Nomura Sustainability Day

Nomura Agri Planning & Advisory’s Food and Agriculture Sustainability Initiatives

Atsuyuki Futono
President
Nomura Agri Planning & Advisory Co., Ltd.

October 5, 2021
1. Why is Nomura engaged in food and agriculture sustainability?

2. Food and agricultural innovation toward sustainable development

3. NAPA solutions
1. Why is Nomura engaged in food and agriculture sustainability?
1. Why is Nomura engaged in food and agriculture sustainability?

Long history of involvement in agriculture

- Nomura has contributed to the growth and development of food and agriculture since its founding in 1925
- In September 2010, Nomura Agri Planning & Advisory (NAPA) was established to provide solutions to challenges in agriculture

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1925</td>
<td>Nomura Securities established</td>
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<tr>
<td></td>
<td>Investment in Brazil Farm</td>
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<tr>
<td>1965</td>
<td>Nomura Research Institute (NRI) established</td>
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<tr>
<td>1975</td>
<td>Nomura Agriculture and Livestock Research Institute (Nomurabras) established</td>
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<tr>
<td>2010</td>
<td>Nomura Agri Planning &amp; Advisory (NAPA) established</td>
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<tr>
<td>2011</td>
<td>Nomura Wago Farm (currently Nomura Wago Sakaki Farm) established</td>
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<tr>
<td></td>
<td>Nomura Farm Hokkaido established</td>
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</tbody>
</table>

Founding philosophy

Contribute to the revitalization of local communities and the growth of the Japanese economy through the agribusiness
1. Why is Nomura engaged in food and agriculture sustainability?

Responding to increasing global food demand and environmental impact

- Increase in global food demand (particularly meat) driven by population growth and development of emerging economies; Environmental impact remains a challenge (Protein crisis)
- To reduce environmental impact, alternative proteins are attracting attention

Food supply outlook for 2050

<table>
<thead>
<tr>
<th>Protein Source</th>
<th>2015 Consumption (kg)</th>
<th>2050 Forecast (kg)</th>
<th>Increase due to Feed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain</td>
<td>24.42</td>
<td>36.44</td>
<td>Approx. 1.5x</td>
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<tr>
<td>Oil seeds</td>
<td>4.56</td>
<td>5.92</td>
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<tr>
<td>Sugar crops</td>
<td>1.69</td>
<td>1.83</td>
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<tr>
<td>Animal products</td>
<td>8.65</td>
<td>13.98</td>
<td></td>
</tr>
</tbody>
</table>

Source: World Food Supply and Demand Projections to 2050, Ministry of Agriculture, Forestry and Fisheries, Japan

Environmental impact per kilogram for each protein source

- Grain consumption (kg): GHG 1/10, Water 1/20
- Sugar crops consumption (kg): GHG 1/100, Water 1/2000
- Oil seeds consumption (kg): GHG 0.231, Water 10
- Animal products consumption (kg): GHG 2.6, Water 930

Source: Compiled by NAPA based on IPCC Report, FAOSTAT

Agriculture GHGs account for over 10 percent of total industrial emissions

- Industry, transport, household: 89%
- Agriculture: 11%
- Livestock, dairy: 5%
- Rice crop: 1%
- Other: 1%

Source: NAPA estimate based on "Plant-based meat raw materials and production process", Utsunomiya University, National Agriculture and Food Research Organization

Stronger demand for meat driven by population growth and development of emerging economies

Higher demand for grain and water (Needed for meat production)

Increased GHGs from livestock production
- Forest destruction
- Extensive use of chemical fertilizers
1. Why is Nomura engaged in food and agriculture sustainability?

Food and agriculture is a fundamental theme for global sustainable growth

- Increasingly complex supply chains and diversified needs of consumers impact various industry sectors

The 17 SDG goals can be broadly divided into three themes: natural capital, society and economy. Social issues related to food, agriculture, the environment and natural resources have become more severe.

