Data Collection Survey on Promotion of Agriculture and Agribusiness in the Maldives

Final Report

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Japan International Cooperation Agency (JICA)

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Nippon Koei Co., Ltd.

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Data Collection Survey on

Promotion of Agriculture and Agribusiness in the Maldives

Final Report

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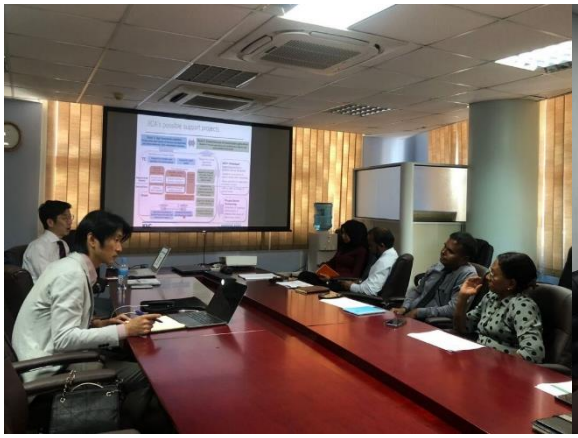
Table of Abbreviation

	:	
AgroNat	:	Agro National Corporation
AMCE	:	Average Marginal Component Effect
AMCS	:	Addu Meedhoo Cooperative Society
APC	:	ADDU Poeple’s Cooperatiove Society
BCA	:	Building Consent Authorities Registry
BCC	:	Business Center Corporation
BSF	:	Black Soldier Fly
B to B	:	Business to Business
CEDAW	:	Convention on the Elimination of all forms of Discrimination Against Women
CSA	:	Climate Smart Agriculture
DX	:	Digital Transformation
EC	:	Electrical Conductivity
EIA	:	Environmental Impact Assessment
EPA	:	Environmental Protection Agency
EU	:	European Union
FADIP	:	Fisheries and Agricultural Diversification Programme
FAO	:	Food and Agriculture Organization of the United Nations
FDI	:	Foreign Direct Investment
FVC	:	Food Value Chain
GAP	:	Good Agricultural Practices
GCF	:	Green Climate Fund
GDP	:	Gross Domestic Product
GEAP	:	National Gender Equaliy Action Plan 20
GEF	:	Global Environment Facility
HAC	:	Hanimaadhoo Agriculture Center
HDC	:	Housing Development Corporation
ICSB	:	International Council for Small Business
ICT	:	Information and Communication Technology
IFAD	:	International Fund for Agricultural Development
IFF	:	Island Farmers Forum
IPPC	:	International Plant Protection Convention
IsDB	:	Islamic Development Bank
JETRO	:	Japan External Trade Organization
JICA	:	Japan Internation Cooperation Agency
JOCV	:	Japan Overseas Cooperation Volunteers
JPP	:	JICA Partnership Program
LAC	:	Local Authority Company

LGA	:	Local Governemnt Authority
LUP	:	Land Use Plan
MAP	:	Maldives Agribusiness Program 2020-2025
MFDA	:	Maldives Food and Drug Authority
MFMC	:	Maldives Fund Management Corporation
MIRA	:	Maldives Inland Revenue Authority
MMA	:	Maldives Manetary Authority
MNU	:	Maldives National University
MoFMRA	:	Ministry of Fisheries, Marine Resources and Agriculture
MoGFSS	:	Ministry of Gender, Family and Social Service
MTCC	:	Maldvies Transport and Contracting Company
MWCC	:	Maldvies Women's Chambers of Commerce
NFAP	:	National Fishery Agriculture 2019-2029
PDSAE	:	Project for Developing Sustainable Agricultural Economy
RO	:	Reverse Osmosis
SAP	:	Strategic Action Plan
SC	:	Supply Chain
SDFC	:	SME Development Finance Corporation
SDGs	:	Sustainable Development Goals
SEEDS	:	Sustainable Economic Empowerment and Development for SMEs
SME	:	Small and Medium Enterprise
SOE	:	State-Owned Enterprises
STO	:	State Trade Organization
UNDP	:	United Nations Development Programme
UNESCO	:	United Nations Educational, Scientific and Cultural Organization
WB	:	World Bank
WDC	:	Women's Development Committee

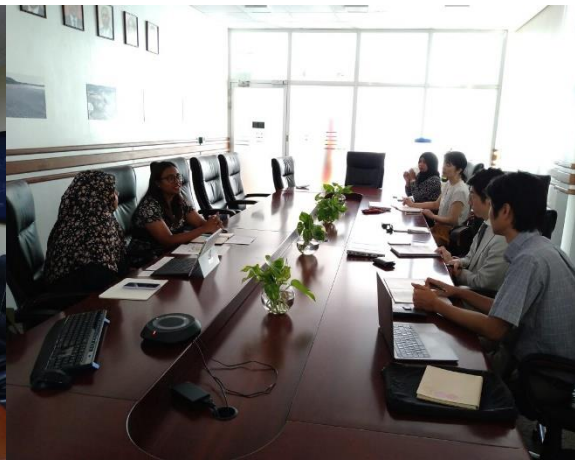
Activity Photos



Final Report Meeting with MoFMRA

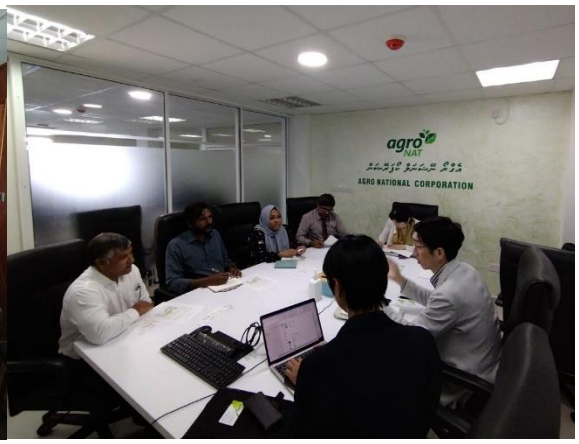
Meeting with SDFC

Meeting with LGA



Meeting with Ministry of Environment

Meeting with Ministry of Tourism



Meeting with AgroNat

Meeting with Maldives National University

Meeting with Hanimadoo Agriculture Center

Meeting with Utheem island council

Meeting with Baarah island council

Meeting with farmers in Nilandhoo

Meeting with farmers in Nolhivaram

Meeting with farmers in Angolhitheem

Production in backyard (Inguraidhoo)

Interview with farmers (Utheem)

Interview with farmer (Kondey)

Interview with farmer (Gemanafushi)

Interview with farmer (Maakurathu)

Visiting maket in Malé

Meeting with WDC (Finey)

Visiting leased agriculture island (Maafahi)

Visiting leased agriculture island (Theefaridhoo)

Visiting leased agriculture island (Lun'boakandhoo)

Interview for conjoint analysis

Chapter 1. Outline of the Survey

1.1 Background and Objectives of the Survey

The Republic of Maldives (hereinafter referred to as "Maldives") is an island nation consisting of 1,192 islands. Most of the population is concentrated in the capital city of Malé, and the economic disparity between the capital and the rural areas is expanding, which calls for economic revitalization in the rural areas. Since the country's economy is heavily dependent on the tourism sector, the COVID-19 pandemic caused a significant drop in the number of foreign tourists, which severely hurt the country's overall economy. With such vulnerabilities becoming apparent, the government of Maldives has made industrial diversification, especially agricultural promotion, a priority issue in order to establish a strong economic foundation.

Although agricultural sector in the Maldives is currently small due to various constraints, the potential for growth is promising given the demand in the tourism sector and the potential for import substitution. The government of Maldives is also undertaking efforts to promote agriculture while receiving support from donor agencies, but the effectiveness of these efforts has yet to be confirmed.

The purpose of this survey was to collect information and conduct analytical studies necessary to examine agricultural promotion measures, mainly crop production, and cooperation measures by JICA, which would contribute to industrial diversification in the Maldives.

1.2 Survey Structure and Timeframe

The survey was conducted over a seven-month period, from December 2022 to June 2023, by the following four-person team.

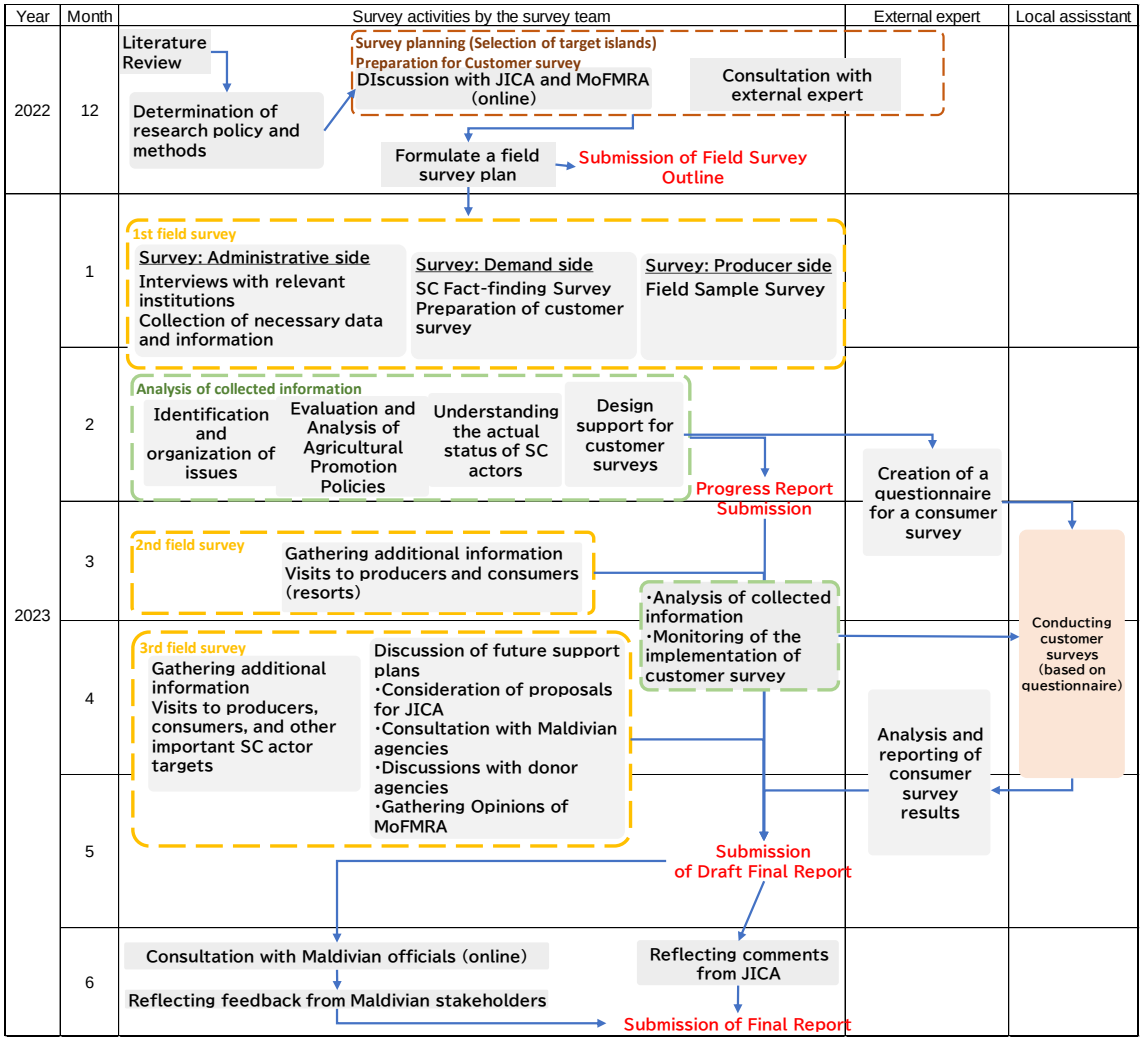
1. Team leader / Entrepreneurship support
2. Agriculture Development
3. Entrepreneurship Support
4. Supply Chain (Logistics / Marketing)

In addition, a (modified) conjoint analysis method was used in the survey on agricultural commodity customers. Associate Professor Keisuke Kawata, Institute of Social Science, the University of Tokyo provided assistance as an outside expert in the analysis and design of the questionnaire. In addition, the survey team sought cooperation from the Ministry of Fisheries, Marine Resources and Agriculture (MoFMRA) in suggesting target islands to be surveyed and in coordinating appointments with relevant organizations and groups in the Maldives.

1.3 Method of Implementation and Survey Target (island)

1.3.1 Implementation Method of the Survey

In the survey, literature review in Japan was conducted, followed by a field survey. In addition to interviews with relevant institutions and organizations in the capital city of Malé, field surveys were conducted by visiting the 37 islands listed in Table 1-1 and interviewing producers as well as actors in the agricultural supply chain (SC). The overall process of the survey is shown in the figure below.



Source: JICA Survey Team

Figure 1-1 Overall Process of the Survey

1.3.2 Selection of Survey Target (island)

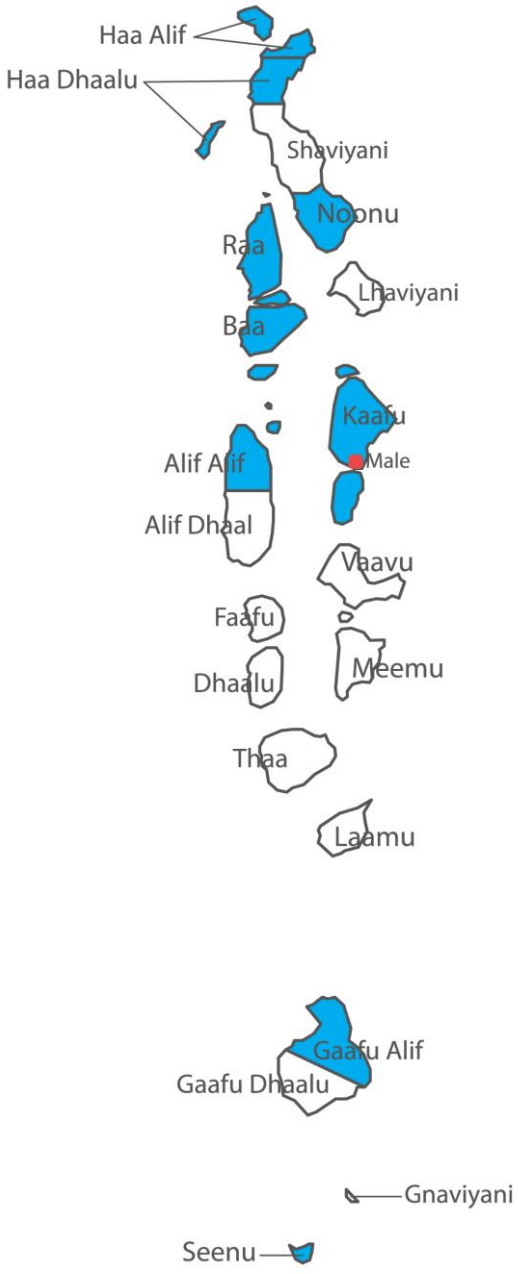
In selecting the islands to visit, efforts were made to ensure diversity in terms of geographic location and island size. For the agricultural islands, not only inhabited agricultural islands but also uninhabited agricultural islands were added to the list of candidates so that the number of

resorts in the vicinity would be diversified. In addition, to examine the effectiveness of existing agricultural promotion programs, both targeted and non-targeted islands were considered for coverage.

After creating a long list based on these conditions, the survey team narrowed it down to a short list in consideration of the efficiency of domestic travel in the Maldives so that the survey team could visit as many islands as possible in a short period of time. Based on the list prepared by the survey team, the MoFMRA provided advice and consultation, which resulted in the final list of islands to be visited. The MoFMRA was asked to ascertain whether the island councils viewed agricultural development as a priority area, and care was taken to ensure that the visits included active islands that could be potential targets for future support.

Table 1-1 List of islands visited (excluding Malé)

Atoll Name	Island name (resort name)
Inhabited island (manned agricultural island)	
Haa Alifu	Barah.
	Utheem
Haa Dhaalu	Finey.
	Nolhivaran
Noonu	Manadhoo
Alif Alif	Thoddoo
Kaafu	Kaashidho
Baa	Kamadhoo
	Kihaadhoo
	Maalhos
Raa	Angolhitheem
	Vaadhoo
	Inguraidhoo
	Maakurathu
Gaafu Alifu	Nilandhoo
	Kondey.
	Gemanafushi
Seenu	Meedhoo
	Hulhudhoo
	Hithadhoo
	Maradhoofeydhoo
Uninhabited agricultural island	
Haa Alifu	Maafahi
Haa Dhaalu	Theefaridhoo
Noonu	Felivaru
	Maafunafaru
Raa	Lun'boakandhoo
	Dheburitherey Vaadhoo
Gaafu Alifu	Funadhoo
resort island *Conjoint analysis interviews only	
Haa Alifu	Hideaway
Baa	Four Seasons
	Reethi Beach Resort*.
	Milaidhoo
	Amilla* (Japan)
	Vakkaru*.
	Dusit Thani*.
	The Westin*.
	Seaside*.
Gaafu Alifu	The Residence
Other	
Haa Dhaalu	Hanimadhoo
Noonu	Manadhoo



*Colored are the atolls visited in this survey.

1.4 Structure of the Report

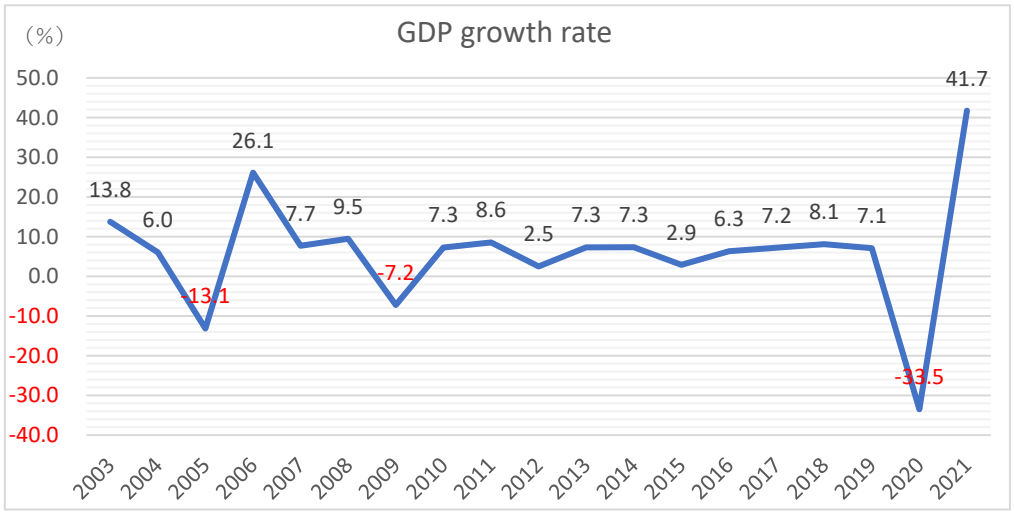
The report provides an overview of the current state of the agricultural sector in the Maldives in Chapter 2. Furthermore, in Chapters 3 through 5, the survey team will organize and analyze the information obtained from this survey from the perspectives of producers, government support, and consumers/supply chain. Based on the above, the report will summarize the recommendations from this survey in the last chapter (Chapter 6).

