%), Robert Bosch LLC(US)(10.34%)		
Capital	36,800 million yen		
Net sales	Consolidated:272,998 million yen Non-consolidated:264,623 million yen (FY Dec’ 2016)		
Core Business	Manufacturing and development of automobile component such as fuel injection device, brake system, electronics power train etc.	Strength of the company	<ul style="list-style-type: none"> • It is global supplier of sensors. In addition to high quality products, in recent years it can offer integrated services based on strengthening of IoT solutions.
		Entry strategy	<ul style="list-style-type: none"> • “Plantect” keeps the induction cost down, as it is wireless compatible which does not require large-scale installation and investment and can be used based on monthly rental charges. Moreover, it pays attention to convenience of users such as screen design attaching importance to operability.
		Others	<ul style="list-style-type: none"> • Bosch group has a lot of affiliated companies including Bosch Rexroth Corporation, Bosch Packaging Technology K.K., Bosch Security Systems, Ltd. etc. in Japan.

2.Situation of Overseas Companies Entering the Market

(2) Case Studies of Major Overseas Companies ②Mitsubishi Mahindra Agricultural Machinery

- The forerunner of Mitsubishi Mahindra Agricultural Machinery Co., Ltd. was Mitsubishi Agricultural Machinery Co., Ltd. and was responsible for agricultural machinery segment in the Mitsubishi Heavy Industries Group. It changed its name to the present name in 2015 following third-party allotment to India's Mahindra & Mahindra, No. 1 company in the world in terms of volumes of tractors.
- A synergistic effect is expected based on respective strengths of Japanese and Indian sides.

Company outline	
Name of company	Mitsubishi Mahindra Agricultural Machinery Co., Ltd.
Head office	667-1, Higashiizumochoiya, Matsue-city, Shimane,699-0101
TEL	0852-52-2111
Representative	Masayuki Suematsu, Managing Director Sudhir Kumar Jaiswal ,CFO, Representative Director & Vice President
Establishment	1945
URL	http://www.mam.co.jp/english/index.html
Investor	Mitsubishi Heavy Industries, Ltd.(66.7%), Mahindra & Mahindra Limited(33.3%)
Capital	4.5001 billion yen
Net sales	44.8 billion yen (FY Mar' 2017, consolidated)
Core Business	Sale of agricultural machinery and sale and erection of agricultural facility

Conditions of entry to smart agriculture field in Japan	
Major efforts	<ul style="list-style-type: none"> • Mitsubishi Mahindra Agricultural Machinery Co.,Ltd. is engaged in R&D on new agricultural machinery and facilities by using biotechnology, computer control and robot technology etc. • In February 2017 it launched 2 types of MIT tractors using MIT(system that makes the operational information on machine visible and supports the machine based on that information). In addition, it also launched Smart Eye Drive where even an inexperienced operator can carry out linear jobs and improvement in work efficiency and reduction in operator fatigue can be achieved through cheap devices.
Strength of the company	<ul style="list-style-type: none"> • It develops technology and R&D techniques from the global perspective as the only foreign comprehensive manufacturer in Japan in agricultural machinery. It utilizes Mahindra & Mahindra's IT prowess for development and possesses development capability to deal with diverse issues related with each type of crop, environment and soil.
Entry strategy	<ul style="list-style-type: none"> • It is putting to use product development capability, cost competitive manufacturing and global deployment capability having first-rate sales network in the world including India, China and America of Mahindra & Mahindra in the field of agricultural machinery. Moreover, it aims at strengthening domestic and overseas competitiveness by utilizing the technological and brand capability of Mitsubishi Heavy Industry group.
Others	<ul style="list-style-type: none"> • Post-capital alliance, company's performance is showing improving trend and investment in plant and equipment and sales is also increasing.

2.Situation of Overseas Companies Entering the Market

(2) Case Studies of Major Overseas Companies③ Philips Lighting

- Philips Lighting is a group company of the leading electric appliances manufacturer Philips Group and offers lighting products, systems and services.
- In Japan it is engaged in full-scale development of light emitting diode (LED) for plants and vegetables factories. It confirmed the merits of efficient development of vegetables without using pesticides in 2 Japanese factories. Viewing Japan as a growth market with limited agricultural land in the urban area, it is expanding sales of the system in line with the specifications of the plant factories of customers.