Source: Compiled by NAPA based on CONSERVATION INTERNATIONAL JAPAN ANNUAL REPORT

Deepening crisis related to food, agriculture, the environment and natural resources

- Food shortage
- Soil degradation
- Labor, human rights
- GHG emissions from food production
- Biodiversity crisis
- Forest destruction
- Food loss
- Animal protection
- Water shortage
- Marine pollution, resource degradation
2. Food and agricultural innovation toward sustainable development
2. Food and agricultural innovation toward sustainable development

Evolution of global food and agribusiness

Hosted Nomura Global Food & Agri Forum 2020 with guest speakers from global food and agribusiness companies

- Large-scale greenhouse agriculture in Almeria, Spain

- New Zealand’s global kiwi strategy

- Salmon farming and global marketing in Norway

Cooperative Agricola San Isidro (CASI) CEO
Antonio Domene

ZESPRI international Limited
Asia Regional Manager
Nick Kirton

Norwegian Seafood Council
Director Japan & Korea
Gunvar L. Wie
2. Food and agricultural innovation toward sustainable development

Evolution of global food and agribusiness

Automation of livestock farming in the Netherlands

Transformation of food distribution in China

Creation of startups in the US, Israel, Japan

Lely Holding
Business Development
Processing Director
Guus van Roessel

Hema Fresh
(Alibaba’s Hema Fresh) CEO
Vice President of Alibaba Group
Yi Hou

IntegriCulture

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2. Food and agricultural innovation toward sustainable development

Global investment in food and agritech is accelerating

- Financing of up and coming food and agritech startups has accelerated
- In 2020, total investments in startups was $26.1bn compared to Y6.4bn in 2014, an average annual increase of 26%

<table>
<thead>
<tr>
<th>Funding amounts for international food and agri startups (2020)¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traceability, food safety related</td>
</tr>
<tr>
<td>B2C platform</td>
</tr>
<tr>
<td>Restaurant tech</td>
</tr>
<tr>
<td>Alternative protein, etc.</td>
</tr>
<tr>
<td>Food delivery related</td>
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<tr>
<td>Ghost restaurants, etc.</td>
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<tr>
<td>Agribio</td>
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<tr>
<td>Next generation farms</td>
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<tr>
<td>Agricultural materials online sales</td>
</tr>
<tr>
<td>Farm management, sensing</td>
</tr>
<tr>
<td>Biofuel, useful substance</td>
</tr>
<tr>
<td>Online restaurant, meal kit</td>
</tr>
<tr>
<td>FinTech for agriculture</td>
</tr>
<tr>
<td>Agricultural robots</td>
</tr>
<tr>
<td>Home &amp; cooking tech</td>
</tr>
</tbody>
</table>

1. Source: AgFunder report
2. Food and agricultural innovation toward sustainable development

Research and publication on global cutting-edge businesses changing food and agriculture

Next generation farm (Plant factory, land-based/cutting edge aquaculture)

<table>
<thead>
<tr>
<th>(1) Plant factory</th>
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</thead>
<tbody>
<tr>
<td>1. Spread</td>
<td>Japan</td>
<td></td>
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<tr>
<td>2. Farmship</td>
<td>Japan</td>
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<tr>
<td>3. Kidaya</td>
<td>Japan</td>
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<tr>
<td>4. Farm &amp; Factory Wakasa</td>
<td>Japan</td>
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<tr>
<td>5. Seiden Kogyo</td>
<td>Japan</td>
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<tr>
<td>6. Fujian Sanan Sino-Science Photobiotech</td>
<td>China</td>
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<tr>
<td>7. Crop One HD</td>
<td>US</td>
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<tr>
<td>8. Aero Farms</td>
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<td>9. Bowery Farming</td>
<td>US</td>
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<td>10. Freight Farms</td>
<td>US</td>
<td></td>
</tr>
<tr>
<td>11. Infarm</td>
<td>Europe</td>
<td></td>
</tr>
<tr>
<td>12. Growing Underground</td>
<td>Europe</td>
<td></td>
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<tr>
<td>13. Seedo Corp</td>
<td>Israel</td>
<td></td>
</tr>
</tbody>
</table>

(2) Land-based, cutting edge aquaculture

| 1. FRD Japan      | Japan |  |
| 2. Soul of Japan  | Japan |  |
| 3. SalMar         | Japan |  |

Agriculture robot (Drones, automated harvesting robots, robot tractor)

<table>
<thead>
<tr>
<th>(1) Drone</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. Nileworks</td>
<td>Japan</td>
<td></td>
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<td>2. DJI</td>
<td>China</td>
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<tr>
<td>3. XAG</td>
<td>China</td>
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(2) Harvesting robots

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<tr>
<td>1. inaho</td>
<td>Japan</td>
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<td>2. Abundant Robotics</td>
<td>US</td>
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<td>3. Octinion</td>
<td>Europe</td>
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<td>4. Lely</td>
<td>Europe</td>
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<tr>
<td>5. Tevel Aerobiotics Technologies</td>
<td>Israel</td>
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<tr>
<td>6. Meshek (76);</td>
<td>Israel</td>
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</table>