Chapter 2. Current Status of the Agricultural Sector in the Maldives

2.1 Agricultural Sector Overview

2.1.1 Economic Outlook

The Maldives, with its special industrial structure in which tourism accounts for 21% of total GDP, had a solid economic growth rate averaging 6.3% (2015-2019) until 2019, but in 2020, the industry slumped due to a significant decrease in foreign tourists due to the Covid-19 pandemic, resulting in a GDP growth rate recorded the largest drop in its history at -33.5%.



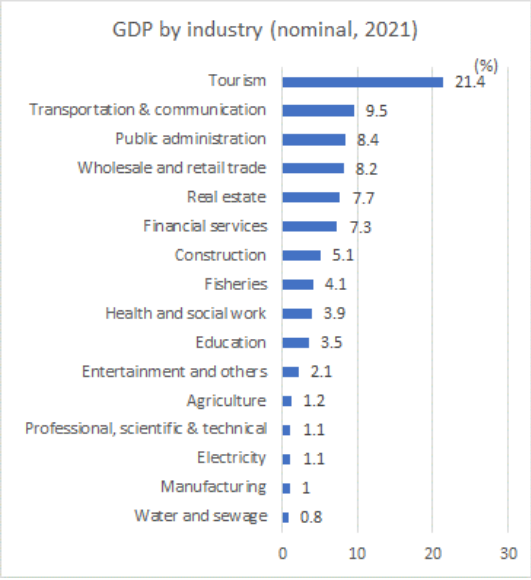
Source: World Bank Data

Figure 2-1 GDP Growth Rate

GDP per capita was US$10,366 in 2021 but fell to US$7,282 in 2020 (down 35% from 2019), following a significant decline in GDP.

As the figure on the right shows, looking at the GDP breakdown by industry as of 2021, it can be observed that the tourism sector accounts for the largest share, 21.4% of the total. Furthermore, according to the Maldives Bureau of Statistics, the sector's share increased by 9.8 percentage points compared to the previous year, which is attributed to the sector's significant recovery from the Covid-19 crisis.

Agriculture, on the other hand, accounts for only 1.2% of the total, and its economic contribution is

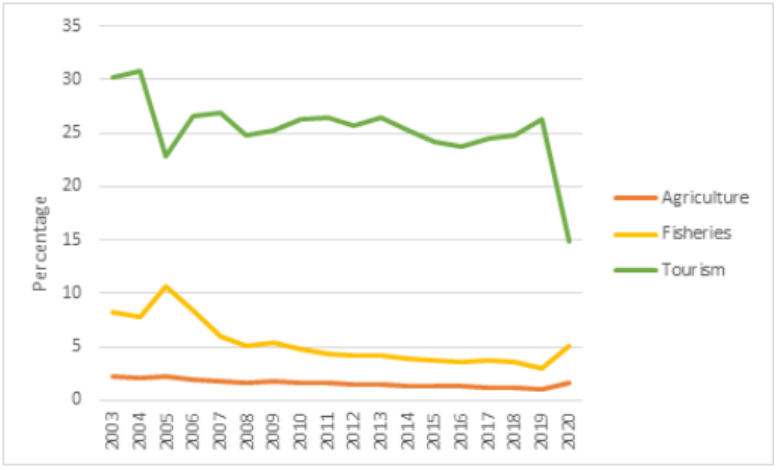


Source: Maldives Bureau of Statistics

Figure 2-2 GDP by industry

currently extremely small.

However, while the entire world was affected by the Covid-19 crisis, the country was quick to reopen its borders and begin accepting foreign tourists in 2020, which led to a rapid recovery in the tourism sector and a significant improvement in economic growth. However, the overreliance on tourism and the need to diversify the industry, as manifested by the Covid-19 disaster, are widely recognized. The graph on the right shows the historical trends in the GDP composition of the three sectors of tourism, fisheries, and agriculture. The significant decline in 2020 led to an increase in the share of the other two sectors in the total GDP, confirming the importance of agriculture and fisheries in the Maldives' industrial diversification, which can be seen in the graph.



Source: Maldives Bureau of Statistics

Figure 2-3 GDP Composition by Major Sector

2.1.2 Natural Condition

The Maldives consists of 1,192 islands, which are distributed over a distance of approximately 830 km from north to south and 120 km from east to west. Of these, 187 are inhabited islands and the rest are uninhabited. The cultivable area is estimated to be about 4,000 ha, which accounts for 10% of the national land area. It is about 0.01 ha per capita, and the real land area that can be used for agriculture tends to decrease due to recent population growth and growing demand for residential and other purpose areas. Furthermore, the average elevation is 1.5 meters above sea level and the highest elevation is 2.4 meters above sea level. It is estimated that 1 meter rise in sea level would submerge approximately 80% of the country, making large-scale agriculture impossible due to the effects of global warming.[1][2][3]

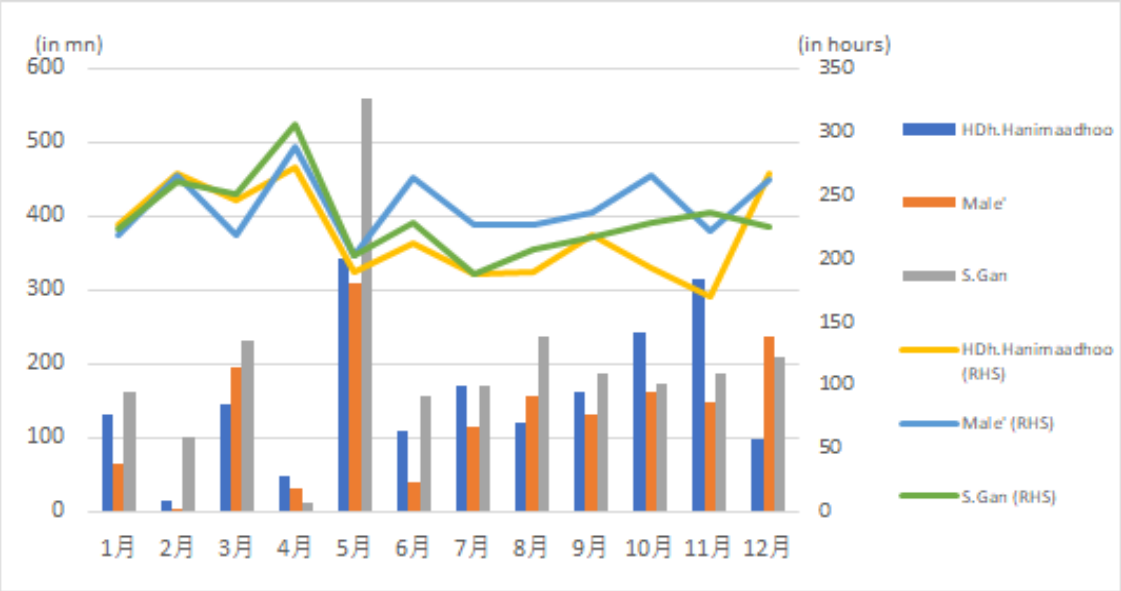
The low altitude and small size of the Maldives, with approximately 80% of the inhabited islands less than 100 hectares in area, means that there is no open bodies of water such as rivers or freshwater lakes. Therefore, the three main sources of water for agriculture in the Maldives are rainwater, groundwater, and desalinated water. Also as a country made of atolls, the Maldives is based primarily on limestone formed by reef-building corals.

The Maldives is an equatorial country and belongs to the tropical monsoon climate in the Köppen climate classification. There is a dry season from November to April due to the northeast monsoon

[1] Statistical Yearbook of Maldives 2020
[2] National Fisheries and Agricultural Policy 2019-2029
[3] The World Bank In Maldives. https://www.worldbank.org/en/country/maldives/overview

and a rainy season from May to October due to the southwest monsoon. According to data of the year 2021 from the Maldives Bureau of Statistics, annual precipitation is about 1,897 mm in HDh. Hanimaadho in the north, 1,586 mm in Malé in the middle, and 2,385 mm in S. Gan in the south, and annual sunshine hours are about 2,633 hours in HDh. Hanimaadho, about 2,633 hours in Malé, about 2,894 hours in Malé, and about 2,770 hours in S. Gan.

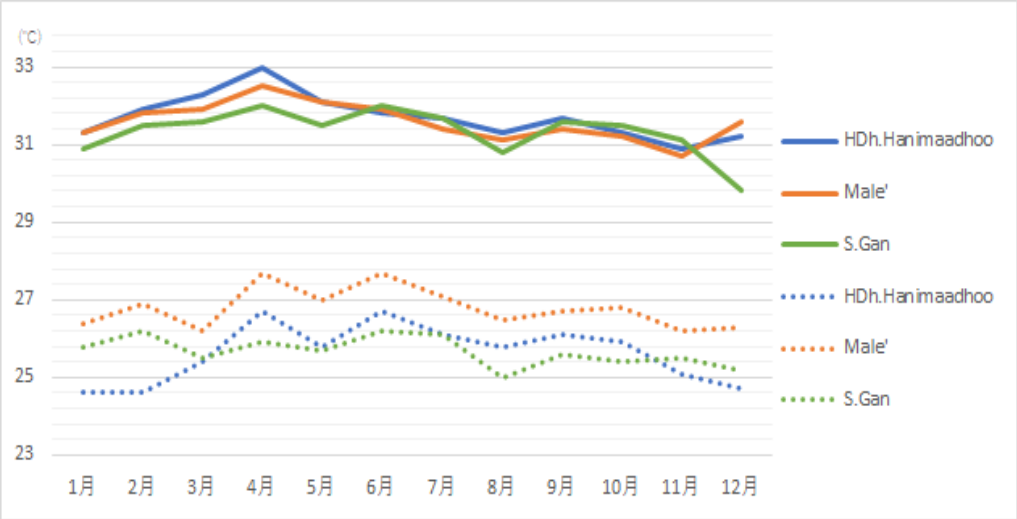
The figure below shows monthly trends for 2021. While precipitation varies significantly from season to season, sunshine hours are observed to be somewhat stable.



Note: Bar graph shows precipitation (left-hand scale line); line graph shows sunshine hours (right-hand scale line)
Source: Prepared by the research team based on the Statistical Yearbook of Maldives.

Figure 2-4 Monthly precipitation and sunshine hours

Regarding temperatures, the hottest months of the year nationwide are from March to May, and the coolest months are from October to January, but temperatures do not vary much throughout the year. The figure below shows the monthly maximum and minimum temperatures for 2021 by region. While there is little regional variation in maximum temperatures, minimum temperatures vary from region to region, with Malé, located in the central part of the country, having the lowest temperatures throughout the year.

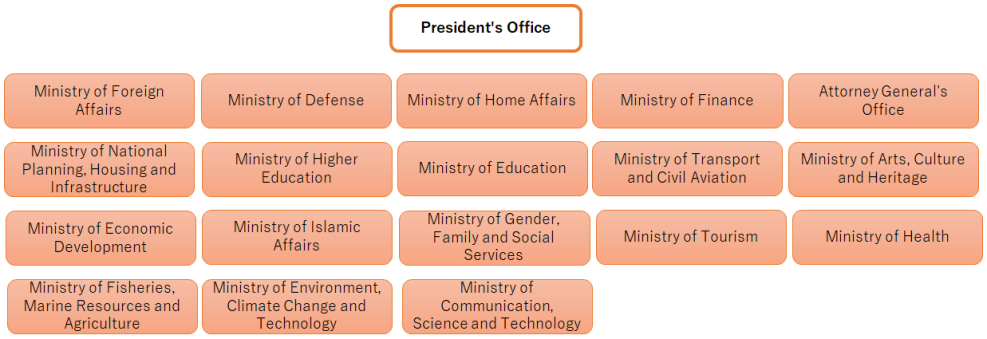


Note: Solid lines indicate maximum temperatures and dotted lines indicate minimum temperatures.
Source: Prepared by the Survey Teams based on the Statistical Yearbook of Maldives

Figure 2-5 Monthly maximum and minimum temperatures by region

2.1.3 Administrative Organization

Among the government agencies (central ministries) in the Maldives shown in the figure below, MoFMRA is the ministry in charge of the agricultural sector and is responsible for planning and executing related policies. In addition, the Ministry of Economic Development, Ministry of Environment, Climate Change, and Technology, and Ministry of National Planning, Housing, and Infrastructure are also involved in inter-ministerial coordination in the introduction and enforcement of institutions and regulations related to the agricultural sector. These ministries are important not only for agricultural development, but also as policy-making bodies for environmental conservation and land development, as well as responsible for projects at the central level. The Environmental Protection Agency (hereafter referred to as "EPA"), which is responsible for assessing the environmental impact of land development projects, including those in the agricultural sector.



Source: Government of Maldives[4]

Figure 2-6 Government Agencies

[4] https://www.gov.mv/en/organisations

For the administrative districts involved in local autonomy, there are 20 administrative atolls. The table below shows the administrative atolls and the number of islands which belong to those.[5]

Table 2-1 Administrative atolls and number of islands

	atoll	No. of islands	population		atoll	No. of islands	population
1	Haa Alif	14	14,603	11	Vaavu	5	1,995
2	Haa Dhaalu	12	22,534	12	Meemu	8	5,471
3	Shaviyani	14	13,686	13	Faafu	5	4,858
4	Noonu	12	12,481	14	Dhaalu	6	6,628
5	Raa.	15	17,565	15	Thaa.	13	10,249
6	Baa.	13	10,655	16	Laamu	11	14,642
7	Lhaviyani	4	8,969	17	Gaafu Alifu	9	9,174
8	Kaafu	9	17,714	18	Gaafu Dhaalu	9	12,775
9	Alifu Alifu	8	7,997	19	Gnaviyani	1	9,166
10	Alifu Dhaalu	10	10,532	20	Seenu (Addu)	6	25,053

Note: inhabited islands only
Source: Census 2022 and LGA

Councils are established on each island as an administrative body, and council members are elected, with a maximum number of 5-7 members, depending on the size of the island, to include women. The term of office is five years, and the current regime is now in the second year. The island council is managed by an administrative staff in addition to the Council members, but there are no specialists in agriculture assigned to councils.[6]

Administrative atolls also have councils, but the members are representatives of the island council members on each island in the atoll. The administrative atoll is the link between their islands and the central government, and the atoll council is responsible for supporting and supervising the activities of the island councils.

2.1.4 Labor Force

A census was conducted for the first time in eight years since the last one in 2014. Excluding resident foreigners from the total population, the Maldivian population stands at 382,751, with an average annual growth rate of 1.5% since 2014 (338,434).

[5] https://www.lga.gov.mv/page/82/12
[6] The current term begins in April 2022 to start this new five-year term (previously three years). According to the Island Council members, the longer term of office was established to ensure more stable development projects and self-governance on the island.

Table 2-2 Census Data (2022)

	Population	Maldivian	Resident foreigners	Proportion
Total	515,122	382,751	132,371	100%.
Malé	212,138	161,108	51,030	41%.
inhabited island	236,747	204,277	32,470	46%.
resort island	52,396	15,689	36,707	10%
commercial island	13,841	1,677	12,164	3%

Source: Maldives Bureau of Statistics

By region, 41% of all Maldivians live in Malé, almost equal to the population in the local island (46%). Many Maldivians and foreign residents reside on the resort island where employees live and work. Calculating based on the current number of resort islands across the county, an average population per resort island is about 300 people. Commercial islands are uninhabited islands leased for commercial purposes other than resorts; leased agricultural islands stated later are also classified in this category. One difference from other islands is that most of the residents on the commercial islands are foreign residents.

Next, the number of persons per household shows a decrease from 5.24 in 2014 to 4.7 this time, indicating that household size is shrinking as the birth rate declines. The decline was more pronounced in Malé, where the decrease was from 5.4 to 4.5, and may be due in part to the fact that the cost of living has increased more than on the regional islands.

Next, by age group, the 15-64 age group, which constitutes the labor force, accounted for 69% of the total population, almost unchanged from 68% in 2014. Furthermore, when looking at the regional difference, most of the labor force is concentrated in the capital city of Malé, especially among the 25-29 age group. On the other hand, the female labor force is larger on the local islands. The service sector, including the tourism sector, will account for 63% of the total workforce in 2021, while only 11% of the total workforce will be in the agricultural sector[7][8].

On the other hand, with the development of the tourism sector in the Maldives, it is common for especially young workers to leave their islands of residence, due to the lack of job opportunities on the islands and lured by attractive working conditions in the surrounding resorts. As the table below shows, the population at the resorts (Maldivians) is growing at a faster pace than the overall population. Husbands and fathers working at the resorts usually live away from their families, affecting not only the exodus of human resources off the islands, but also the Maldivian way of life.

[7] https://data.worldbank.org/indicator/SL.AGR.EMPL.ZA?location=MV
[8] There are 7,613 farmers, both men and women, registered with the MoFMRA. It is estimated that not all farmers are necessarily registered with the Ministry, but the actual number is much higher.

Table 2-3 Maldivian Population Residing in Resorts

	2014	2022	Increase rate
Maldivians as a whole	338,434	382,751	13%.
Maldivians residing at the resort	11,609	15,689	35%.

Source: Prepared by the research team based on data from the Maldives Department of Statistics

2.1.5 Domestic Production

Agricultural crop production in Maldives can be broadly divided into production by ordinary farmers on inhabited islands and production on uninhabited islands owned by companies under lease contracts with MoFMRA. However, statistical data on crop production in the Maldives is not well organized.

1) Production on inhabited islands

According to the Agriculture Survey 2019, each island council was tasked until 2006 with collecting coconut cultivation and other agriculture-related information from island farmers and submitting it to MoFMRA through the atoll councils. However, due to low response rates from many island and atoll councils, as well as inadequacies in the information collection process by island councils and resulting concerns about the quality of the information provided, this information collection system has not continued since about 2007. Since then, no national survey on agriculture has been conducted in the Maldives. Due to this background, an agricultural survey based on the main agricultural islands of the country was conducted in 2019 by the Maldives Bureau of Statistics and MoFMRA.

Since the survey was conducted on a total of 11 major agricultural inhabited islands, it can be said that the data presented in the survey can reflect somehow the scale of domestic production in the Maldives, even though it does not cover all the agricultural islands. The table below shows the total production of these 11 islands by crop type.[9]

Table 2-4 Production of Major Crops in Inhabited Islands (kg)

	production	sales	Percentage for sales
Watermelon	645,101	585,832	90.80%
Papaya	606,062	554,477	91.50%
Eggplant	555,380	233,458	42.00%
Banana	523,948	513,844	98.10%
Cucumber	403,129	378,505	93.90%
Pumpkin	216,604	202,021	93.30%
Gourd	156,385	156,230	99.90%
Yam	99,893	83,223	83.30%
Capsicum	75,841	62,789	82.80%

Note: Data as of 2019.
Source: Agriculture Survey 2019

[9] The most active agricultural producers K K.Kaashidhoo and AA Thoddoo are included, the others are HA Kelaa, Lh Naifaru, Adh Maamigili, F Magoodhoo, L Gan, L Fonadhoo, Gdh Gahdhoo, GN Fuvahmulah, S Meedhoo

As the table above shows, most of the crops produced on inhabited islands are for commercial use, although some are for self-consumption.