Company outline	
Name of company	Philips Lighting Japan GK.
Head office	Philips Building, 2-13-37, Konan, Minato-ku, Tokyo,108-8507
TEL	03-3740-5156
Representative	Kengo Hayashida, President
Establishment	2016(Incepted in 1953)
URL	http://www.lighting.philips.co.jp/home
Investor	Philips Lighting Holding B.V..
Capital	60 million yen
Net sales	NA
Core Business	Sales of electric appliances and consulting business of lighting (The company was spin-offed from lighting division of Philips Electronics Japan, Ltd.)

Conditions of entry to smart agriculture field in Japan	
Major efforts	<ul style="list-style-type: none"> • In line with the type of vegetable to be cultivated or the plant for horticulture, it offers lighting with optimum wavelength of blue, red, white and far-infrared rays utilizing LED and conditions that enable growth. • In addition to reduction of energy cost, it offers pesticide-free vegetables cultivation method which has no impact of pests and environmental pollution. • It supplies to Delicious Cook Co., Ltd, a affiliated company of Kokubu Group, that manufactures packed lunches and side-dishes and Innovatus Inc. which is a start up plant factory.
Strength of the company	<ul style="list-style-type: none"> • It has established a R&D center “Glowise Center” in Einthoven, Netherlands in order to use its own lighting technology in agriculture. • It holds largest cultivated area in the world as a research facility and the entire area can be digitally controlled. In a room where weather conditions can be changed, by individually controlling the cultivation environment mainly through optimization of LED wavelength, it carries out R&D on a wide variety of crops for efficient production method, especially leafy vegetables.
Entry strategy	<ul style="list-style-type: none"> • Philips Lighting has installed LED lighting for plant factory in University of Osaka Prefecture and Chiba University and is trying to expand its use for research. • It is in the midst of expanding its sales in Japan by appointing CCS known for LED lighting for inspection as its sales agent.
Others	<ul style="list-style-type: none"> • Since the system of Philips Lighting can cultivate vegetables efficiently without using any pesticides, it is expected that the demand in urban Japan where agricultural land is limited will increase.

2.Situation of Overseas Companies Entering the Market

(2) Case Studies of Major Overseas Companies④Edyn

- Edyn is a California based start up. By placing sensors produced by Edyn directly on the soil, data on temperature, humidity, nutritional state, amount of radiation of the soil is collected and accumulated and is sent to the smartphone of the user through the system of the company. Based on the information received “Edyn Garden Valve” releases right amount of water automatically. Moreover, the user can see the information received from “Edyn Garden Sensor” on the application and can obtain information on the types of plants suitable for the soil and the right method for their cultivation.

Conditions of entry to smart agriculture field in Japan	
Major efforts	<ul style="list-style-type: none"> • Edyn has tied up with Innotech Corporation of Yokohama to market its products in Japan. In addition to domestic sale of EDYN products in Japan, Innotech also provides support on service development.
Strength of the company	<ul style="list-style-type: none"> • Based on Smart Gardening device “Edyn Garden Sensor” and “Edyn Garden Valve” developed by it, Edyn has realized accumulation of information collected from soil and its visualization. • Data on nutritional state, amount of water, amount of radiation, temperature and humidity in the soil is obtained with the help of soil sensors of Edyn and is stored in the server through the network based on Wi-Fi function in-built in the sensors. • User can confirm on the smartphone about the status of soil based on such data and grasp the optimum environment for development.
Entry strategy	<ul style="list-style-type: none"> • The price of each device has been kept around USD100 so that it is affordable for the farmers. It aims to disseminate it at the earliest.
Others	<ul style="list-style-type: none"> • In 2016 simultaneously with announcing that it has secured investment worth USD200 million from Fenox Ventures Inc, Idealbulb Ventures, Morningside Group and Indicator Ventures, it has expressed its intention to enter Japan using these funds. • It announced entrusting IT offshore development solutions to the Vietnamese subsidiary of Evolvable Asia Co., Ltd. in 2017 in order to speed up product development as well as establish cost competitiveness.