(3) Robot tractor

<p>| | |</p>
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<tbody>
<tr>
<td>1. Kubota</td>
<td>Japan</td>
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<tr>
<td>2. Yanmar Agri</td>
<td>Japan</td>
</tr>
</tbody>
</table>

Agribio (Protein alternatives such as plant-based meat, victimless meat, insect food, genome editing)

<table>
<thead>
<tr>
<th>(1) Alternative proteins</th>
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</thead>
<tbody>
<tr>
<td>1. IntegriCulture</td>
<td>Japan</td>
<td></td>
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<td>2. BugMo</td>
<td>Japan</td>
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<td>3. Taberumo</td>
<td>Japan</td>
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<td>4. Musca</td>
<td>Japan</td>
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<td>5. Ainan Liberacio</td>
<td>Japan</td>
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<tr>
<td>6. Gryllus</td>
<td>Japan</td>
<td></td>
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<tr>
<td>7. Ellie</td>
<td>Japan</td>
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<td>8. Beyond Meat</td>
<td>US</td>
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<td>9. Kite Hill</td>
<td>US</td>
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<td>10. Memphis Meat</td>
<td>US</td>
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<td>11. Finless Foods</td>
<td>US</td>
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<td>12. Calysta Energy</td>
<td>US</td>
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<td>13. Mosa Meat</td>
<td>Europe</td>
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<td>14. NovaMeat</td>
<td>Europe</td>
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<tr>
<td>15. Hargol FoodTech</td>
<td>Israel</td>
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(2) Genome editing

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<tbody>
<tr>
<td>1. EditForce</td>
<td>Japan</td>
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<td>2. Platinum Bio</td>
<td>Japan</td>
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<td>3. Calyx</td>
<td>US</td>
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<td>4. Ginkgo Bioworks</td>
<td>US</td>
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<tr>
<td>5. Inari</td>
<td>US</td>
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</tbody>
</table>

Production platform (IoT-ICT system)

| 1. Optim      | Japan |
| 2. SkymatiX   | Japan |
| 3. Vegetalia  | Japan |
| 4. Fujitsu    | Japan |
| 5. Farmnote   | Japan |
| 6. Farmer’s Business Network | Japan |
| 7. The Climate Corporation | US  |
| 8. Hispatec   | Europe|
| 9. Priva      | Europe|
| 10. Connecterra | Europe |
| 11. Nofence AS | Europe |
| 12. Afimik    | Israel|
| 13. A.A.A Taranis | Israel |
2. Food and agricultural innovation toward sustainable development

**Food & agritech market size**

- Food and agritech is projected to grow in several sectors including production technology, distribution, and the alternative proteins market.

![Projected size of domestic market in five food & agritech sectors](Image)

*(Years: 2019-2030)*

**Projected size of domestic market in five food & agritech sectors**

<table>
<thead>
<tr>
<th>Year</th>
<th>Next-generation farm</th>
<th>Agricultural robot</th>
<th>Production platform</th>
<th>Distribution platform</th>
<th>Agribio</th>
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<tbody>
<tr>
<td>2019</td>
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<td>2020</td>
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<td>2021</td>
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<td>2030</td>
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</table>

*CAGR 17.6% (2020-2030)*

![Projected size of global market in five food & agritech sectors](Image)

*(Years: 2020-2030)*

**Projected size of global market in five food & agritech sectors**

<table>
<thead>
<tr>
<th>Year</th>
<th>Next-generation farm</th>
<th>Agricultural robot</th>
<th>Production platform</th>
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<td>2020</td>
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</table>

*CAGR 28.6% (2020-2030)*

*(Source) Nomura Agri Planning & Advisory*
3. NAPA solutions
3. NAPA solutions
Features of NAPA’s consulting services

- Deliver business strategy consulting across the entire food and agriculture value chain
- Expand operations leveraging synergies with Nomura Group’s client network

Provide solutions to the entire food value chain and each participant

Agriculture, forestry, livestock & fisheries

Producers

Processing companies

Distributors (Trading companies, EC, market)

Retailers, food service, etc.

Consumers (Global)

Entry from other industries
(Major corporations - SMEs)

Global agritech
Bio startups

Distribution & logistics innovators
Retail tech/exports

Food/ health care tech Startups

Domestic network built over more than 10 years

Nomura Group network

Research and consulting provided by NAPA

- Drawing up of new business plans and management strategies for food & agribusiness
- Financing/capital & business alliance for food & agribusiness
- Marketing/export of agricultural, forestry and fisheries products
- Industry research on food & agribusiness in Japan and overseas
3. NAPA solutions
Strong interest from corporates as a new area of business

- Corporates have a wide range of food and agriculture needs, and over 100 listed companies alone have entered the sector.