2) Production on uninhabited island

Apart from agricultural activities on inhabited islands, uninhabited islands in the Maldives are leased to individuals or companies for agricultural purposes. 52 islands have already been leased, and according to MoFMRA, the average size of these islands is about 20 hectares, which means that the total area will reach 1,000 hectares nationwide. Although the whole area of those islands will not be used for agriculture, more uninhabited are expected to be leased in the future, and crop production on uninhabited agriculture islands will have a certain impact nationwide based on the arable area of approximately 4,000 ha throughout the country as mentioned earlier.

Data on crop production on uninhabited islands is required to be reported to MoFMRA every three months by the owner. However, according to the MoFMRA, the reality is that the amount of crop production on all of the uninhabited agricultural islands is not accurately known because not all 52 islands have started production, or many of them fail to report production data.

The table below shows the total annual production for a total of seven islands for which reports have been received by MoFMRA as of May 2023.[10]

Table 2-5 Production of leased uninhabited islands

	Total (kg)	Average per island (kg)
watermelon	127,836	18,262
cucumber	83,852	11,979
papaya	39,013	5,573
pumpkin	37,205	5,315
eggplant	25,331	3,619
banana	7,394	1,056
lettuce	3,092	442
tomato	846	121

Note: Estimated production for one year based on production volumes for a reporting period of three to four months.
Source: MoFMRA

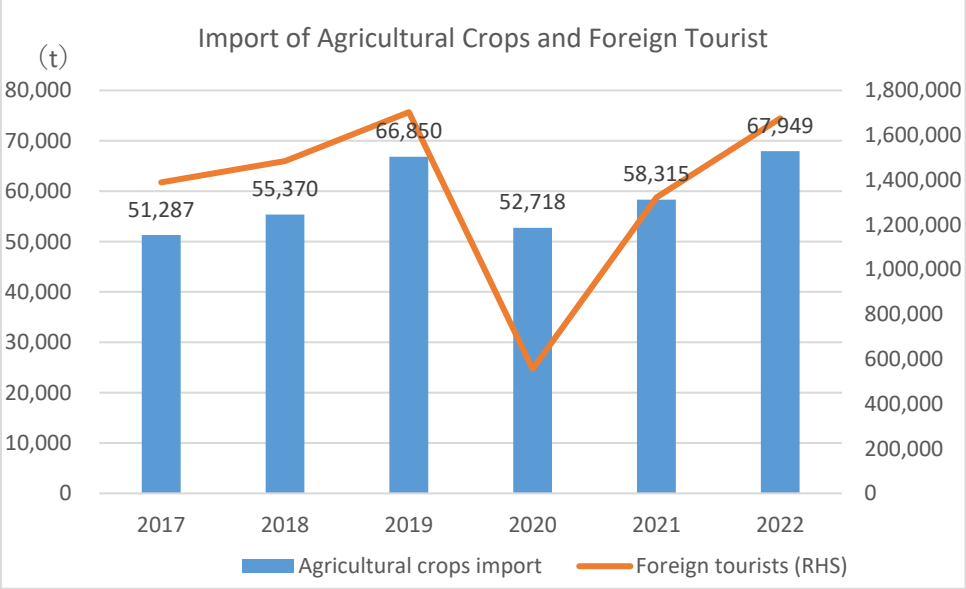
MoFMRA regards the lack of relevant data, such as national production, as a serious problem in policy considerations. The collection of agricultural data from resident and leased agricultural islands throughout the country and the establishment of a centralized management and analysis system are priority issues in the agricultural sector of Maldives.

2.1.6 Agricultural Imports

With limited domestic production capacity, the Maldives relies on imports for much of its domestic demand. The bar graph below shows the trend of imports of agricultural products, and the line graph shows the number of foreign tourists. The volume of imports of agricultural products has been increasing steadily, which can be attributed in part to the increase in demand

[10] Ha.Maafahi, M.Thuvaru, M.Fenfuraaveli, GA.Funadhoo, B.Aidhoo, N.Vamathi, Ha.Maafahi, Dh.Uhdhoo

for agricultural products due to the increase in the number of foreign tourists. This is supported by the fact that, as shown in the figure below, import volume fell in 2020, the year of the Covid-19 outbreak, but recovered steadily after the resumption of foreign tourist arrivals in that year, and exceeded the pre-covid level in 2022.[11]

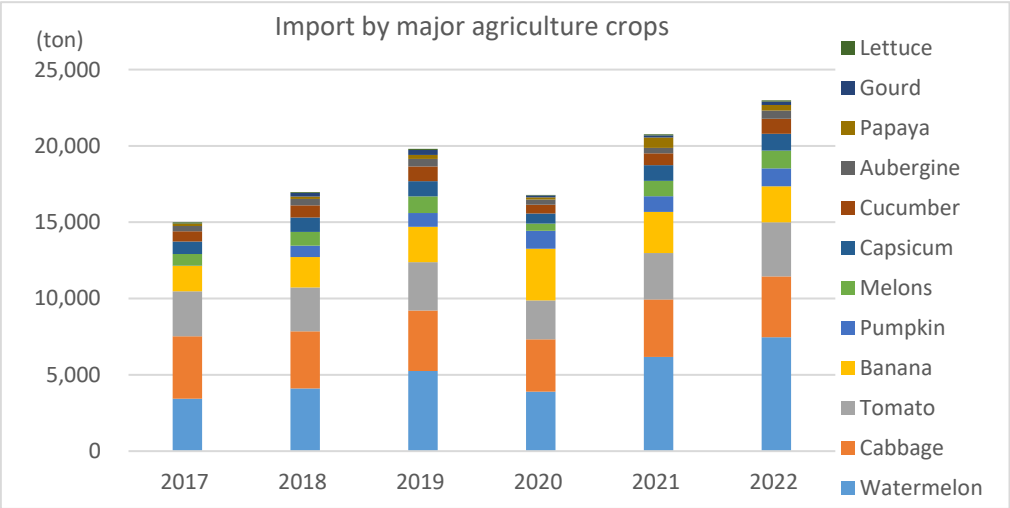


Source: Prepared by the research team based on data from Maldives Customs.

Figure 2-7 Trends in Crops Import Volumes

Furthermore, the Maldives has set import substitution as one of the motivations for agricultural promotion, and has identified the 17 most impactful commodities[12]. The graph below shows the import volume of these strategic commodities according to the classification of customs statistics data. While the overall import volume of agricultural products upper graph increased by 32% since 2017, the growth rate of only the strategic commodities shown in Figure 2-8 is 53%, with a steeper curve, indicating the appropriateness of the selection of these commodities.[13]

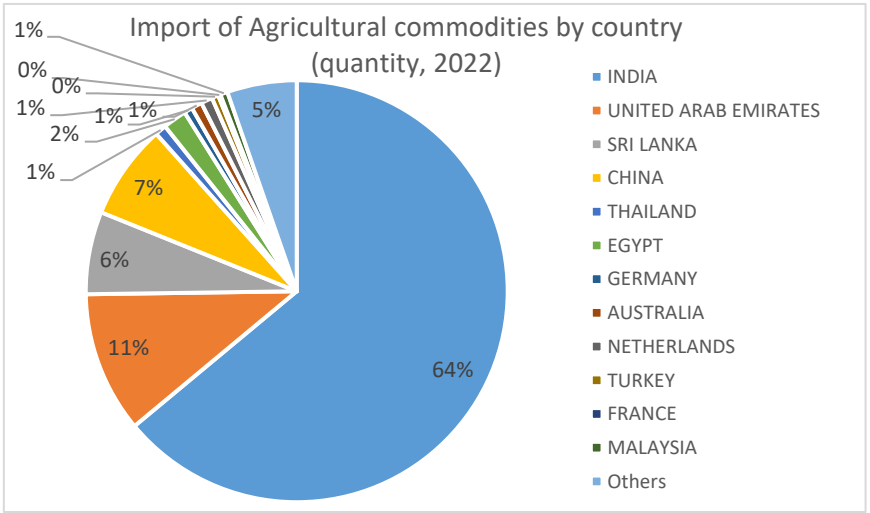
[11] After limiting the HS code to category 7 (Edible vegetables, roots and tubers), the total is tabulated.
[12] Pumpkin, Banana, Papaya, Sponge gourd, Snake gourd, Okra, Maldivian cabbage, Watermelon, Cucumber, Brinjal, Lettuce, Green beans, Melon, Tomato, Capsicum, Chinese cabbage, Butternut
[13] The number of items does not match the number of items in Figure 2-8 because the classification of 17 items and the Maldivian customs classification do not completely match and some items have been aggregated.



Source: Prepared by the research team based on data from Maldives Customs.

Figure 2-8 Import Volumes of Major Agriculture Crops

The following chart shows a country-by-country breakdown of import statistics for agricultural products. The United Arab Emirates, which ranks second after India in first place, is considered to function more as a logistics hub than an actual agricultural crop production area. Therefore, Sri Lanka is considered to be the next largest producer of agricultural products. The survey interviewed several resort companies that rely on imports for most of their vegetable and fruit procurement, and the information on their exporting countries is consistent with that shown in the figure below. The countries frequently raised by the procurement managers of the interviewed resorts are Thailand, Germany, Egypt, Australia, as well as India and Sri Lanka.[14]



Source: Prepared by the research team based on information from the Maldives Department of Statistics.

Figure 2-9 Crop Import Statistics by Country

[14] After limiting the HS code to category 7 (Edible vegetables, roots and tubers), the total is tabulated.

The above figure shows the breakdown in volume terms, and Figure 2-10 shows this in value terms, with India's share dropping to 31% in terms of value. The value per kilogram is the lowest in India at MVR 10/kg, indicating that a large amount of cheap agricultural products from India are flowing into the Maldives. This seem to be due to the fact that the transportation cost are lower in India than in other countries because of its proximity to the Maldives, but this is not the case because Sri Lanka offers MVR 47/kg. Interviews with retailers confirmed that the inflow of cheap agricultural products from India is lowering the market price in the Maldives, and the data supports this view.

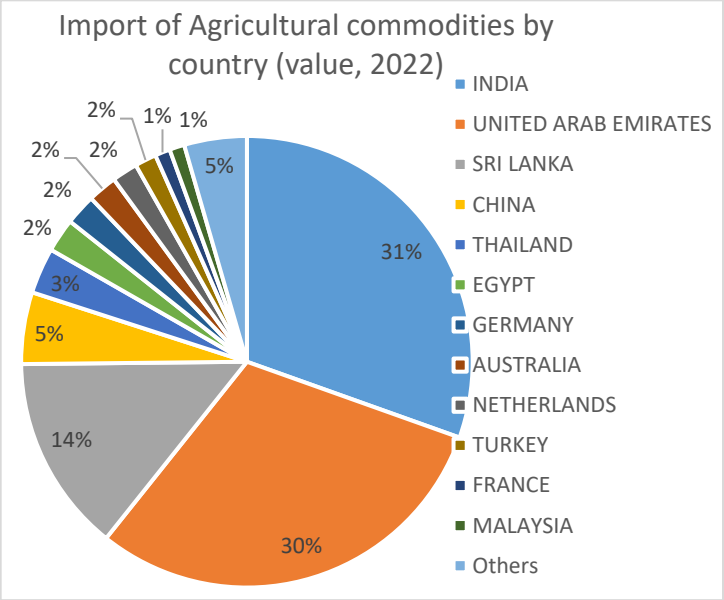
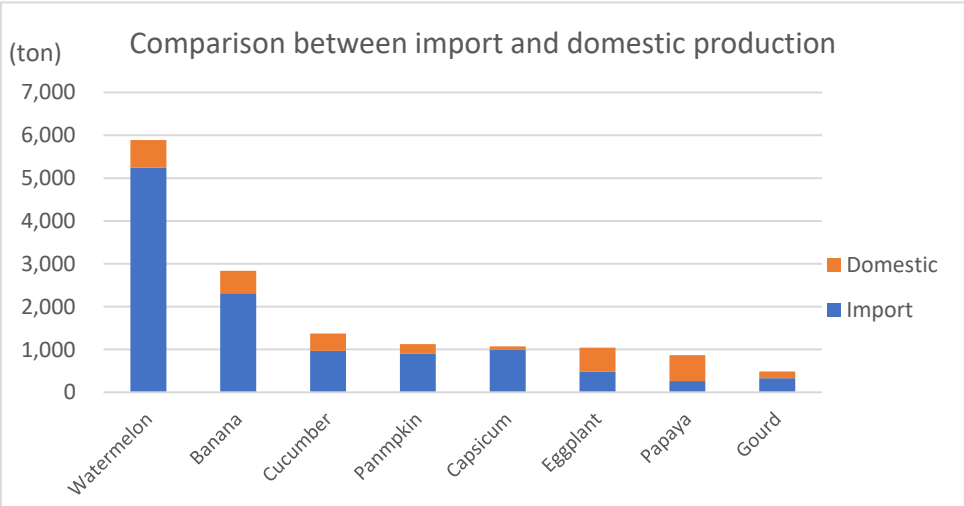


Figure 2-10 Crop Import in Value

Next, to compare domestic production and import volumes for the 17 crops mentioned above, the JICA survey team used data from the Agriculture Survey 2019, which is shown in the figure below. While domestic production of eggplant and papayas exceeds the volume of imports, imports of watermelon, cucumbers, and peppers, which are commonly produced by general farmers, are significantly higher than the volume of imports. Even among the 17 crops selected for import substitution, we find that the situation is different.



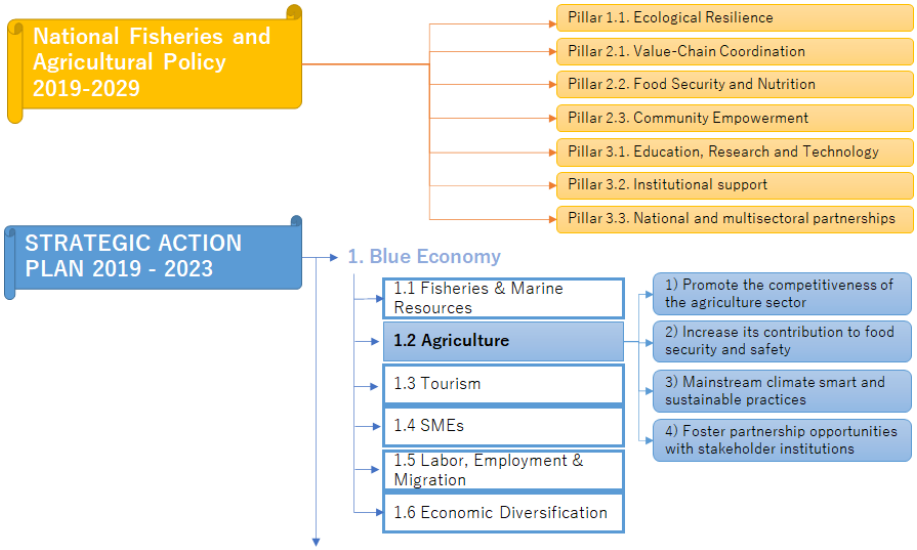
Note: Since the domestic production volume is based on data from 11 major agricultural islands, the actual production volume is estimated to be even higher. Import volumes also use 2019 data.
Source: prepared by the research team based on Agriculture Survey 2019 and import statistics data.

Figure 2-11 Import Volume vs. Domestic Production

2.2 Summary of Major Policies, Development Strategies, and Other Issues related to the Agricultural Sector

2.2.1 Policies Related to Agricultural Promotion

Two national policies were formulated at the same time regarding the development of agriculture sector in the Maldives. One is the National Fishery Agriculture Policy 2019-2029 ("NFAP"), which is the first National Agriculture Policy in the Maldives. The other is the Strategic Action Plan 2019-2023 ("SAP"), which addresses national development goals and government priorities, also gives importance to agriculture as a sub-sector belonging to the Blue Economy, one of the five priority sectors.



Source: Prepared by the survey team

Figure 2-12 National Policies related to the Agricultural sector

The above chart shows the priority agenda of each policy. The agendas common to the two policies can be regarded as the most important agendas in the development of agriculture sector in the Maldives. From this perspective, in addition to "climate change countermeasures" and "food security", “agribusiness creation”, which this survey considers important, is found to be the most important item.

Furthermore, more common items were identified at the activity level. lists the strategic activities set by NFAP and the similar activities planned by SAP side by side. These can be seen as individual strategies that the government of Maldives considers important.

Table 2-6 Comparison between two national policies

NFAP			SAP	
Climate change measures	1.1.1.F.	Promote and facilitate the implementation of ecologically friendly and resilient production systems for farmers, such as on-site compost and biofertilizers production	3.1	Introduction of the latest climate-friendly agricultural technologies
Value Chain Building	2.1.1.A.	Facilitate the sustainable use of local agricultural resources for the production of fertilizers, pesticides, animal feeds and other inputs	4.2	Enhance efficient use of resources for sustainable agriculture
	2.1.1.B.	Strengthen the role of state-owned agencies mandated to effectively link-up farmers to other value-chain stakeholders,	1.1	Develop market infrastructure and linkages for local agricultural produce
	2.1.1.C.	Facilitate the implementation of medium-scale processing facilities	1.3	Establish medium scale production facilities in selected regions and identify crops for value addition.
Food security	2.2.1.B.	Foster the production and marketing of selected field crops in which the country has the potential to attain self-sufficiency	2.3	Increase production of identified crops for self-sufficiency and reduction of imports
Community Development	2.3.1.F.	Facilitate the implementation of a platform to attract and retain youth engagement in agriculture	4.3	Sensitise and build capacity of children and youth to the importance of agriculture to support overall social development and livelihoods
	2.3.1.I.	Facilitate the implementation of entrepreneurship programs, internships, subsidized job placements, and other employment schemes	4.6	Reduce dependency on expatriate labour, and empower and encourage local participation in agriculture
Administrative Support	3.2.1.A.	Facilitate the implementation of a development plan aimed at building the technical, managerial and technological capacities of human resources	4.4	Strengthen technical capacity of Agricultural Officers and Island Councils
	3.2.1.B.	Identify, promote and support opportunities aimed at strengthening the managerial, technical and technological capacities of affiliated centers	4.5	Strengthen agricultural research that feeds into development of extension systems
	3.2.1.C.	Enhance the presence of extension service at the grassroot level	4.4	Strengthen technical capacity of Agricultural Officers and Island Councils
	3.2.1.D.	Support the development of a legal framework and certification system that will lead to the establishment of national standards for product quality and sustainable use of natural resources	1.4	Integrate Good Agricultural Practice (GAP) standards into the legal framework and support farmers in GAP certification
Partnership	3.3.1.A.	Facilitate proper collection, aggregation, analysis and dissemination of reliable data	4.1	Strengthen national agricultural data collection capacity

Source: Prepared by the survey team

As 2023 is the final year of SAP, goal to be achieved by the end of the year is set, as shown in the table below for agriculture sectors.