(Source) Press release materials, website if the company(<http://smarthome.reviewed.com/features/welcome-to-the-smart-garden-of-edyn>)(JPN only), (<http://www.innotech.co.jp/edyn/>)(JPN only)

2.Situation of Overseas Companies Entering the Market

(3) Partner Candidates of Overseas Companies

- Smart agriculture is a broad-based domain and in order to promote ‘new agriculture’ that enables labor-saving and high quality production based on utilization of advanced technologies including robot technology and ICT, collaboration between diverse industries from within and outside Japan is happening.
- There is a beeline by industries that possess devices such as sensors and camera or indigenous technologies in software for fresh entry in this domain. There is also collaboration between industry, government and academia for their practical use as well as joint research such as ICT companies, academic institutions, municipalities and those engaged in agri business forming consortium.
- Opportunities for entry of foreign companies possessing advanced technologies in the Japanese market are increasing but agriculture itself has its local indigenous culture and practices. Since development of products suitable for the local agricultural crops and networking with local farmers who are the users are important elements, it is desirable that collaboration with Japanese business persons is pursued.

Examples of potential partner candidates

Business category	Name of company	Business in the smart agriculture field	Example of possible alliance scheme
Academic institutions	Osaka Prefecture University, Chiba University and Utsunomiya University	Demonstration experiment on vegetables cultivation in research institutes	<ul style="list-style-type: none"> • Joint experiment based on technology provision
Robotics related	NICHIDEN Corp.	Operation of advanced plant factory using robots in collaboration with the University of Osaka Prefecture	<ul style="list-style-type: none"> • Provide new devices etc. • Provide software
	YASKAWA Electric Corp.	Deployment of automated system from sowing, harvesting, packaging to shipment using robots.	
ICT related	Nepon Inc.	Deployment of agriculture ICT cloud service "Agrinet"	<ul style="list-style-type: none"> • Provide new devices etc. • Joint development of contents in new fields
	Showa Denko K.K.	Provide total support for plant factory business applying high speed cultivation method "Shigyo Method".	
	Topcon Corp.	Offer comprehensive management system for farms	
	KUBOTA Corp.	Promote farming service support system using agricultural machinery and ICT	
Entry from different industries	Kewpie Corp.(Food)	Development of Complete Control type plant factory "TS Farm"	<ul style="list-style-type: none"> • Provide production control system • Joint experiment in the plant factory
	Toyota Tsusho Corp.(General trading)	Operation of plant factory using waste heat from the factory	
	East Japan Railway Company(Transportation)	Construction of sunlight type plant factory in Iwaki-city in Fukushima	
	OBAYASHICorp.(Construction)	Development of artificial light plant factory jointly with Chiba University	

(Source)Websites of each company

3. Business Environment Surrounding Smart Agriculture Related Services

(1) Permissions, Restrictions and Incentives etc. ① Permissions and Restrictions

- There is no restriction on foreign investment in agriculture. However, there are stipulations based on the Agricultural Land Act with regard to entry of corporates in agriculture, regardless of their nationality in agriculture.
- In order to carry out agriculture business, companies must satisfy the requirements for “judicial person qualified to own farmland” for holding and purchasing agricultural land. To be more precise, companies that carry out agriculture without using the agricultural land or based on leasing of agricultural land, it is not necessary to satisfy the requirements for “judicial person qualified to own farmland”.
- Earlier there was hardly any entry of corporates in agriculture except in some SEZs but following drastic changes in 2009 in the “Agricultural Land Act”, entry of companies based on leasing method was completely liberalized. And since 2016, government is promoting sixth industrialization and management efficiency in agriculture based on revision of requirements for judicial person qualified to own farmland.

Conditions for entry of companies in agriculture	
Salient features of the Agricultural Land Act	<ul style="list-style-type: none"> ● For general companies to enter agriculture by purchasing agricultural land (acquire ownership right), they must satisfy the requirements for agricultural production corporations. ● As for leasing (renting etc.), it is no longer necessary to satisfy the requirements for agricultural production corporations and it has now become possible for general companies other than agricultural production corporations to acquire the ownership rights.
Requirements for ‘judicial person qualified to own farmland’ (Required when companies hold agricultural land)	<p>(1) Corporate form requirements:</p> <ul style="list-style-type: none"> • Company limited (restricted to closely held companies) , membership company or agricultural producer’s cooperative cooperation <p>(2) Business requirements:</p> <ul style="list-style-type: none"> • Majority of turnover must be from agriculture (Including sales and processing etc.) <p>(3) Voting rights requirements:</p> <ul style="list-style-type: none"> • Agriculture related persons: The voting right of person regularly engaged in agriculture business, individual who has offered the agricultural land, local public body, agricultural cooperative etc. must possess more than ½ of the total voting rights. Individual who has lent agricultural land to the corporate through Farmland Intermediary Management Institutions or Farmland use and Consolidation Facilitating Organizations • Members other than agriculture related persons: Right to vote less than ½ of the total voting rights <p>(4) Director requirements:</p> <ul style="list-style-type: none"> • More than half of the Directors to be regularly engaged (In principle, more than 150 days in a year) in agriculture business (including sales and processing etc.) • Among Directors or important employees (Farm Manager etc.) more than 1person must be engaged in agricultural operation (In principle, more than 60 days in a year)