Classification matrix of companies entering the agriculture sector

<table>
<thead>
<tr>
<th>Factory type</th>
<th>Unutilized facilities are used by many companies to set up plant factories as a new business (Shimizu Corporation, Orix, Toyota Tsusho, Mitsubishi Estate, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many companies set up plant factories to supplement/bolster their businesses (Kagome, Kewpie, Kubota, Valor, Oriental Land, Japan Airlines, etc.)</td>
<td></td>
</tr>
</tbody>
</table>

No. of listed companies entering agricultural production business

Supplementary business²

- Companies with food-related core businesses such as supermarkets or food service enter the sector to supplement or strengthen their businesses (Aeon, Lawson, Mos Food Services, etc.)
- Many companies produce organic vegetables or fruits as a new business (Sojitz (Aquaculture), Inabata, Kyudenko, etc.)

New business

113 companies¹

1. Including companies that have already exited the sector.
2. Supplementary business: Businesses that supplement the core business, including direct procurement of food raw materials or products, or improving the value of the core business.
3. Note: This classification is based on NAPA’s subjective perspective and actual reasons for entering the sector may differ.

Source: NAPA, based on public information.
3. **NAPA solutions**

**Support business expansion**

- **Support companies entering the food and agri sector through market research and help with technology**

**Examples of private company needs**

**Consider**

Entry into agriculture and want to create a business vision/plan

**Developing a new area of business by applying in-house technology and resources to food and agri**

- **Major manufacturers**
  - Issues
    - Basic research toward the development of new food and agri businesses
    - Target promising areas based on latest business models and market assumptions
  - **NAPA value**
    - Analysis/proposal of latest business models
    - Estimate project size for each alternative protein value chain

- **Major material manufacturers, trading firms, energy companies**
  - Issues
    - Create concept for fully enclosed plant factory model
    - Identify promising areas where in-house technologies can be used based on the latest business models, technological trends, and market assumptions
  - **NAPA value**
    - Analysis/proposal of promising enclosed plant factory models
    - Estimate domestic and global plant factory size by product

**Alternative protein (plant-based meat, cultured meat, insect food, etc.) value chain business opportunity (NAPA estimate)**

**Stakeholders**

- Consumer
- Food service provider
- Retailer
- Food wholesaler
- Meat company
- Food processor
- Raw material processor
- Raw material producer

**Order/procurement**

- Capital investment
- Equipment replacement

**Production/processing**

- Plant-based meat
- Raw material processing

**Distribution/sales**

- Retail
- Food service
- Advertising
- Logistics

**Consumption/disposal**

- Cooking equipment

**Plant factory market size projection (NAPA estimate)**

(100 million yen)

- Lettuce
- Spinach, Herbs
- Strawberry, Tomato
- Vaccine, Others

**NAPA estimated business size**

(Year)
3. NAPA solutions

Support the sustainable growth of local communities/economy

- Support multiple projects that contribute to the growth of local economies, including strategies to expand export of farm and marine products, attracting companies and promoting collaboration with local companies

<table>
<thead>
<tr>
<th>Issues</th>
<th>Relocation of local market, redevelopment into export hub (Narita City)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deterioration of Narita Wholesale Market</td>
</tr>
</tbody>
</table>

**NAPA commissioned for wholesale market redevelopment**

- Help promote project by meeting with existing market players, new players and buyers in Japan and overseas
- Promote new strategy based on vision to relocate the wholesale market close to the Narita Airport, expand exports

**New market to open Feb. 2022, signed agreement with Rungis, France**

<table>
<thead>
<tr>
<th>Issues</th>
<th>Sixth Sector Industrialization Company Attraction Project (Himeji City)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expansion of abandoned farmland</td>
</tr>
</tbody>
</table>

**NAPA commissioned for Sixth Sector Industrialization Company Attraction Project**

- Matching event with sixth sector industrialization companies, local companies and large enterprises, business launch follow-up
- Attract cutting edge sixth sector industrialization companies to Himeji City, promote collaboration with local community/companies

**Emergence of agriculture startups, multiple collaboration agreements**

- Long-term partnerships with local companies entering agriculture business

---

**Visitor attractions**

- Visitor attractions
- Seafood wholesale
- Logistics center
- Fruit and veg. wholesale
- Facilities