Table 2-7 Goals and indicators set by the SAP

Policy 1: Improve competitiveness of the agricultural sector	
Target 1.1:	01 Agricultural Market established in Greater Malé' Region; 02 Regional Agricultural Markets established; and Agri-boat operational in 03 regions covering 07 atolls
Target 1.2:	at least 1,500 farmers & 10 agricultural enterprises including 300 women benifited from the loan scheme
Target 1.3:	02 Agri-centres will be developed; 04 Commercial Poultry Farms, 03 Commercial Goat Farms and 10 agri-farms are operational
Target 1.4:	20 Commercial Farms are M-GAP Certified
Policy 2: Contribute to food security	
Target 2.1:	at least 02 Urban Gardening Plots (ready for commercial sale) established in each population hub
Target 2.2:	training programs coupled with inputs assistance (cuttings and seedlings) conducted for 20 islands
Target 2.3:	40 potential major agricultural islands receive planting materials and necessary training to grow selected crops focused on import substitution
Policy 3: Climate-smart sustainable agriculture	
Target 3.1:	IPM Guidelines are fully implemented in at least 50 agricultural islands
Target 3.2:	50 islands received training in homebased hydroponics systems and sustainable irrigation technologies
Target 3.3:	05 Coconut based Agroforestry systems will be developed and modelled in Agricultural Centres
Policy 4: Partnerships to improve access to relevant data	
Target 4.1:	the national agriculture sensitization campaign is implemented
Target 4.2:	at least 150 people are trained with MQA certification in agriculture to support agriculture extension at island level
Target 4.3:	at least 2,000 farmers benefited from agriculture extension support services from 60 locations
Target 4.4:	at least 2 trained personnel provide veterinary services at national level, and 2 regional plant and animal quarantine facilities are operational.

Throughout the JICA's survey activity, none of the above goals were found achieved. For example, as for Target 1.2, the actual number of loan cases for the agricultural sector did not reach the above target presented in Chapter 4 below.

The challenges facing the Maldivian agricultural sector, as recognized at the policy level, are organized in the NFAP. As the table below shows, in addition to natural environmental and geographic factors, the lack of human resources and institutional challenges are recognized.

- Inadequate communal land attribution system
- Shortage of rural labor
- Low technical skills among farmers, as well as low capital and financial investment
- Insufficient access to extension services
- Difficult access to financial credits (due to inappropriate conditions set by financial institutions)
- Uncoordinated vital data collection, analysis and dissemination to all sector' stakeholders
- Increased population density which competes with farmland use
- Insufficient control of cheap and low-quality imported inputs

- Poor knowledge of the state of forest resources and their availability
- Absence of policies and regulations for proper management of mangroves

Figure 2-13 Agricultural Sector Challenges Recognized at the Policy Level

2.2.2 Policy Measures for Agricultural Development

Recognizing the aforementioned challenges in the agricultural sector, various measures for agricultural development are being implemented. The three main agricultural development measures are as follows, each of which corresponds to the aforementioned priority areas of agricultural promotion in the Maldives.

Agriculture Promotion measure	Climate change countermeasures	Food security	Agribusiness initiatives
Support to create agribusiness	✓		✓
Import substitution by public corporation		✓	
agricultural use of uninhabited islands		✓	✓

A government initiative called the Maldives Agribusiness Program is underway to create agribusiness. The Agricultural Corporation has been established under the Ministry of Economic Development to promote a contract farming system to increase domestic production of important crops to replace imports, and the third is the leasing of uninhabited islands to promote agriculture in the Maldives, where land is scarce.

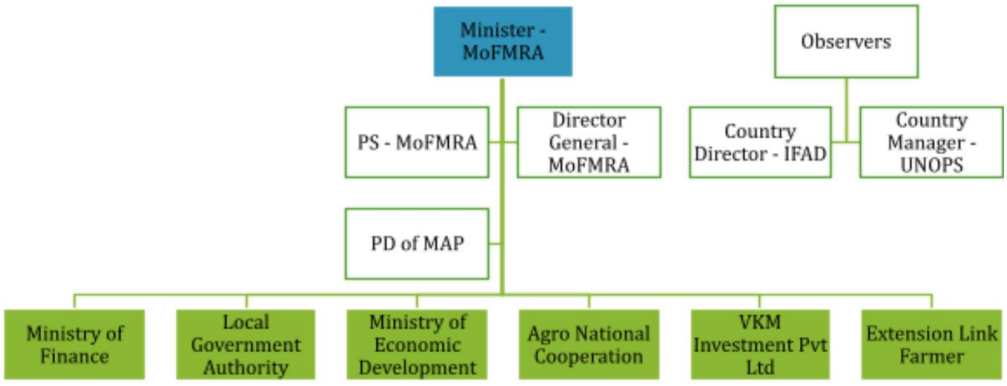
1) Support to Create Agribusiness

The Maldives Agribusiness Programme 2020-2025 ("MAP"), which aims to create agribusiness, has been established, and implementation is underway with financial support from IFAD to introduce climate change-responsive agriculture and build supply chains. A summary of MAP activities is shown in the table below.

Table 2-8 MAP Summary

Implementing agency	MoFMRA
Financing	International Fund for Agricultural Development (IFAD), Government of Maldives
Period	August 2020 - September 2025
Activity Area	It covers 26 islands in 3 northern atolls (Haa Alif, Haa Dhaalu, Shaviyani)[15] and other agricultural islands throughout the country.
implementation system The Programme Steering Committee (PSC), chaired by the Minister of Agriculture and Fisheries and including relevant ministries and agencies as members, provides recommendations and approves the Programme's activities. The Programme Implementation Unit (PIU) is located within the MoFMRA and is responsible for overall operations and coordination.	

[15] See Attachment 1.



Activities: carried out under the following three components	
Component 1 Enabling policy, institutions and services	The program will support 800 ha of agricultural land of registered farmers living on 98 of the 189 inhabited islands in the country and 582 ha of corporate farms distributed on 24 islands, including uninhabited islands.
Component 2 Climate-smart production	Provide technical guidance on Climate Smart Agriculture (CSA) proposed by FAO and the International Agricultural Research Organization to 2,150 registered farm households (280 ha of registered farmland), 645 non-registered farm households (85 ha) and corporate farms (250 ha on 6 islands) distributed within 26 islands in the three northern atolls.
Component 3 market connection	Establish a supply chain in the above three atolls over a two-year period starting in 2022. Then, it will expands the target regions and eventually cover the entire country.

Source: Progress Report of Maldives Agribusiness Programme, September 2022.

The PIU confirmed that activities have been delayed due to the Covid-19and the results achieved at this time are as follows.

- Community Needs Assessment was conducted to gather information related to agriculture on the target islands and to interview producers about the challenges they face. As a result, it was found that one of the challenges is procuring input materials.[16]
- A B-to-B event was held in HDh. Hanimaadhoo in an attempt to connect producers and buyers. Although several concrete business negotiations occurred, any cases resulting in a contract are not observed because the producers were unable to meet the buyers' requirements in terms of production volume and transportation.[17]
- The formation of the Island Farmers Forum (IFF) on a total of 24 of the target islands have been supported. The objective is joint purchasing, production and sales. It is an informal organization, requiring registration but without membership fees or other obligations. The initiative has just begun, and its effects are yet to be seen.

[16] Maldives Agribusiness Program, "Community Needs Assessment Report."
[17] According to a related article (https://www.psmnews.mv/en/104688), farmers from the 26 islands covered by the MAP were invited.

2) Agricultural Promotion by Agricultural Public Corporation

The Agricultural Corporation (Agro National Corporation, AgroNat), established in 2020, provides assistance to farmers to build supply chains. A major initiative is the support for the purchase of agricultural products through the contract farming. AgroNat conducted a market survey and considered the contents and conditions of the contract before introducing this system. Since the start of the program in 2020, approximately 700 farm households have participated in the program nationwide, and more are expected to join in the future. The table below shows the islands with contract farmers at this time. The islands highlighted as below are also the target island of aforementioned MAP.

Table 2-9 Locations of AgroNat Contact Farmers

atoll	island	atoll	island
Haa Alif	Kelaa.	Thaa.	Buruni
	Baarah	Laamu	Gan
Haa Dhaalu	Nolhivaran		Isdhoo.
	Nolhivaranfaru		Fonadhoo
	Vaikaradhoo		Maabaidhoo
Shaviyani	Goidhoo	Gaafu Alif	Gemanafushi
Noonu	Manadhoo		Nilandhoo
Baa.	Goidhoo	Gaafu Dhaal	Fiyoaree
Lhaviyani	Olhuvelifushi		Hoadedhdhoo

Source: AgroNat

In addition to supporting farmers, another main objective of the program is import substitution, and the target of this system is limited to the 17 crops, mentioned earlier, for the purpose of import substitution. According to AgroNat, achievements have already been confirmed since the system started in 2020, and for example, 20% import substitution has been achieved for papaya. On the other hand, AgroNat recognizes that it contributes to farmers' income stability as a result of supporting farmers.

On the other hand, the manpower of AgroNat is outstripped by the sheer number of contracted farmers, who are widely scattered across the country, making it difficult to manage them properly and to provide services promptly. Under these circumstances, AgroNat is working to introduce Community Farming in addition to the contract farmer system. This is an initiative in which AgroNat obtains land within inhabited islands or the whole part of uninhabited islands from island councils or MoFMRA through lease agreement, and after building the necessary infrastructure, invites farmers experience modern farming techniques such as hydroponics, designating the crops to be produced there and providing

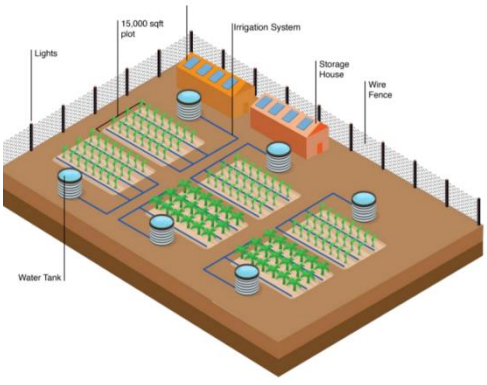


Figure 2-14 Concept of Community Farming

all necessary production materials to the farmers by AgroNat.

Compared to the contract farmer system, which requires management of small farmers scattered across the country, even with their focal points stationed on site, Community Farming has the advantage of being able to manage and support multiple farmers at a single location. In addition, the provision of the basic infrastructure necessary for cultivation lowers the hurdles for farmers to start farming, which is an effective mechanism for all parties[18]

3) Agricultural promotion through uninhabited island leases

In the Maldives, where land for agriculture on inhabited islands is limited, the utilization of land on uninhabited islands is one of the strategic measures for agricultural development. A total of 52 uninhabited islands have been leased for agricultural use in the 30 years since the first uninhabited island lease was made in 1994. The number of leased agricultural islands per atoll is shown in the table below, with Noonu Atoll having the largest number.[19]

Table 2-10 Number of leased agricultural islands in each atoll

	atoll	No. of islands		atoll	No. of islands
1	Haa Alif	3	10	Alifu Dhaalu	1
2	Haa Dhaalu	2	11	Vaavu	1
3	Shaviyani	7	12	Meemu	3
4	Noonu	9	13	Faafu	0
5	Raa.	5	14	Dhaalu	2
6	Baa.	5	15	Thaa.	1
7	Lhaviyani	4	16	Laamu	6
8	Kaafu	1	17	Gaafu Alifu	2
9	Alifu Alifu	0	18	Gaafu Dhaalu	0

According to the MoFMRA survey, the owners are either companies or individuals, with 69% of all owners being companies and the remaining 31% being individuals. The majority is women. The aforementioned agricultural islands where AgroNat is developing Community Farming are also included[20].

Leasing new agricultural island will be determined through a bidding process. First of all, a list of candidate uninhabited islands is announced by MoFMRA on an irregular basis[21]. Applicants submit the required documents to MoFMRA, and the documents will be reviewed as the first screening. Proposals that pass the first round will then undergo a second round of review by an evaluation committee comprised of experts from the Ministry of Finance and lawyers, where a final decision will be made. According to MoFMRA staff, most proposals that are rejected are those that do not have all the required documents or are incomplete in the first round. Proposals

[18] As of May 2023, they are located on 18 islands across the country. Apart from that, the company worked with island councils on 56 islands to solicit farmers.
[19] See Attachment 2 for a detailed list.
[20] L. Gaadhoo and HA. Mulidhoo
[21] New islands to be put out to bid will be selected based on criteria such as (1) area (there are no clear rules, but 10-25 ha is normal), (2) access to the airport, and (3) no problems from an environmental protection perspective.

that pass the first round are highly likely to pass the second round and reaching a final agreement. In fact, many were rejected, and most recently in October 2020 a total of six uninhabited islands were put out to bid, but only two of them were ultimately awarded leases.[22]

Agricultural leases on uninhabited islands are governed by the Uninhabited Islands Act, and the period of lease is typically for 21 years, with a lease rate of MVR 0.1 /sqft[23]. Lease terms may be extended for up to 35 years if the initial investment exceeds USD10 million. Since the islands are uninhabited, they are leased without any of the basic infrastructure, the owners are responsible for all transportation infrastructure, water, energy, etc. In particular, with regard to water, the use of groundwater is prohibited on uninhabited islands from the standpoint of environmental conservation, and owners must install their own RO facilities and other equipment. In terms of transportation infrastructure, since the island is uninhabited, there are no private cargo or passenger transportation services available, and the construction of jetty and arrangements for transport vessels will have to be made on their own.

It is pre-agreed in the contract with MoFMRA that the leased agricultural island will use 30% of its area for crop production. This condition was introduced as a countermeasure to the food shortages exacerbated by the Covid-19 pandemic. Each island will set a production target at the beginning of the lease. As for the actual production, the farmer is obligated to report the crop and production to the MoFMRA every three months once production has started. While 30% of the land of islands are obligated to be used for agricultural production, vegetation located 20 meters inland from the beach must be retained to prevent erosion of the beach, and no cutting is allowed. Besides, for Inland area, wetlands, marshes, and mangroves must be maintained in their present condition.

Although more than 50 uninhabited islands have been leased for agricultural use to date through a bidding process and lease agreements, not many islands actually have sustainable crop production. According to MoFMRA representatives, only about half of all owners report their production every three months.

2.2.3 Decentralization

In recent years, the Maldives has seen further decentralization, which has deeply affected agricultural development. The Decentralization Act, which came into effect in 2010, has undergone a total of eight amendments, and has been gradually transferring legal and financial autonomy to atoll and island councils. In accordance with the Decentralization Act, island councils are required to develop a Land Use Plan (LUP) and obtain approval from the central government (Ministry of National Planning, Housing & Infrastructure, "Ministry of National

[22] MoFMRA, No:(IUL)30-E/30/2020/101, Announcement: Invitation to bid for a long-term lease of uninhabited islands for agricultural investments, by 'Malé', Maldives. https://www.gov.mv/dv/files/islands-for-long-term-lease-mofmra.pdf

[23] This is the rate under the current system; uninhabited islands contracted prior to this date were subject to a different, higher rate.

Planning").

According to interviews with the Ministry of National Planning, as of April 2023, a total of 70 islands have already completed LUP approval, and 20 others are currently in the formulation process. Some small islands with tight budgets have not been able to get involved in LUP formulation in the first place. As a difference from the situation prior to 2019, islands councils are mandated to reflect opinions of the islanders into the LUP. However, in order to simplify the process, there is no need to ask third-party experts to conduct on-site surveys, and island council staff can conduct their own surveys and formulate their own plans. The review is conducted by the Ministry of National Planning, and the main criteria are listed in the table below. The reasons why submitted LUP drafts are sent back to councils during the approval process are often contrary to environmental protection, such as the location of waste disposal facilities (not in close proximity to residential areas) and the retention of vegetation.[24]

Table 2-11 Main criteria in reviewing the LUP

✓ Distance between waste disposal and surrounding facilities (e.g., not in close proximity to schools)
✓ Environmental protection within 20m from overseas
✓ Distance between the park and the mosque (reason: to ensure that there are no noise-generating areas around the mosque)
✓ Distance between power plant and surrounding area
*The location of the farmland is not questioned.

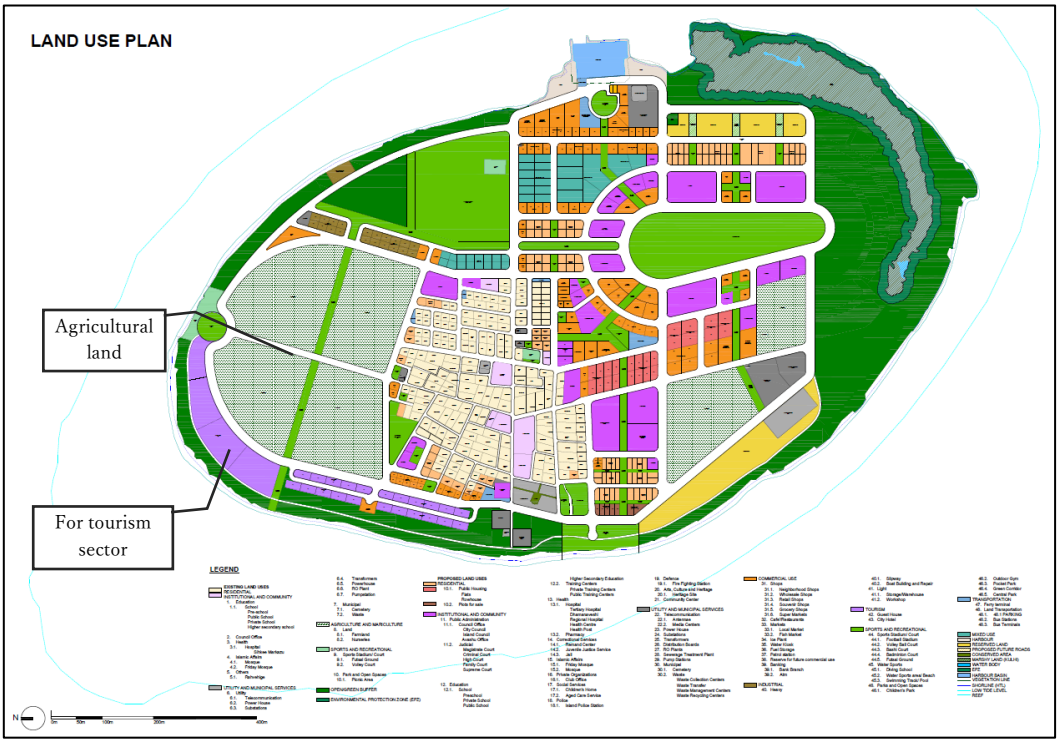
Development of the island is implemented in accordance with the approved LUP. Leasing of land to investors and private businesses does not require approval from the central government, such as the Ministry of Planning, but can be decided by the island council, which is also authorized to act in contract with investors and private businesses[25]. Councils can also set the unit prices for land leases[26], which vary from island to island. Financially, in addition to grants from the central government, which are determined according to the number of islanders, island councils need to secure other sources of revenue by their own. That is why it is important for island council how to utilize land as a source of its own revenue, and land lease fees collected from private businesses and island residents are an important source of funding.

While each island has different sizes of area, population density, major industries, and council policies, the size of agricultural land listed in the LUP varies, and some islands have no agricultural land set aside at all. In addition, demand for residential areas is expected to further expand as the population grows, and the amount of arable land will tend to decrease more and

[24] Details are provided in the guidelines for LUPs (Land Use Plan Guidelines 2005).
[25] Even before the LUP approval became mandatory in 2019, there were island councils that had developed LUPs, but they were required to obtain approval from the Ministry each time they ceded island land for a specific use, not just agriculture.
[26] Until 2021, the Ministry of State Planning determined the unit price of the land lease. There was a fixed fee table, and the system was based on the size and population of the island to determine the appropriate category.

more in the future.