3. Business Environment Surrounding Smart Agriculture Related Services

(1) Permissions, Restrictions and Incentives etc. ② Incentives

- In the Cabinet decision in 2016 Japanese government approved the “Japan Revitalization Strategy 2016” and clearly identified promotion of “Fourth Industrial Revolution” that uses the technological breakthrough of IoT (Internet of things), Big Data, artificial intelligence and robot sensor as the most important key to leading future revolution in productivity.
- In the field of agriculture, “Drastic improvement of productivity based on introduction of innovative technologies” was laid out as a goal and in that implementation of the “Project for use of AI for creation of future agriculture” (Tentative title) was identified for dramatically enhancing the productivity based on realization of auto-operation system for tractors, and utilization of AI and IoT.
- For promotion of business, offering incentives such as subsidy for R&D are expected but they are subdivided depending on the targeted domain. Since the subsidy is available for specific areas or the application period for subsidy or applicable conditions vary depending on the theme such as joint experiment by consortium of multiple business persons (*), it is recommended that separate inquiry is made with the MAFF or METI(Ministry of Economy, Trade and Industry).

Priority field for Agriculture, forestry, and fishery and foods industries introducing robot technologies

Priority field	Current condition	Goal
Automation of operations using GPS guidance system	<ul style="list-style-type: none"> ● Introduction of operation assist device utilizing satellite positioning information such as GPS etc. is progressing ● Marketing of auto-pilot system for agricultural machinery in farms by 2018 and R&D for the realization of unmanned system based on remote monitoring are being pursued. 	<ul style="list-style-type: none"> ● Market auto-pilot system in farms under manned surveillance by 2018 ● Realize unmanned system and auto-pilot tractor under remote surveillance by 2020.
Mechanization and automation of heavy labor currently being done manually	<ul style="list-style-type: none"> ● Besides labor-saving based on Assist Suit for loading/unloading of harvest, provide relief from the drudgery of stiff, dangerous and repetitive jobs based on weeding robot, afforestation and silviculture robot, aquaculture and ship bottom cleaning robot, boxed lunch filling robot, auto-milking and feeding system etc. 	<ul style="list-style-type: none"> ● Introduce more than 20 types of new robots that contribute to labor-saving in the fields of agriculture, forestry, fisheries and food industry.
Labor saving and high quality production based on linking of robot and advance sensing technology	<ul style="list-style-type: none"> ● Realize multiple yields and high quality production by maximizing the potential of agriculture, forestry and fisheries products based on fusion of minute cultivation (precision farming) based on sensing technology and past data and useful knowledge of farm operators. 	

(*)Telephone interview to MAFF and METI.

(Source)MAFF “Main trends in smart agriculture so far”(http://www.maff.go.jp/j/kanbo/kihyo03/gityo/g_smart_nougyo/attach/pdf/kenkyu_kai05-2.pdf)(JPN only)