**Facilities**

**BEFORE**

**AFTER**
3. NAPA solutions
10 years of consulting (Japan)

Consulting projects up to 2020

- Business concept, company collaboration
- Business planning, financing support
- International market analysis
- Horticulture center revitalization project
- Food & agri project
- Business planning, financing support
- Support launch of joint venture
- Horticulture center revitalization project
- Financing support
- Market research for fully enclosed plant factory
- New agri-food business research
- Enclosed plant factory launch research
- Support new business development Ph1

- Regional development project
- Plant factory sale
- Support export project
- Horticulture center revitalization project
- Regional revitalization plan
- Food & agri business Ph1
- Formulating group vision
- Next generation manager training
- Market research for fully enclosed plant factory
- New agri-food business research
- Enclosed plant factory launch research
- Support new business development Ph1

- Moss greening project marketing
- Agriculture management improvement school Ph1, Ph2
- Support regional revitalization with regional financial institutions, universities and local government
- Tokushima revitalization project
- Creation of management plan for wheat producer
- Shodo Island olive processing
- Livestock business succession
- Fruit Flower Park rebuilding plan
- Sixth Sector Industrialization Project
- Agriculture business launch planning Ph1, Ph2
- Development of new artificial light-only plant factory
- Solar powered plant factory business launch
- Launch of agricultural production business
- Developing business model for moss greening project
- Entry into agriculture field
- Irrigation system marketability research
- Agriculture related market and needs research for new business

Note: Excluding national research project by central government; not all projects
3. NAPA solutions
10 years of consulting (Overseas)

Research and consulting projects in Asia, global (up to 2020)

- Research on use of IoT data
- Formulating plan to promote international agricultural market, research on overseas buyer markets
- Research on latest genome editing technology in vegetable breeding
- Research on export markets for farm and marine products
- Creation of food value chain
- Expansion of agriculture ICT overseas
- Ph1, Ph2
- Expanding export of marine products
- Formulation of plant factory plan by the UAE
- Promoting international agricultural market concept

Global expansion of the food and agribusiness as a sustainable industry reaching the next level
3. NAPA solutions
Global megatrends and food & agriculture consulting themes

- Deliver a wide range of solutions to business management issues in the food and agriculture sector by combining NAPA’s expertise and Nomura Group’s financial solutions.

Megatrends

- Fourth industrial revolution driven by digital

New themes

1. Create a new market using AI and robotics including new technologies and big data

2. Global integration of the value chain from production to distribution/consumption

3. ESG investment and SDGs as a key part of local government and business management

4. Circular economy requires rebuilding of business and social systems

Consulting themes offered by NAPA

- Alternative proteins, new varieties, biomaterials
- Food analytics, demand projection
- State-of-the-art distribution platform
- SDGs management concept
- New entry into food and agribusiness, business collaboration
- GHG reduction project, investment

Sustainability

- Sustainable management driven by carbon neutral

Fourth industrial revolution driven by digital

Global integration of the value chain from production to distribution/consumption

ESG investment and SDGs as a key part of local government and business management

Circular economy requires rebuilding of business and social systems

★ Indicates NAPA’s strengths and implementation record, not the number of projects.
3. NAPA solutions

New initiatives to support sustainable growth industries

**Ecosystem hub** to consolidate and share information on global expertise and challenges in the food and agri sector

**Innovation/Cultural exchange**

**Hub for business creation/growth**

**Ota City manufacturing companies trial collaboration**

**Verification tests across Japan**

**Ota market**

Collaboration with companies, local government, universities, financial institutions, etc.

**Goal 5 program director**
Professor Kazuhiro Chiba,
Tokyo University of Agriculture and Industry

R&D on food supply industry toward opening up new market 10 projects

- Cultivation of new crop varieties by genome editing technology
  Ryo Osawa, Professor, University of Tsukuba

- Elucidation and utilization of soil microbial functions
  Haruko Takeyama, Professor, Waseda University

- Food and feed production using insects fed by food and feed waste
  Kei Yura, Professor, Ochanomizu University

- 3D food cartridge
  Mitsutoshi Nakajima, Professor, University of Tsukuba

**New food brand ‘Agrichano’ and sale of digital membership**

Agriculture X Food X FinTech = Solutions to ‘regional revitalization,’ ‘social issues’ and ‘private domain’

**Content Company**

- Raise producers’ income (higher added value)
- Create new business model for food-service industry (not store-visit model)
- Improvement of consumer’s food literacy (dietary education)

**Future Innovation Company**

- Online capital markets using blockchain technology
- Digitalization of rights
- Creation of digital asset market and formation of ecosystem
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