As a sample of LUPs, the one of HDh. Finey is shown below. It is color-coded by usage and divided into residential areas, public areas, and vegetated areas. The agricultural land is represented by light green stripes, with a total of approximately 400 meter square parcels on the north side (left side of the map) and two more parcels on the south side. In addition, many inhabited islands, not only this island, are planning to attract and develop tourism industry on the island, and in the above figure, the purple area in the northwest corner (lower right of the map) is being considered for a hotel or guest house in the future.



Source: Hdh.Finey Island Council

Figure 2-15 Resident Island Land Development Plan

Although decentralization is being promoted on the institutional level, the enforcement capacity in practice has not kept pace, and many councils are unable to develop income-generating activities, provide public services, revitalize communities, or contribute to solving environmental and social issues, due to a lack of human and financial resources. In addition, municipalities are faced with the challenge of improving their capacity in terms of development planning, project implementation, and financial management (budget planning, operations, and acquisition of revenue loss).

New policies and measures related to decentralization allow for the establishment of Local Authority Companies (LAC). The LAC, which is allowed to be formed due to an amendment to the Decentralization Law, is intended to supplement the public sector in each inhabited island where the private sector is not able to provide services. The following 15 areas are not limited to

those listed above, but there are cases where the atolls and islands councils may approve projects that are not listed but are deemed necessary by the council.[27][28]

① Convention Center
② Education Service Provision
③ Clinic
④ Hospital
⑤ Renewable Energy
⑥ Waste Management
⑦ Agriculture
⑧ Fish processing, establishing ice plants
⑨ Operating Boat Yards
⑩ Guest House of Tourist Hotel
⑪ Airport operation/ Management
⑫ Social Housing
⑬ Cable TV Service
⑭ Pharmacies
⑮ Shops (sale of basic/essential items)

In addition, for target sectors from No. 1 to No. 9 even if private sector players exist, LAC is allowed to participate if it is determined that the demand in the region is not being completely met. The inclusion of agriculture as a target sector allows the atoll and island council itself to establish business entities to participate in the sector and play some role in the supply chain.

[Case Study] AA. LAC on Thoddoo Island

LAC was officially registered on Thoddoo Island in December 2022, ahead of the rest of the country. The organization is supposed to be managed by three Managing Directors (one from Council members and two from residents). Specifically, the following duties are listed in the Articles of Incorporation

1.Museum Management Service
2. Waste Management Service
3. Port Service Management
4. Marketing and Public Relations of "AA
5. Road Maintenance
6. Maintenance of Public Parks
7. Development and Management of Designated Tourist Beach areas
8. Establishing and Managing resources to enable sustainable farming

[27] The first LAC in the country was established on Thoddoo Island in December 2022. https://www.trade.gov.mv/aa-thoddoo-registered-as-the-first-island-with-a-local-authority-company-in-the-maldives

[28] https://business.egov.mv/Home/LocalAuthorityCompanyFaq (see April 2023): ① Convention Center (shall consist of tourist hotel/guest house, meeting rooms, food establishments, shops), ② Education Service Provision, ③ Clinic, ④Hospital, ⑤ Renewable Energy, ⑥ Waste Management, ⑦Agriculture, ⑧ Fish Processing, establishing ice plants, ⑨Operating Boat Yards, ⑩Guest House or Tourist Hotel, ⑪Airport operation/ Management, ⑫Social Housing, ⑬Cable TV Service, ⑬Customer Service TV Service, ⑭Pharmacies, ⑮Shops (sale of basic/essential items)

9. Development and Management of Convention Centre
10. Dedicated Fiber Link (Private fiber end to end connection)
11. Development and Management of Nursery:
12. Development and Management of Day-care Centre
13. Management and Operation of AA. Thoddoo Pre-School

The management has made it clear that it intends to secure revenues through tourism sector services and to focus on low-profit areas for resident services. Specifically, the project will generate income through 1) tenant fees from the tourism sector (to be leased to Authentic Maldives stores, etc.) and beach use fees. 2) Contribute to residents through projects related to the agricultural sector. Specifically, the project will be responsible for "2. attempting to recycle food waste and convert sewage sludge into fertilizer through the waste management business," "8. branding and sustainable development of the island's agriculture through resource management and building sustainable agriculture," and "11. contributing to the tourism sector and supporting agricultural production through seedling development and management. The company will be responsible for "8. The issues for those agriculture sector-related projects are as follows.

(1)	Lack of seedling production	Production functions for seedling demand from public and private sources. Public demand is for green plants and ornamental plants, while private demand is for vegetable and fruit tree seedlings. It is unclear how to secure the necessary human resources for these implementations.
(2)	Lack of organic matter circulation	Collection and recycling of food waste from households and guesthouses, promotion of agricultural use, and coordination with WACOM and STELCO are needed. LAC does not have the appropriate technology and there is a need for the Island Council to enhance LAC's functions through the involvement of private companies with technology.
(3)	Lack of agricultural human resources	LAC plans to hire an agricultural production engineer to support branding and sales channel formation for island agricultural products, but no timeline has been set. A framework is needed to support the placement of agricultural technology extension officers by the private sector on the island.

2.2.4 Environmental Regulations

In developing agriculture in the Maldives, where resources are extremely limited, recycling and sustainable agricultural activities are essential, and environmental protection policies and regulations play an important role in this regard. The Ministry of the Environment perceives that agriculture is one of economic activities, and environmental considerations are often overlooked. It is also concerned that farmers tend to continue traditional farming methods and have little motivation to learn new methods. Under such circumstances, it is necessary to create awareness among residents of the importance of environmentally friendly agriculture. Environmental laws and regulations relevant to the agricultural sector are as follows.

- ✓ Environment Protection and Preservation Act 1993
- ✓ Plant Protection Act 2011
- ✓ EIA regulation 2012
- ✓ Agriculture Pesticide Control Act 2021

The following describes the actual operation of these laws and regulations with respect to crop

production practices and agricultural materials used, such as chemical fertilizers.

Regulation of crop production

An Environmental Assessment (EIA) will be conducted for new projects involving agricultural production. After the EIA Regulation was first published in 2007, a new law came into effect in 2012, and through five amendments since then, is undergoing another amendment at the moment. With regard to agricultural projects, an EIA is required for projects that take place on land of 1 ha or more. For projects of less than 1 ha, a simplified procedure, namely EIA screening, is applied, where the applicant fills in an online form with information about the project (location, size, production, personnel, land preparation, facilities to be installed, etc.) and submits it to the EPA. If all the necessary information is provided, the applicant will receive a permit without any problems. The procedures and processes for EIA are as follows.

①	Hire one from EPA-registered consultants (available on their website).
②	Apply to the EPA to conduct an EIA.
③	Scoping meeting: EPA discusses the EIA of the applied project, including its methods and opportunities to be used. Typically, the applicant makes a presentation.
④	Finalizing TOR: The TOR is drafted by the consultant and submitted withNo.2 above, and finalized by EPA.
⑤	Conduct EIA: Consultant conducts EIA. As for the duration of the study, EPA recommends no less than six months and no more than one year, and however there will be no issue if it is completed in a few days.
⑥	EIA Check: Outsourced to an external party (called EIA reviewer, different from EIA consultant). The fee varies depending on the length of time required, with a basic fee of MVR 5,000 for 15 days, and options of MVR 10,000 for 10 days (intermediate) and MVR 20,000 for 5 days (express) if an urgent response is needed. The fee is paid by the applicant to the Reviewer through the EPA.
⑦	Evaluation sheets: Reviewer submits evaluation sheets to EPA.
⑧	With reference to this, EPA will verify the content based on the above TOR. Request any missing information from the applicant.
⑨	As a permit, an Environmental Decision Statement is issued, which contains the conditions to be fulfilled. For example, start a project within a year and inform the EPA of it.

Once the EIA is approved, the project will then be monitored by the EPA according to the monitoring plan submitted and approved at the time of the EIA. First, groundwater quality (ph, temperature, etc.) will be measured every 3 months during the initial project phase (construction phase). If the work involves not only inland construction work but also coastal work, such as the construction of jetty, numerical measurements are also taken for seawater. The same measurements will then be taken one year after entering the operation phase. Apart from that, the EPA may conduct on-site inspections. Due to EPA staffing shortages, not all approved projects were covered, and only one agriculture-related project (an island) was inspected in 2022. The target islands for entry inspections are selected at random. Atolls are identified first, and then

target islands are selected based on the efficiency of inspectors' traveling. Since the selection is not based on sector, the extent to which agricultural projects will be covered has not been determined.

In the case of agriculture, the above EIA Screening should in principle apply to agricultural activities on inhabited islands, but according to EPA officials, no cases have been filed in the past. When individuals conduct agricultural activities on inhabited islands, as long as land is provided by councils, there are no other procedures required at the central level, and in reality, there is no mechanism for imposing an EIA. Procedures related to infrastructure such as electricity need to contact the central ministry (URA under the Ministry of Environment), and if the EPA is informed as a result of information sharing among the relevant agencies, the EIA can be applied. However, even if a case is detected to apply EIA, subsequent monitoring would be extremely difficult due to the small scale and wide-spreading locations of agricultural activities conducted on local inhabited islands.

Regulations on agricultural materials

Various chemical fertilizers are used in large quantities to increase productivity. The situation is serious on some specific agricultural islands and has led to a reluctance to buy by resorts and other consumers who are concerned about their safety. In 2022, the Ministry of Environment used the support from Global Environment Facility (GEF)[29] to hire an external consultant to conduct a Baseline Chemical Assessment. Its report includes data pertaining to the amount and type of chemical fertilizers used by farmers. On the other hand, impacts on soil, groundwater, and marine biodiversity have not been measured or evaluated.

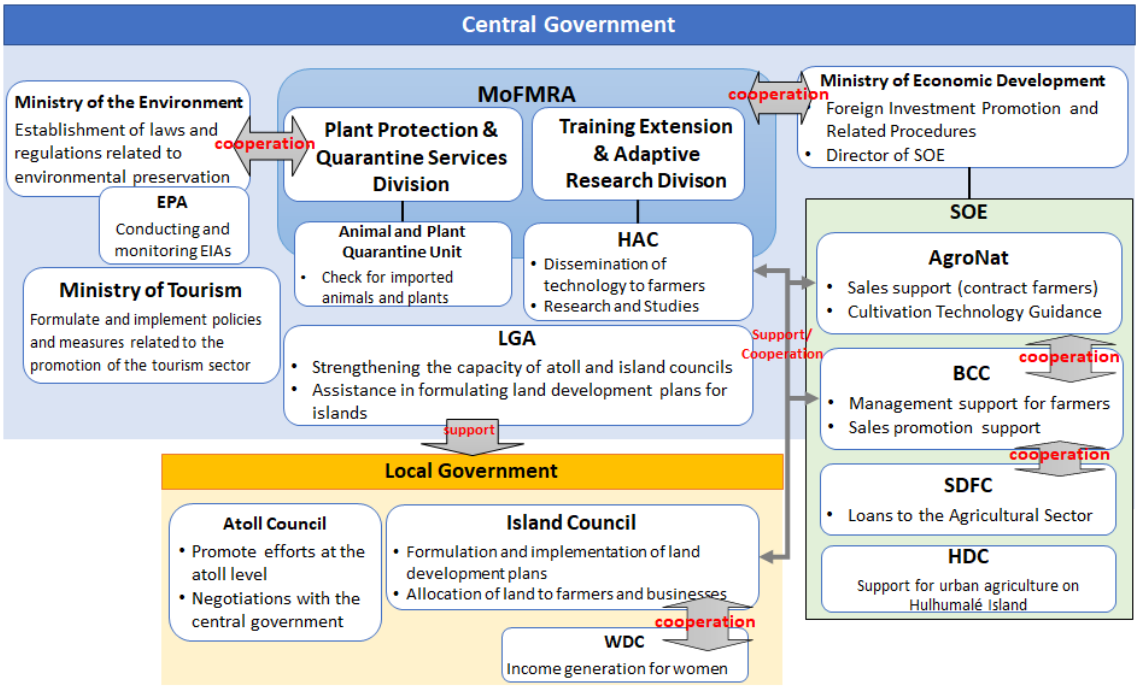
The Agricultural Pesticide Control Act is the relevant legislation in this regard. Customs has a relevant agency check the imported goods based on SOPs according to the classification of the imported goods. Pesticide Control Services is an organization that should be in charge of regulating pesticides, and however it is not in reality, and anyone can freely import pesticides from abroad.

2.3 Organizations related to the Agricultural Sector

This section organizes information on governmental organizations related to the agricultural sector. First, there is the Agricultural Department of the MoFMRA, which deals with agricultural policy, and several sections are located under it. The Animal and Plant Quarantine Unit, under the jurisdiction of the section in charge of vegetation protection and quarantine functions, conducts quarantine checks on imported plants. The Hanimadhoo Agriculture Center (HAC), under the jurisdiction of the section in charge of agricultural extension, is also responsible for providing technical guidance to producers nationwide. On the other hand, AgroNat, SME

[29] Global Environment Facility (GEF). A trust fund established at the World Bank that, in principle, provides grant assistance for additional costs incurred in implementing projects that address global environmental issues.

Development Finance Corporation (SDFC), and Business Center Corporation (BCC), which are state-owned enterprises under the Ministry of Economic Development (MEDC), are each performing important tasks such as building supply chains, providing financial support to producers, and providing management support to farmers respectively. They are performing their individual tasks and collaborating with each other as needed. At the local level, island councils under the jurisdiction of the Local Government Authority (LGA) are working to promote agriculture, and the Women's Development Committee (WDC) established on each island is also working with the island councils from the perspective of income generation for women. To attract foreign investment in the agricultural sector, the Ministry of Economic Development develops promotion activities to other countries and work with MoFMRA when the agricultural sector is an agenda. Furthermore, the Ministry of Environment develops laws and regulations related to environmental conservation, and exchanges views with the MoFMRA on topics where there is concern about the impact of agricultural activities.



Source: Prepared by the survey team

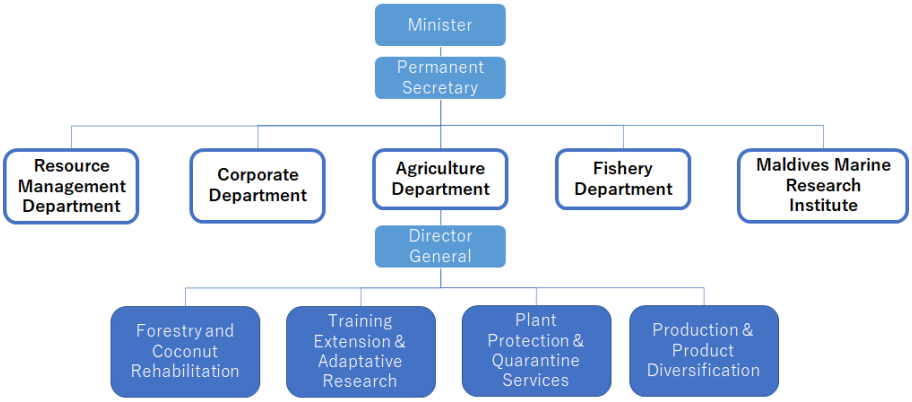
Figure 2-16 Organizations related to the Agriculture Sector

The following is a summary of each institution related to the agriculture sector. Activities for agricultural development, such as support services for farmers, implemented by each agency will be described in detail in Chapter 3.

1） Fisheries, Marine Resources and MoFMRA (MoFMRA)

Policy making in the agricultural sector is handled by the MoFMRA's Agricultural Department. As shown in the figure below, there are four sections in the Department, each in charge of a

different field, with a total of 14 employees, including the Director General.[30]

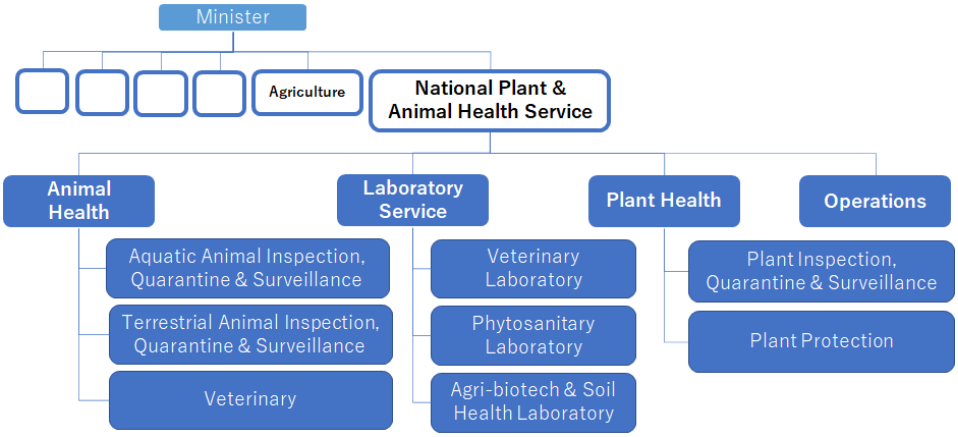


Source: MoFMRA

Figure 2-17 MoFMRA Organization Chart

In addition, Training Extension & Adaptive Research is in charge of the Hanimadhoo Agriculture Center, and Plant Protection & Quarantine Services is in charge of the Animal and Plant Quarantine Unit.

The MoFMRA is currently undergoing reorganization, and according to the revised organizational chart, the main change is that the Animal and Plant Protection and Quarantine Service, which is currently under the Department of Agriculture, will be separated from the Department and upgraded to a department, namely the National Plant & Animal Health Service. The figure below shows the structure under the department.



Source: MoFMRA

Figure 2-18 Organization Chart after MoFMRA Reorganization

2） Hanimadhoo Agriculture Center (HAC)

It is the only research center in Maldives in the field of agriculture, and was established in 1997 in Hanimaadhoo in the northern Haa Dhaalu Atoll, as part of the MoFMRA Agricultural

[30] It does not include the staff of the Hanimadhoo Agriculture Center and Quarantine Unit, described below.

Department. There used to be a similar institution in Laamu Atoll, which was heavily damaged by the 2004 tsunami.[31]

The center is staffed by a representative and six technical staff members. One of them lives on the island, but the other five are from the surrounding islands and live and work in the facility. Several other part-time workers are employed. A JICA volunteer was previously stationed in the agency in the poultry farming field in 2015, and the center's staff found the technical guidance at that time beneficial and had requested the deployment of a new volunteer to JICA. As a result, a JICA volunteer is supposed to be dispatched in 2023.

On the other hand, there are some financial issues, and it is difficult to purchase necessary equipment, and activities that are supposed to be carried out are not being carried out. Since it is positioned as a part of the MoFMRA, it is entirely funded by the MoFMRA budget and managed and executed within that framework. Each year, the center applies to the headquarters for the necessary budget, but only about one-third of the budget is actually allocated.

Activities include providing short-term training for farmers, testing crop varieties and production and distribution of seedlings, but only on a small scale.

3) Ministry of Economic and Development

The Ministry of Economic Development, which is responsible for foreign investment registration procedures, also has jurisdiction over foreign investment in the agricultural sector. The Trade & Investment department is in charge of foreign investment approvals, as shown on the right. The Ministry is also responsible for investment promotion, and under the jurisdiction of this department, an investment promotion agency, Invest Maldives, has been established, with a staff of about 10 people working in the Ministry office. The agency is promoting foreign investment in promising industries, including the agricultural sector, to other countries, including Japan, in cooperation with its diplomatic missions abroad.