3. Business Environment Surrounding Smart Agriculture Related Services

(2) Major Industry Organizations and Associations

Major Organizations and Associations Related to Smart Agriculture

Name of organizations and associations	Contact Information	Core Business
Japan Agricultural Information Systems Association (JAISA)	<p>http://jaisa.org/(JPN only)</p> <p>2-25-18, Aoyamadai, Abiko-city, Chiba, 270-1175</p> <p>E-MAIL:office@jaisa.org</p>	<ul style="list-style-type: none"> No. of members: Approx. 60 members It offers minute services to those engaged in wide-ranged agriculture including part-time farmers, small-scale farmers, home garden lovers by bringing together companies and individuals who carry out unique activities from among a large number of companies engaged in dissemination of Agritech. It offers support to farmers for the introduction of Agritech.
SMARTAGRI CONSORTIUM	<p>http://smartagri.uecs.jp/(JPN only)</p> <p><Tokyo office> Social innovation group Innovation Business Department Smartagri Consortium office Fujitsu Solution Square, Fujitsu Limited, 1-17-25, Shinkamata, Ota-ku, Tokyo, 144-8588 TEL: 03-6424-6716</p>	<ul style="list-style-type: none"> No. of members:104 businesspersons(As on July 2017) In the field of facility horticulture, it aims at building the Japanese advanced model to realize “Enhancement of advanced technology”, “increase in farmer’s income”, and “overseas deployment” etc. by utilizing ICT with UECS(Ubiquitous Environment Control System) as the base. In order to realize “Japanese style facility horticulture” as a highly productive new system using ICT, common goals were shared among industry-academia and government including the advanced different types of industries and in view of the fact that a broad-based collaboration was a pressing need, All Japan initiative was undertaken.
Japan Agrobot Association	<p>http://www.agrobot.jp/english.html</p> <p>c/o M2Labo 110-1 Horinouchi, Kikugawa-city, Shizuoka, 439-0006</p> <p>TEL: 0537-28-7721</p>	<ul style="list-style-type: none"> It consists of over 10 members from leading agricultural machinery manufacturers and academic institutions and observers. Presently, M2 Labo, Japan serves as the Chairman of the association. Along with aiming at new form of agriculture, forestry and fisheries industries using robots by combining together the agricultural production technologies held by Japanese industry-academia and government and the robotics, it aims at building new industrial domain that leads the world by utilizing the local industries. It is also engaged in compiling recommendations concerning safety of robots for agriculture and standard specifications.

3. Business Environment Surrounding Smart Agriculture Related Services

(3) Major Exhibitions

- The largest agricultural expo in Asia “The 7th Agricultural World(AGRI WORLD 2017)” will be held in Makuhari Messe in October 2017.
- It is divided into 3 areas namely, “Agricultural materials EXPO”, “Next Generation Agricultural EXPO” and “6th Generation Industrialization EXPO” and 900 companies including many foreign companies will put up their booths. All kinds of products and services related with agricultural will be on display and many business negotiations will be carried out between agricultural corporates and cooperatives, companies contemplating entering agriculture and exhibitors over the 3 days of the Expo. In addition, Kansai version of the Expo is also scheduled in Osaka in May 2018.

Major exhibitions related to Smart Agriculture held in Japan		
AGRI WORLD 2017		
	Tokyo Expo	Osaka Expo
Date	11 October to 13 October, 2017	9 May to 11 May, 2018
Venue	Makuhari Messe	INTEX Osaka
Organizers	Reed Exhibitions Japan Ltd.	Same as on the left.
URL	http://www.agritechjapan.jp/en/tokyo/	http://www.nogyoworld.jp/kansai/?hd=tokyo
Records in FY 2016(*1)	<ul style="list-style-type: none"> ● No. of visitors: Approx. 24,670 ● No. of exhibitors: 646 Companies 	<ul style="list-style-type: none"> ● No. of visitors: Approx. 16,000 primarily from Western Japan ● No. of exhibitors: 238 Companies (*2)
Major exhibitions held at the same time		
Name of exhibition	Target industries	
Next Generation Agriculture Expo(AGRINEXT)	Next generation technologies and products will be on display under one roof. It will include international next generation agriculture such as IT agriculture, solar sharing, 6 th generation industrialization, plant factories etc.	
Farmers’ Processing & Sales Support Expo (6 th Generation Industrialization EXPO)	Food processing machinery, OEM, freshness and hygiene control, store design	
International Agricultural & Technology Expo(AGRI TECH)	Business meetings on facility horticulture materials, farm products, agricultural machinery etc.	
Tool Fair	Working clothes for agriculture, agricultural tools, horticulture tools, safety goods (Osaka Expo only)	

(*1) Past events include those that were either held simultaneously or in combination with other events.

(*2) Kansai Expo was held for the 1st time in April 2017. According to organizers, next time (2nd one) it will be a bigger event in scale and nearly 30,000 visitors and 500 exhibitors are expected.

(Source) Websites of each exhibition