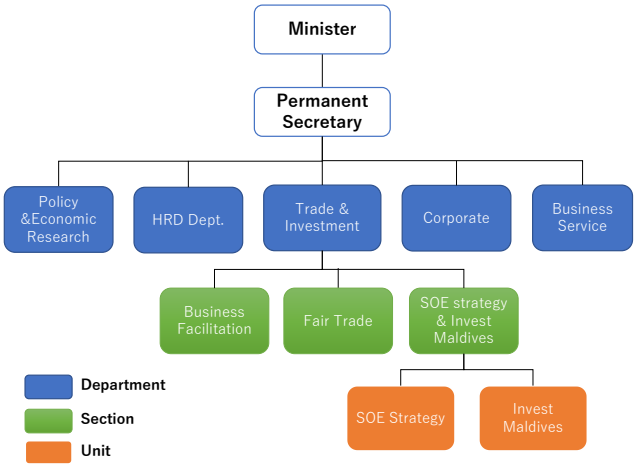


Figure 2-19 Organogram of MED

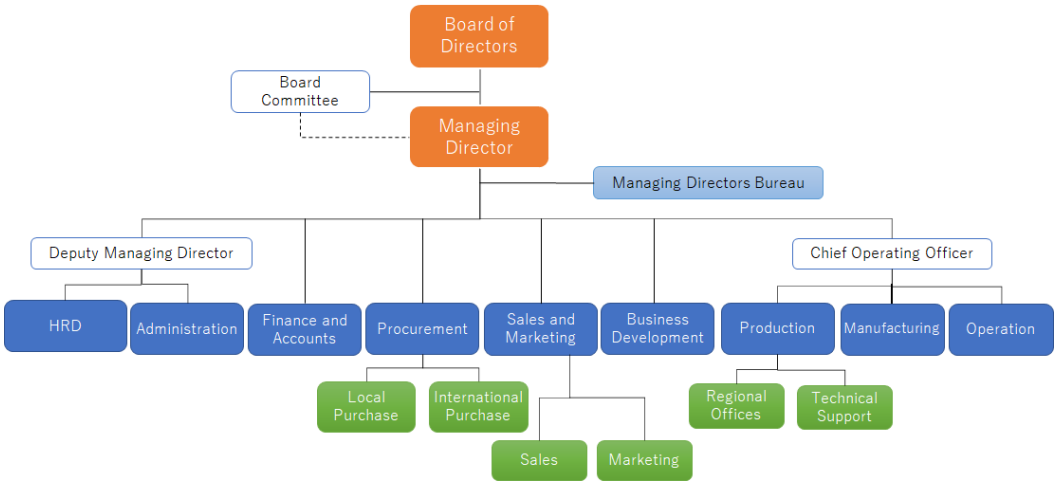
The Ministry also supervises state-owned enterprises, which is handled by the SOE Strategy Unit shown in the organogram. The following is a list of relevant state-owned enterprises under the Ministry that are involved in agricultural development.

[31] Jurisdiction of the Training Extension & Adaptive Research Section

4） Agro National Corporation (AgroNat)

An agricultural corporation established on April 21, 2020 under the Maldives Fund Management Corporation (MFMC), it provides support services to farmers. It has reporting obligations to the Ministry of Finance and the agency, and however conducts its day-to-day activities independently.[32]

The organizational structure is shown in the figure below, with 37 personnel in the Malé office and approximately 40 staff on the local islands. Personnel assigned to local islands will be hired among the islanders. The company's operating budget is 100% government funded, with some contributions from outside sources.



Source: AgroNat

Figure 2-20 AgroNat Organization Chart

5） SME Development Finance Corporation (SDFC)

A non-bank financial institution established in 2019 under the Ministry of Economic Development to provide financial support to SMEs, with 100% government funded. In addition to the agricultural sector, the company is developing various loan products to provide financial support to SMEs, with tourism, fisheries, ICT, and manufacturing as priority sectors. Details are discussed in Chapter 3.

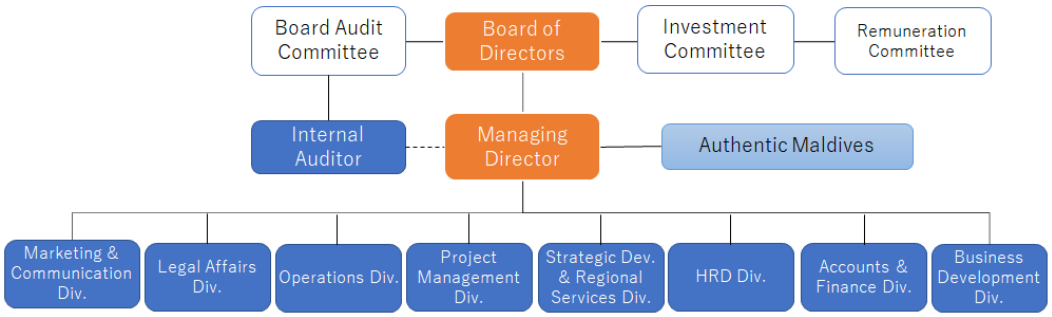
6） Business Center Corporation (BCC)

It is a state-owned company, established in 2017 by presidential decree, under the Ministry of Economic Development, and is positioned as an implementing agency for projects related to the promotion of micro, small, and medium enterprises. In addition to its headquarters in Malé, the company has 13 regional centers nationwide with one or two staff, providing a variety of support

[32] A state-owned company established in accordance with a presidential decree, it was launched as an investment promotion agency focusing on three sectors: tourism, infrastructure, and renewable energy, and then began covering other sectors such as agriculture as investment in tourism stalled due to the Corona disaster. Specific work includes assisting foreign companies with due diligence. https://www.mfmc.mv/

services to SMEs located in rural areas, regardless of sector. In 2021, the company became a member of the International Council for Small Business (ICSB), the leading international organization for small business research, and international partnership building is underway.

To meet the needs of SMEs in various sectors, including agriculture, it is building and strengthening the support system with assistance from the Japanese government and international organizations. The company's organizational chart is shown below.



Source: BCC

Figure 2-21 BCC Organization Chart and Regional Offices

7） Housing Development Corporation (HDC)

A 100% state-owned company established in 2001 under a presidential decree, it is primarily responsible for development planning and construction projects on Hulhumalé Island. The development of Hulhumalé Island is divided into two phases, together covering approximately 400 hectares. Currently, a master plan is being developed for the second phase, which includes vegetation and botanical gardens in the central park.

Activities for the agricultural sector include the promotion of an urban agriculture project on Hulhumalé Island in one component of the SME-supported project SEEDS, which is described later. The company's role is primarily to provide land only, and does not provide technical assistance or other support for the agricultural activities of individual participants. As the developer of Hulhumalé Island, the company is interested in how to monetize the limited land on the island, and therefore needs to reconsider whether or not to continue the project once SEEDS ends and financial support is no longer available.

8） Local Government Authority (LGA)

Although the LGA is not directly involved in agricultural development, it can be said to play an indirect role in supporting the agriculture sector implemented at the island level, as its main role is to build the capacity of island councils. The LGA is an organization established under the Decentralization Act, with an office in the city of Malé and 53 staff members as of February 2023. It is connected to councils across the country and meets regularly, and their capacity building programs have been conducted online since the Covid-19 crisis.

Its main tasks include development planning and monitoring of councils nationwide, and capacity building of council staff. The LGA may provide technical assistance, as needed, to private operators considering investing or doing business on inhabited islands, including consultation with island councils and contracting procedures. In addition to technical assistance, the LGA also provides financial support. For example, to assist island councils in formulating LUPs, the LGA has provided financial support to some island councils by securing special budgets from the central government, as it is often difficult for the councils to cover the cost of hiring external consultants from their own budgets. LGA has provided financial support to some island councils by securing a special budget from the central government.[33]

Currently, with the support of UNDP, LGA is strengthening its local administrative capacity, and however it still lacks knowledge in various areas of administrative capacity and needs further external assistance in areas such as sustainable local economy, environmental management (e.g. waste and renewable energy management), and social development (e.g. education, health care, etc.).

9） Ministry of the Environment

As previously mentioned, the Ministry of the Environment also has a close relationship with the agricultural sector, since agricultural development and environmental conservation should coexist. In fact, the Ministry of Environment has had opportunities to collaborate with the MoFMRA and exchange views on policy matters. The management of resort islands that do not have a council or other organizations to manage the island had been a topic to be discussed.

The EPA, which oversees EIA, is a regulatory agency under the Ministry of Environment, and was established in 2008 by presidential decree, merging the Environmental Research Center and the Maldives Water and Sanitation Authority.

It is responsible for the protection, conservation, and management of the environment and biodiversity, as well as regulatory activities for waste management and pollution prevention under the Environment Protection and Preservation Act. As for the organizational structure, there are about 35 employees in total in the following three sections

- EIA Department
- Research & Conservation Department
- Waste Management Department

Since the EIA Department has only four technical staff members, it is not able to handle all of the registered projects because the department is responsible for not only EIA approval but also subsequent monitoring work.

[33] A total of 42 islands have received assistance, most of which have already received LUP approval. The LGA initially approached the government to cover all the islands, but was unable to do so due to limited government budgets. Forty-two islands were targeted as small islands with relatively tight budgets.

2.4 Support by other aid agencies for agricultural development

In the Maldivian agricultural sector, international organizations have provided various assistance to date. Assistance organizations and support details are shown in the table below.

Table 2-12 Assistance provided by donor agencies

Organization	Support Scheme	Projects Supported and Implemented	Area of support
IFAD	financial support	Maldives Agribusiness Programme (MAP)	• Formation of agricultural associations • Technical guidance and sales promotion
UNDP	technical support	SEEDS Phase-1 and Phase-2 (PDSAE)	• Introduction of contract farming • SME, Entrepreneurial Support
FAO	Financial and technical assistance	FAO's Country Programming Framework	• Strengthen capacity for animal and plant quarantine • Development of digital tools for agricultural extension • Strengthen capacity for pesticide residue testing • Formation of agricultural associations
WB	Financial and technical assistance	TransFORM Project	• Strengthen capacity for animal and plant • Promotion of private investment

Source: Prepared by the survey team

1） IFAD

IFAD does not have an office in the Maldives, but supervises remotely from its office in Sri Lanka, where it provides various financial support through the Maldives Agribusiness Program (see 2.2.2 Agricultural Development Measures) mentioned earlier. In addition to that, IFAD has expressed interest in supporting the development of a mobile version of the digital tool mentioned above, which FAO supported in its development.

2） United Nations Development Program (UNDP)

UNDP has an office in Malé and is implementing the following agricultural development program, SEEDS, together with the Government of the Maldives. Funds are provided by the Japanese government.

(1) SEEDS

Name: Sustainable Economic Empowerment and Development for SMEs
Period: 2020-2021
Partner institutions: MED, MoFMRA, AgroNat, MFMC, BCC, and HDC
Purpose: to support SMEs to address the socioeconomic impact of COVID-19, with a particular

focus on women, young people, and persons with disabilities.

Table 2-13 Support and achievements

	Activity	Implementer	Achievement
Outcome 1	Improving food production capacity through entrepreneurial support	HDC	• Training of 48 agricultural entrepreneurs through urban agriculture (26 plots) on Hulhumalé Island.
Outcome 2	Promoting the improvement of the organizational capacity of AgroNat	AgroNat	• Support provided to 256 contracted farmers • Installation of refrigerated storage facilities at 9 locations nationwide
Outcome 3	Supporting SMEs through technical assistance to BCC	BCC	• Nationwide expansion of BCC support for SMEs

Source: UNDP Maldives[34]

Regarding Outcome 1, Phase 1 has 16 of 600 sqft plots available for rent to groups of producers (a group of three individuals). The total number of applications reached approximately 340, and 16 groups were selected and offered through a lottery. The breakdown includes women's groups, youth groups, and disabled groups. In Phase 2 stated later, 12 more plots of the same size were leased. The condition for being an user is that the applicant must be a resident of Hulhumalé Island and no need to be originally a farmer. At the beginning of the program, with the support of MoFMRA and AgroNat, training on cultivation methods is provided to users.

A fee of MVR 800/month is charged per plot, and the user is responsible for water, energy, and other costs. Bananas and other crops are currently being grown, but HDC officials have not yet heard of any cases that have led to significant profits.

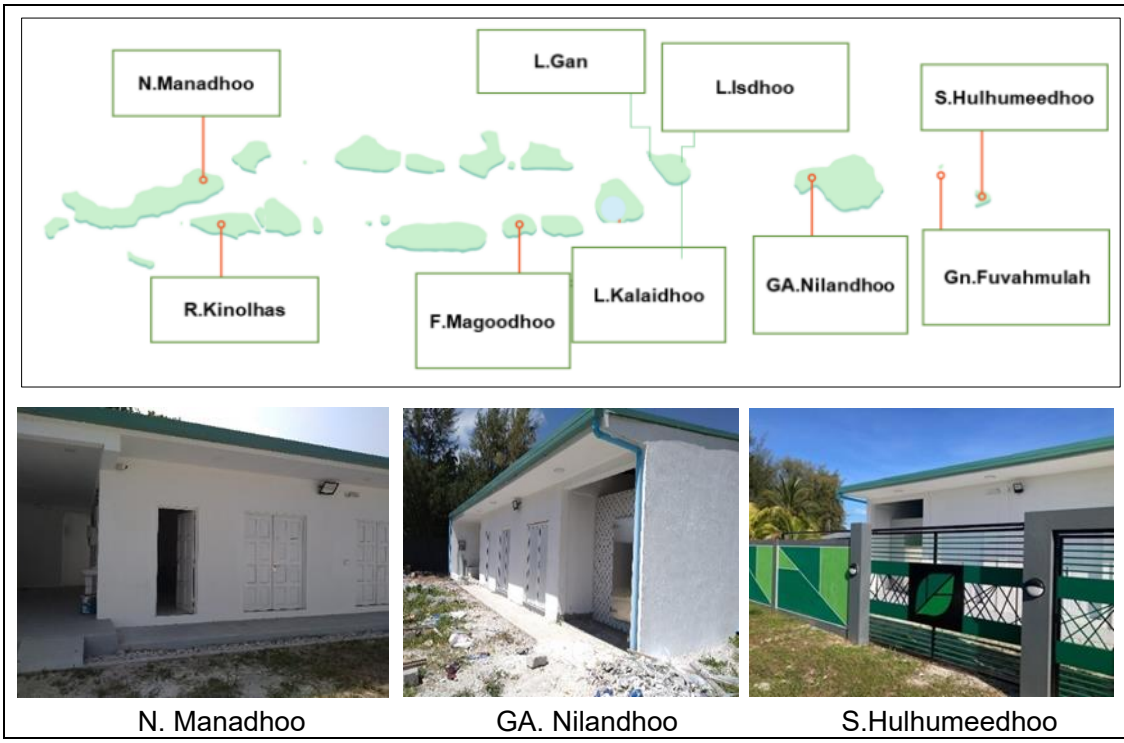
On the other hand, as a HDC’s business, the above usage alone is not sustainable because it is not profitable. Such pricing is possible because operating and other funds are currently being provided as part of the activities of SEEDS. In order to make the most effective use of the limited land on Hulhumalé Island, HDC needs to use it for profitable purposes and has to decide whether it should continue in the future by comparing agricultural uses with other businesses such as real estate development.

Source: Survey team photo

Figure 2-22 Urban Agriculture Project on Hulhumalé Island

[34] https://www.undp.org/maldives/news/seeds-project-and-pdsae---project-steering-committee-meeting-held

With regard to Outcome 2 above, in addition to the aforementioned purchase of produce, a package of basic materials and equipment necessary to start farming was provided to the contract farmers. In addition, AgroNat is supposed to provide capacity building assistance to farmers on how to use the solar-thermal cold storage units that have been installed on nine islands across the country. The location of the installed cold storage facility and the site are shown in the figure below.



Source: map provided by AgroNat; photos taken by research team.

Figure 2-23 AgroNat Cold Storage Facility

(2) PDSAE

Name: Project for Developing Sustainable Agricultural Economy (PDSAE)

Period: 2021-2024 (in progress)

Objective: To improve domestic production capacity by focusing on the agricultural sector in a way that leverages the results of SEEDS Phase 1.

Table 2-14 Activities and implementing agencies in PDSAE

Output	Activities	implementing agency
1: Strengthening assistance to increase local farmer expertise in agriculture	1.1 Promotion of Good Agriculture Practices (GAP) based on contract farming system	MoFMRA
	1.2 Establish a laboratory for soil testing and plant tissue culture at HAC	MoFMRA
	1.3 Strengthening the capacity of agricultural extension workers on the island	MoFMRA
	1.4 Establishment of training facilities and operational support at Laamu Atoll	MoFMRA

	1.5 Support for farmers to apply innovative and environmentally friendly agricultural practices	AgroNat
2: Enhancing agricultural capacities and opportunities to ensure food security	2.1 Scaling up and mainstreaming urban agriculture incubation programs for young generation in the Greater Malé region	HDC
3: Enhancing support industries and value-added services to augment agro-businesses	3.1Development of organic markets to market produce from urban agriculture projects	HDC
	3.2 Develop an incubation plan for the agriculture and food and beverage sectors centered on the "farm to table" concept	BCC
	3.3 Create additional support structures to enhance BCC services to the agricultural/food production sector	BCC
	3.4Establish sustainable and effective crop transport mechanisms using low-carbon technologies	AgroNat

Source: UNDP, PDSAE Project Document

3） Food and Agriculture Organization of the United Nations (FAO)

FAO dispatches a national consultant at MoFMRA while the Sri Lanka office has jurisdiction over the Maldives. FAO's assistance in the Maldives is based on FAO's Country Programming Framework 2022-2026. The Framework identifies the following priority areas: (1) Economic Transformation (increasing productivity and creating decent work), (2) Nutrition Improvement and Food Security (establishing sustainable agriculture), (3) Protection of the Natural Environment (sustainable environmental conservation), and (4) Inclusive Growth. Based on this, three projects are currently underway. The first two are scheduled to be completed at the end of June 2023.

(1) Quarantine Capacity Enhancement Project

- Provide technical cooperation with MoFMRA's Animal and Plant Quarantine Section. For capacity building, FAO consultants provided technical advice and support for the regulations and SOPs drafted by the MoFMRA. It is currently in the process of being finalized within the Ministry.
- Support the installation of equipment at Velana International Airport (Malé). Since the airport expansion work will not be completed by the end of this project, the equipment to be installed is limited to basic equipment.

(2) Project for Strengthening Service Delivery Capacity to Contribute to Increasing Farmers' Income and Productivity

- The program provides support for the development of web applications (providing information on agricultural products, etc.) for agricultural extension and various types of

training. The application has been developed by a Sri Lankan vendor, and the technical information content is being prepared by MoFMRA based on various information sources.[35]

- A study tour to India was conducted to train agricultural extension workers who will utilize the application and be active in their respective regions. Three farmers, one from each of the northern, central, and southern atolls, were sent to receive training on basic agricultural topics (e.g., irrigation) and specific to horticultural crops. Upon their return to Maldives, the three members conducted training sessions for 15 to 20 farmers in their respective regions to share the knowledge they had learned.
- Training was provided to MoFMRA staff and HAC staff in March 2023 with a prototype version of the web application. A demonstration was conducted for 20 farmers in HDh. Hanimaadhoo, who understood the usefulness of the system. One improvement requested was to have a mobile version of the application instead of a web version

(3) Capacity Strengthening Project for the Introduction of the Certification System

- Furthermore, FAO decided on a new project with the Ministry of Health as the implementing agency in relation to (2) Food Security in the above Country Programming Framework. Of the overall project budget of USD350,000, FAO will contribute USD300,000 (with the government of Maldives bearing the remainder), and the project will be implemented over two years. The support includes strengthening the functionality of pesticide residue inspections necessary for inspections with the aim of introducing quality certification GAP, placing equipment and experts at the MFDA under the Ministry of Health, and providing overseas training for MFDA staff. Although not a direct implementing agency, MoFMRA is also involved in the implementation as a related organization.[36]

4） World Bank

Although World Band has been focusing its support on the fisheries sector, it is planning a new assistance project that will also encompass the agricultural sector. A summary is as follows

- Period: June 2023 - December 2030 (7 years)
- Project financing: USD64 million (including USD38.4 million in grants and USD26.4 million in credit)

Table 2-15 World Bank Project Summary

(Mil. USD)

Component	Grant	Loan	Total amount	Activities
Activities related to regional cooperation	12.00	-	12.00	International activities related to the South West Indian Ocean Fisheries Commission (SWIOFC)
Improving administrative	13.44	13.44	26.88	One of the three sub-components is strengthening quarantine and disease

[35] Details of the application are described later.
[36] Good Agricultural Practices "GAP" (Manual) https://www.gov.mv/en/publications/good-agricultural-practices-gap-manual

capacity of the fisheries and agriculture sector:				control, including human resource development (facilities at Malé and Addu airports, USD 3.2 million out of the total value). The other is to strengthen the functions of the MoFMRA and implement training programs for its staff. In particular, the Resource Management Department, which will be established in the new organizational chart, will be assigned the task of putting commercial island monitoring forms online.
Private Partnerships:	12.96	12.96	25.92	The funds will be used to subsidize leased agriculture island projects, including agricultural uses, and will be a necessary financing method for businesses to develop infrastructure and implement agricultural technology.

Source: Prepared by the survey team based on information from MoFMRA.

As noted above, the organizations have developed their own support for different areas related to agricultural development. MoFMRA recognizes that the implementing agencies and donor agencies in the Maldives are separately implementing agricultural development projects in different areas, and that there is not enough mutual coordination, and some activities are duplicated in some areas. The fact that they do not know what kind of support each other is providing is also a problem, and the fact that MoFMRA is not the primary implementing agency for all agricultural promotion-related projects makes donor coordination difficult. As a countermeasure, donors should exchange information with each other, and joint implementation of projects could be considered.

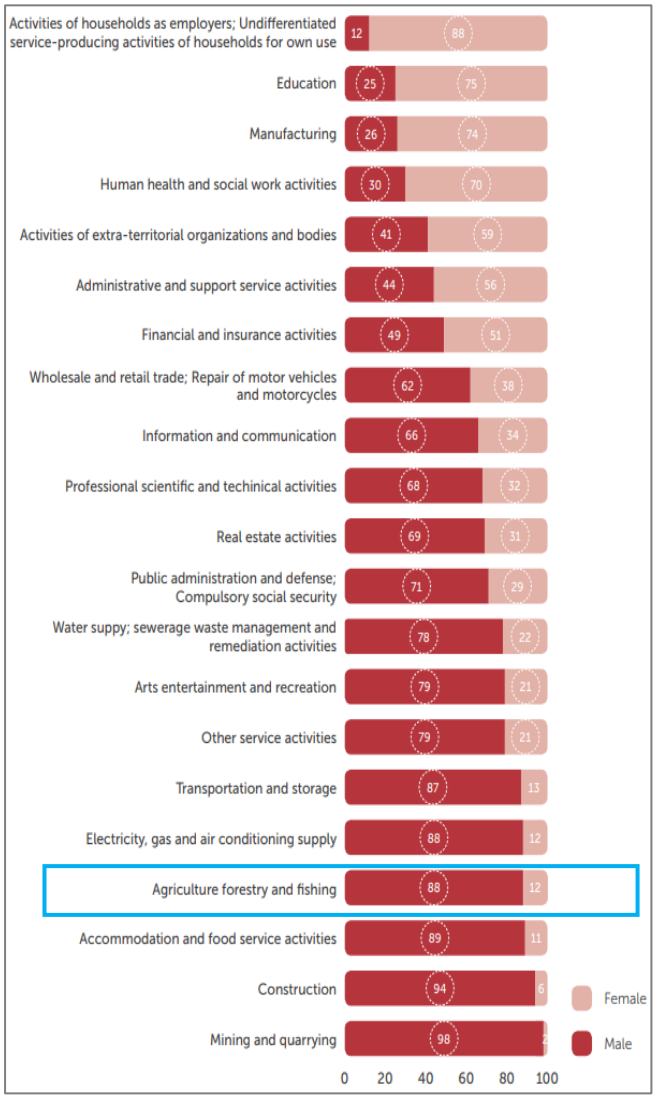
2.5 Women's Employment in the Agricultural Sector

1） Gender Mainstreaming in the Maldives

The Maldives has made significant progress in promoting gender equality in recent years. The 2008 Maldivian Constitution guarantees women and men the same rights and freedoms and removes constitutional barriers to women holding the highest political office in the nation. In addition, the enactment of the Gender Equality Law (Law No. 18/2016), which prohibits direct and indirect gender-based inequality, established the duties and responsibilities of state agencies and other actors to achieve gender equality in the country. The 2019 amendment to the Law on Decentralization (Law No. 7/2010) mandated that at least 33% of the electoral quotas for local councils be reserved for women, thereby promoting women's participation in local politics and governance. That same year, for the first time in history, a female justice was appointed to the Supreme Court.

Thus, while gender equalization has been promoted, issues in women's access to political and economic opportunity barriers till remained today.

For example, the Maldives is struggling to achieve the Sustainable Development Goals (SDGs), including a stagnant score on SDG Goal 5 (gender equality)[37]. Progress reports under the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) also point to the need for gender mainstreaming and increased access to political and economic opportunities for women.



Sector in Maldives (FAO, 2018)

Figure 2-24 Ratio of Male and Female Participation in Economic Activities in the Maldives

2) Women's participation in the agricultural sector and other economic activities

Figure 2-24 shows the ratio of male to female participation in economic activities in the Maldives. Of the total of 21 sectors, the percentage of female workers in agriculture, forestry, and fisheries is only 12%, which is lower than in other sectors.

On the other hand, in many cases, women in this sector help their families with agricultural activities or engage in small-scale activities such as vegetable gardening, food processing, and making and selling souvenir crafts in and around their homes, but these activities are often not included in economic activities as "informal economic activities". Therefore, even if women are actually participating in some agriculture-related activities and contributing to the improvement of their livelihoods, the figures in the statistics do not reflect their participation.

3) Role of Women in Agricultural Activities

Table 2-16 shows the number of workers in the agriculture and fisheries sector by gender, which reveals trends regarding the roles of men and women. Traditionally in the Maldives, men tend to work away from the island and bring home the income, while women are supposed to stay home

[37] Sustainable Development Report 2022

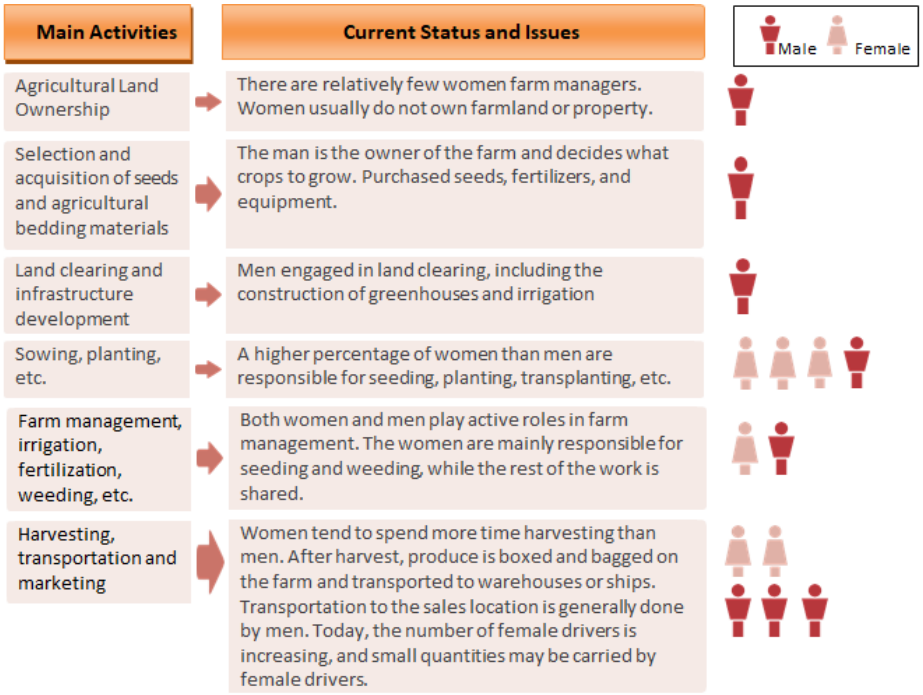
and take care of the family. Therefore, when women participate in economic activities, they tend to prefer activities that can be done at home or on the island, and often choose agriculture-related income-generating activities such as processing forest products such as coconuts and almonds, agricultural products (fruits, vegetables, spices, etc.), preparing sweets and snacks, and making and selling souvenir crafts. The number of respondents who choose to engage in agriculture-related income-generating activities tends to be high.

Table 2-16 Percentage of Women's Participation in Agriculture and Fisheries

Agriculture and Fisheries Activities	Total (persons)	Male (persons)	Women (persons)	Percentage of women (%)
Fishing (industry)	12,016	11,861	155	1.3
Mariculture	356	351	5	1.4
Vegetable cultivation	**895**	**493**	**402**	**44.9**
Fruit growing	**84**	**66**	**18**	**21.4**
Livestock production (poultry, goats, etc.)	74	63	11	14.9
Fish processing	2,759	2,019	740	26.8
Spices, bread, confectionery and other processed foods	**3,861**	**464**	**3,397**	**88.0**
Vegetable and fruit processing	**1,149**	**153**	**996**	**86.7**
Weaving, rope making etc.	**6,638**	**519**	**6,119**	**92.2**
Total	27,832	15,989	11,843	42.6

Source: Country Gender Assessment of Agriculture and the Rural Sector in Maldives (FAO, 2018).

Figure 2-25 summarizes the division of roles between men and women in agriculture on inhabited islands, based on the information collected in the desktop survey and in these field interviews. While traditional and cultural gender roles have been traditionally and culturally divided, with very few cases of women owning farms, etc., the survey also identified a few cases of women taking on roles previously held by men (e.g., driving cars) as the island lifestyle changed with modernization.



Source: see Country Gender Assessment of Agriculture and the Rural Sector in Maldives (FAO, 2018) and results of field interviews (conducted in January 2023).

Figure 2-25 Roles of Men and Women in Agricultural Activities and Current Status

4） Policies Related to Women's Empowerment

There are no formal gender equalization policy documents in the agricultural sector, which seems to be a barrier to promoting gender mainstreaming at the policy level. While the Maldives has made progress and achieved some gender equality in education, this has not translated into decent work opportunities for women. In general, there are fewer employment opportunities for women in inhibited island, and women tend to be at a disadvantage in the labor market.

The cultural and traditional division of gender roles in the Maldives has a negative impact on women's opportunities in education and participation in economic activities. For example, the Maldivian economy remains heavily dependent on tourism, yet less than 6% of employees in tourist resorts are women (FAO, 2018). This is related to cultural and religious restrictions on women's roles and inter-islands mobility, as well as issues such as lack of access to childcare support and other assistance for housework. As a result, they are more likely to participate in informal economic activities at home and on the island, increasing the likelihood that they would perpetuate economic insecurity among women.

In addition, the scarcity of data on women engaged in agriculture makes it difficult to assess the economic contribution of women, especially those who participate in agricultural activities in an informal way.

As noted above, the importance of women's participation in agricultural activities has often been

recognized, but has not been reflected in policy-making process. Under these circumstances, the Maldives has announced its Gender Equality Action Plan (2022-2026) (GEAP) in 2022 and has stated that it would strategically promote the participation of women in economic activities, including agriculture.

(1) Gender Equality Action Plan 2022-2026 (GEAP)

The GEAP was developed to establish a framework for measurable actions to achieve gender equality, with the goal of enabling the Maldives to make the necessary progress toward gender equality and meet its legal obligations and international commitments under the Gender Equality Act.

The GEAP identifies five main pillars, as well as specific outcomes, strategies, and actions for each pillar. Among the five pillars ((1) Leadership and Governance, (2) Economic Empowerment, (3) Gender Mainstreaming in Organizations, (4) Elimination of Gender Violence, and (5) Right of Access to Justice), the strategy related to agricultural activities is included in (2), where actions related to economic activities in the agricultural sector are compiled (table 2-17, see blue box).

Table 2-17 GEAP Strategy: Empowerment of Women in Economic Activities

Action	Timeline					Implementation Agencies		Output Indicators	Baseline 2021 (current situation)	Target at the end of 2025	Means of Verification
	2022	2023	2024	2025	2026	Lead	Supporting				
4.1 Introduce national recognition programs for resorts to improve rates of local hiring with a focus on female employment	●	●	●	●	●	MoT	MoGFSS, MoED, MoHE, resorts, private sectors	National recognition program initiated	N/A	Top 3 resorts recognised annually	MoT report
4.2 Provide proper and safe accommodation options for women in tourist establishments	●	●	●	●	●	MOT	MoGFSS privete sector, resorts	Proprtion of women with safe accommodation in resorts	N/A	100%	MoT quality inspection reports
4.3 Include a special focus on female employment in the tourism sector and other underrepresented areas for both women and	●	●	●	●	●	MoT	MoED, MoGFSS, private sector, tourism establishments	Percentage of females employed in the tourism sector	3% (Resort Employees Survey 2020)	At least 25% of employees working in the tourism sector are female	Census/ MBS
4.4 Pilot and promote opportunities for locals (men and women) to advance in leadership in the tourism sector	●	●	●	●	●	MoT	MoED、MoGFSS、 private sector, MoHE, tourism establishments	Percentage of males and females employed in leadership positions in the tourism sector	N/A	Increase by 5% from baseline for each gender	MoT administrative records
4.5 Continue and expand internship and mentoring programs for higher education students for resort and hotel management training in partnerships with higher education	●	●	●	●	●	MNU and higher education institutions	MoT, MoHE, resorts, private sector, other tourism establishments	Perecntage of students completing internship at a tourism establishment	N/A	100% of all students requiring an internship to be completed as part of studies	Higher education institution records
4.6 Improve mechanisms to increase women's access to commercial loans and to increase the availability of loans, ensuring special provisions for rural women and women from low-income households	●	●	●	●	●	MoED	BML, SDFC BCC, other financial institutions	Proportion of commercial loan schemes with a special provision for women	3 out of total 7 loan schemes	All loan schemes have special provisions	MoED monitoring reports
4.7 Improve women's access to finance for MSMEs (create mechanisms to secure investment funds for women including considering spousal income in loan applications)	●	●	●	●	●	MoED	BML, SDFC BCC, other financial institutions	Proportion of women receiving SME loans	20% approved loans for female-based businesses under SDFC loan products	At least 25% of loans given to women	SDFC records
4.8 Introduce and implement business start-up kits to facilitate women entrepreneurship	●	●	●	●	●		MoED, MoGFSS	Number of women attending orientation sessions on the start-up	Business start-up kit manuals being developed	At least 100 women oriented annually	BCC training records
4.9 Conduct trainings on financial and ICT skills development, marketing platforms, negotiation and communication skills, etc.	●	●	●	●	●	MoED（BCC）	MoED、MoGFSS	Number of women attending training sessions on skill development	Business start-up kit manuals being developed	At least 100 women oriented annually	BCC training records
4.10 Disseminate the findings of nation-wide survey on home-based and informal work	●					MoED（BCC）	MoED、MBS	Report on the survey on home-based and informal work available	Survey completed	Report published in public domain	BCC website
4.11 Establish and maintain a database of women involved in agriculture and food production and conduct programs through Business Centres to improve the capacity of female producers to network, link and negotiate	●	●	●	●	●	MoED（BCC）	MoED, local councils, MoFMRA, MBS, CSOs, WDC, private sector	Database established	N/A	Regular updating of database with the number of producers linked with markets visible	BCC website
4.12 Introduce and implement a recognition program to increase female representation at senior management in private sector businesses, including on boards, in line with national targets and accordingly launch the MGEM certification program for private sector	●	●	●	●	●	MoED	Private secor, MoGFSS	Number of businesses given MGEM certification	N/A	Top 3 recognised annually with MGEM certification	MoED report

Source: National Gender Equality Action Plan 2022-2026 (MoGFSS, 2022), translated by the research team.

5） Women's ownership of and access to assets

During this field survey, participants indicated that while women mainly make decisions related to day-to-day household management, other decisions, such as the purchase of assets and the

construction of houses, are made by men, who provide limited consultation to women (from the results of group discussions with the Women's Chamber of Commerce and Industry).

For example, divorced women are often disadvantaged and displaced by the remarriage of their male counterparts when divorce disputes concerning land ownership arise. Possible underlying reasons for less access to and control over assets by women include norms, cultural traditions, and lack of education and awareness. Less opportunity of education and awareness adds to the burden of household chores, including caring for family members, especially children and the elderly. The "women's rights" are not only a matter of social equality, but also a matter of social justice.

Status of access to and control over assets

- Land including agricultural land and assets are mostly registered in men's names.
- Houses and vehicles are mostly owned by men.
- Routine decisions related to the management of the household are made by women.
- Other decisions are made by men or jointly by men and women.

Reasons behind access and control rights

- Due to social and cultural norms, men are in charge, especially in rural areas.
- Rural women often lack the experience and capacity to plan and implement activities, e.g., it is difficult for women to find opportunities to participate adequate training in the technical skills required for their work.

6） Impacts of Climate Change on Women

As the intensity and frequency of climate change-induced natural disasters increase, ecosystem degradation, freshwater and food depletion occur, rural areas become more vulnerable, and the potential for livelihood changes increases. For women whose livelihoods depend on the island's natural resources, frequent natural disasters can hinder income-generating activities, particularly the processing of forest products such as coconuts and almonds, agricultural products (fruits, vegetables, spices, etc.), and the production of souvenir crafts. In addition, working in the harsh natural environment poses health and safety risks. Thus, for rural women whose livelihoods depend on natural resources, climate change can be a risk that increases their vulnerability.

7） Organizational Empowerment of Women

(1) Maldives Women's Chambers of Commerce (MWCC)

MWCC is the Women's Chamber of Commerce in the Maldives and was established in 2018. It has a membership of approximately 200+ economically active organizations nationwide, most of which are home-based individual entrepreneurs. Members also include women agricultural entrepreneurs. However, due to Maldivian cultural practices, the exact number of female farmers is not known, since there are many cases where the company representatives is male (fathers, husbands, brothers, etc.), and in such cases, female farmers are not necessarily registered with the MWCC.

The purpose of MWCC activities is to support Maldivian women in income-generating activities

(e.g., starting a business, producing and selling souvenirs, managing a guesthouse-style hotel business, etc.) through networking among members, information sharing and opinion exchange, and networking with women's organizations abroad. In November 2022, the group participated in the International Trade Fair (supported by UNESCO) in Hyderabad, India, where it exhibited and sold handicrafts and souvenirs made by its members. MWCC has also established an NGO (Women Chambers of Commerce (WCCM)) to implement projects of international organizations, and will participate in the Eco-industrial Palk Development Project (in Addu Atoll), which includes support for women entrepreneurs by GIZ, as an implementation support organization.

(2) Women's Development Committee (WDC)

In the Maldives, the Decentralization Act (2010, 2019) mandates that Local Councils establish Women's Development Committees (WDCs).

WDC can undertake income-generating activities on its own, developing a program of activities and a budget plan, and upon approval of said plan by the Local Council, receive an allocation of the necessary activity funds. In the interviews for this field survey, the lack of program planning and programming capacity of the WDC was cited as one of issues currently facing.

(3) Cooperatives and, NGOs

There are women's cooperatives and NGOs in the Maldives that are engaged in income-generating activities. In a group discussion with the MWCC, it was noted that although there are a number of development-focused NGOs registered, they suffer from ad hoc interventions and inadequate documentation due to the lack of an environment in which partners can work in a coordinated manner.

There are also efforts to empower women working in cooperative activities, but such efforts tend to focus more on the production sphere than on decision-making. Cooperatives have low planning and management capacity and generally limited ability to run effective operations. Promoting skills in planning, implementing, and monitoring in a sustainable manner and accessible funding for start-up could make the situation improved. Women's cooperatives are often small-scale, family-based livelihood-enhancing activities with limited opportunities to participate in training to enhance their management skills and technical competencies.

8） The need for capacity development in women's participation in the agricultural sector

As noted above, women participate and contribute to agricultural activities in both formal and informal ways. At the same time, the survey highlighted the lack of capacity development and educational opportunities for women. The challenges cited included agricultural cultivation techniques, environmental issues (climate change, freshwater, ecosystem conservation, waste management, etc.), and business skills (e.g., business plan development and negotiation skills), which prevented agricultural activities from effectively improving livelihoods. With access to off-island employment opportunities, such as resorts, difficult, there is a need to promote agriculture

that will improve the economic independence of women who are engaged in or interested in agriculture on the local islands and promote their participation in the formal labor market.

Women's Participation in Agriculture (R. Inguraidhoo)

Historically, R.Inguraidhoo has had a thriving fishing industry, and women have supported the fishing industry from the land, such as by making dried tuna flakes. On the other hand, women have long been involved in agriculture in the form of home gardens (chili and leafy vegetables) and have produced crops not only for their own consumption but also for commercial purposes such as selling within the island. Furthermore, from 2022, farming will begin on leased plots, and women will be the main bearers of these plots.

Chapter 3. Collection of Information related to Agricultural Management and New Farming

In the previous chapter, in addition to an overview of the Maldivian agricultural sector, relevant national policies and agricultural development measures were described. The chapter also outlines the agricultural institutions involved in the implementation of these policies and measures, as well as the support provided by other aid agencies. This chapter will discuss the efforts of these organizations to promote agriculture in the Maldives with the support of aid agencies, and provide information from the viewpoint of support for farmers. Specifically, this chapter summarizes policies and measures related to SME development and entrepreneurship in the Maldives, and then focus on the agricultural sector to identify what kind of support is currently provided to farmers.

3.1 Overview of Policies and Measures related to SME Development and Entrepreneurship

The definition of SMEs in the Maldives is defined by the Small & Medium Enterprises Act based on three criteria: number of employees, sales, and net profit, as shown in the table below.[38]

Table 3-1 Definition of SME

Category		Number of Employees	Sales	Net income
small business owner		0 - 5	~MVR 1,000,000	~MVR 250,000
smaller companies	small business	6 - 30	MVR 1,000,001～ MVR 10,000,000	MVR 250,001～ MVR 2,500,000
	medium-sized enterprise (business, firm)	31 - 100	MVR 10,000,001～ MVR 30,000,000	MVR 2,500,001～ MVR 5,000,000

Source: Small & Medium Enterprises Act

The relevant organizations described in Chapter 2 are the implementers which are developing SME businesses and entrepreneurial support.

3.1.1 Policies and Measures related to SME Promotion and Entrepreneurship Support

SME development in the Maldives is being carried out by a state-owned company under the Ministry of Economic Development. In addition to financial support, technical assistance and sales promotion support are provided.

[38] It was issued in 2013 and revised for the second time in May 2022.

1） Financial support

According to SDFC, there are six to seven financial institutions in the country that provide loans to SMEs. However, the service is not necessarily accessible to all SME, as they are required to make deposits at the same financial institution as a condition for loan application. In this context, SDFC has developed a series of loans for SMEs at lower rates than commercial banks. There are a total of six types for different usages, as outlined in the table below.[39]

Table 3-2 SDFC's Financing Menu for SMEs

menu	Specific Uses	credit ceiling (MVR)	Rate	Requirements
Rashu Fathuru (For local tourism)	Maintenance and renovation of existing guesthouses, new guesthouses, tourism-related services, working capital, marketing/advertisement, and technological innovation	200,000-5,000,000	4%～	• New construction is at least 7 rooms. • Availability of basic infrastructure • Equity requirement based on project (maximum 20% of the total project)
Viyafaari Ehee (working capital)	Inventory purchases and short-term working capital	3,000,000	9.5%	
	Financing Projects and Contracts	1,000,000-2,000,000	9.5%	• Business operation for more than 1 year
Dhanduveri Nafaa (For Agriculture)	Use of technology in agriculture, poultry/livestock farming, agroforestry/plant nurseries, value-added activities	100,000-2,000,000	6%	• 10 - 15% equity capital
Installation of Harumudha (machinery and equipment)	Purchase of new machinery, equipment, vehicles, and vessels for business use	100,000-5,000,000	4%～	• Business operation for more than 2 years • Equity requirement based on project (maximum 20% of the total project)
Viyafaari Tharaggee (business expansion)	Expansion or development of existing businesses; expansion of scale of operations, such as additional floor space or floor space; addition of new product lines or new services within the same business line; renovation or renewal of offices and facilities	5,000,000	4%～	• Business operation for more than 2 years • Equity requirement based on project (maximum 20% of the total project) • Limited to business expansion in the same sector
Fashaa Viyafaari (For startups)	Financing new businesses and start-up investments, and Existing businesses diversifying into new sectors	2,000,000	4%～	• Equity requirement based on project (maximum 20% of the total project) • Not applicable to new retail stores and restaurants.

Source: SDFC

[39] According to the MMA, interest on loans by commercial banks ranges from 8.0% to 15.5% (local currency).

In addition to sector-specific loans, there are also loan programs by purpose. In addition to tourism, agriculture is also treated as a priority sector.

2） Business management support

(1) Business Support

BCC has 13 business centers across the country to support businesses in local islands. For applicants, BCC provides information on business procedures and processes, offers consulting and advisory services, and conducts research on business practices and impacts within those areas. SMEs who are interested in BCC's consultation services can apply for assistance by selecting their nearest business center from the list shown on BCC's website (see below) and filling in the applicant's information and agenda to consult.

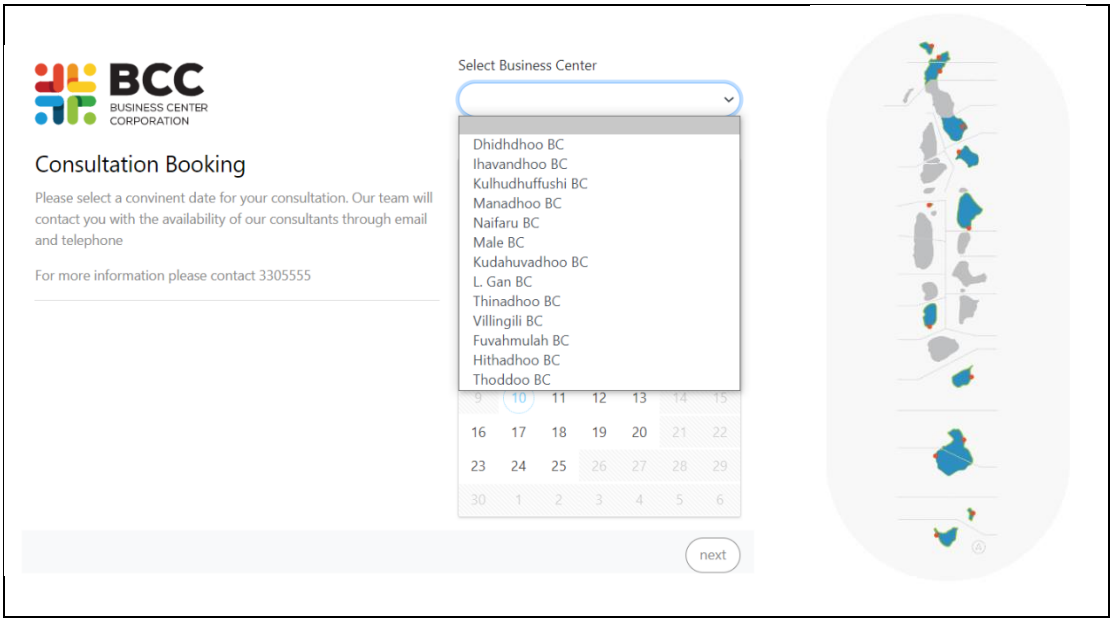


Figure 3-1 BCC Consultation Application Form and Business Center Locations

In addition to consultations individually provided upon the request of the applicants, BCC also organizes workshops for islanders, in cooperation with island councils. Follow-up will then be conducted in response to individual inquiries from interested participants.

The most common consultation topic provided is assistance for company registration, with 1,840 cases actually provided in the three years since BCC was established. The next largest number of cases was assistance in applying for SDFC loans, which amounted to 1,733. Since business plan is part of the required documents when applying for an SDFC loan, BCC’ s assistance is generally provided together with assistance for the loan applications, and the format used in creating the business plan is prepared based on the SDFC's application form. The table below shows the number of consultations BCC has conducted to date (as of May 2023).[40]

[40] Of those, the number of applications actually submitted to the SDFC loan program is not known.

Table 3-3 Number of BCC Consultations

matters for consultation	No. of cases
Business Registration, Name Reservation & eFaas Account	1,840
Assistance in applying for SDFC loans	1,733
Assistance with applications to BCC Job Centers	446
Inquiries about services provided by BCC	312
Assistance in developing business plans and preparing related documents	162
Covid Loan	114
Needs assessment on packing facilities	100
Starting a business	100
Financial information & assistance	98
Inquiries about Authentic Maldives	96
Inquiries about the Business Portal	93
Inquiries about business-related regulations	69
Other loan applications	54

Source: BCC

(2) Sales promotion support

In terms of marketing and sales support for SMEs, BCC has set up stores under the brand namely Authentic Maldives to sell SME products. Authentic Maldives opened its first store in Malé Airport in January 2020, and has since added stores in Malé, Hulhumalé, and resort islands around the country. In Japan, BCC is participating in JETRO's "One Village, One Product Market" by selling Maldivian SME-related products at Narita International Airport and Kansai International Airport as well. Furthermore, as part of SEEDS activities supported by the Japanese government, the Authentic Maldives website has been launched, allowing online transactions.[41]

Store in Malé　　Store at Malé Airport

Source: Survey team photo

Figure 3-2 Authentic Maldives Stores

[41] https://www.jetro.go.jp/jetro/activities/support/oda/ovop.html (see April 18, 2023)

According to interviews conducted at a store in Malé, the company currently handles about 200 SME products, of which about 5 are related to the agricultural sector (agro-processing), and these SMEs source and process their raw materials in the Maldives.

Case 1		Case 2	
The company produces coconut oil from domestic coconuts. It is produced on a local island and delivered in bottles procured from overseas.		Domestic breadfruit and other fruits are processed into chips at a processing plant in Malé.	

A 15-30% margin is deducted from the actual sales to be sold at Authentic Maldives. This is the only cost incurred by SME, and no fixed costs are charged. BCC is still receiving inquiries from more SMEs, and however there is currently no available space at this store, and BCC is introducing them to other stores. Under this circumstance, demand from SMEs is increasing, and BCC has plans to establish two more stores.

Apart from Authentic Maldives that sells SME products on their behalf, there is another facility called SME hub, which rents out sales booths to SME. It was opened in December 2022 in the central district of Malé, and as of April 2023, 16 of the total 19 booths were filled. SMEs using the space sign a one-year contract with BCC and pay a monthly rent determined each booth, with no other variable costs such as utilities. The rent varies depending on the size of the space and facilities, but is about MVR 10,000 per month, which is not always affordable for SMEs. The procedure of applying for a booth is to register a company, fill out a application form, and designate the booth of your choice. If there is more than one applicant, the decision will be made by lot drawing.

Source: Survey team photo

Figure 3-3 SME Hub

As part of the marketing and sales support, product packaging facilities have been established in Hulhumalé Island and Addu City to provide product packaging services for entrepreneurs and SMEs. Some items sold at Authentic Maldives are displayed after packaged by BCC at those

facilities. In addition to products sold domestically, BCC also cans breadfruit chips and exports them to Europe.

The facility was established with the support of the World Bank's project, namely Enhancing Employability and Resilience of Youth (MEERY), aiming to support entrepreneurs in priority sectors.[42]

MEERY Project Overview

1） Period: June 2019 - December 2024
2） Implementing agency: Ministry of Economic Development and Ministry of Higher Education
3） Activities: Activities are being developed under the following four components, with the facilities in the product package related to Component 2.
① Fostering skills development and entrepreneurship in priority sectors, and
② Promoting entrepreneurship and employment through skills development and eLearning strategy,
③ Project coordination, monitoring and evaluation, and
④ Contingent emergency response component (CERC)

According to the BCC, the lack of packaging technology is one of the challenges for SMEs in Maldives, and especially for resorts, durable and well-designed packaging is vital. While it is difficult for farmers themselves to have their own packing facilities, this kind of support by the BCC is considered effective.

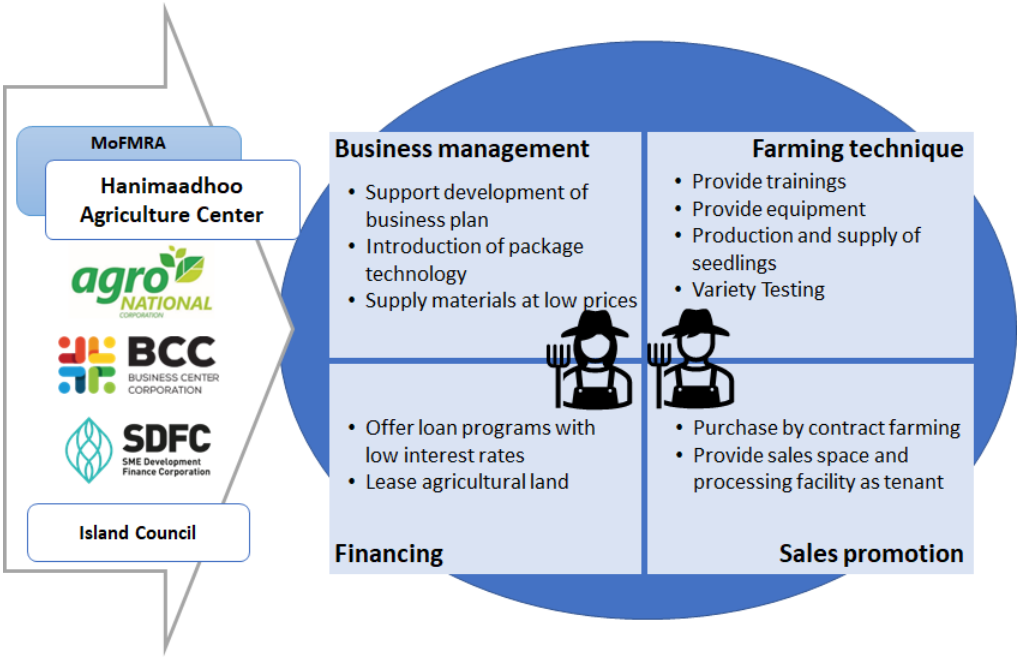
(3) Start-up support

SEED By BCC, a co-working space for startups, is being set up in July 2021 in the same building as the BCC offices in Malé. Established with the support of UNDP and the Japanese government, the facility provides individuals and start-ups with internet-equipped work space and meeting rooms at a minimum rate of MVR 25/hour, and can accommodate about 40 people at a time.

3.1.2 Support targeted to Agricultural Sector

Institutional support targeted at the agricultural sector has been developed mainly for producers, in the areas of management, cultivation techniques, finance, and sales promotion to individual farmers and SMEs. As shown in the figure below, MoFMRA is the central agency, and the island council is the local administrative agency. State-owned enterprises responsible for specific areas of agricultural promotion are developing specialized support.

[42] https://projects.worldbank.org/en/projects-operations/project-detail/P163818 (see April 2023)



Source: Prepared by the survey team

Figure 3-4 Administrative Support for Producers

Financial support will be discussed in detail in Section 3.3 of this chapter. The following part outlines farming technology support, business support, and sales promotion support.

1) Farming Technical Assistance

In terms of technical support, the MoFMRA is taking the lead in providing technical guidance to farmers through the HAC. AgroNat also provides contract farmers with materials and information on crop cultivation by an AgroNat staff stationed on the islands.

Although it would be desirable to have an agricultural specialist on the island councils to promote agricultural extension on each island, there is basically no such post, although informal advice may be offered to farmers, for example, when experienced farmers are elected as council members.

(1) Technical assistance by MoFMRA (HAC)

As technical guidance to producers, HAC staff visit target islands to provide short-term (14 days) training to farmers nationwide. The process to implement the training is that each council submits a request to MoFMRA based on the farmers' requests and the council's intentions. Since HAC is unable to respond to all requests due to lack of human and financial resources, it selects about 25 islands per year from among those requested.

The content is based on a common curriculum (field preparation, plant nutrition, plant pest control, composting, agro-chemical use, etc.), which is modified according to the conditions and needs of the island where the program is implemented. Many of the target producers are dual-income farmers and women, who are usually busy with their primary jobs and household chores, and

therefore the program is usually held in the evening time. There are both lectures and hands-on training, with indoor lectures held at night (20:30-22:00) and on-farm trainings often held before sunset (from 16:00).

The number of participants is usually 30-35 per island. The contact information of the HAC staff is shared with the participants so that follow-up can be done after the training is conducted, and inquiries are always possible. Although there are varying degrees of enthusiasm for agriculture among the participating farmers, 10-15 of the participants are willing and continue to communicate with HAC afterwards. Although the number of times the training has been conducted nationwide is not sufficient, it has received some positive feedback from farmers on the island where the trainings were conducted, and it can be said that HAC's existence is significant as a technical support organization.

In addition to technical guidance, HAC's technical assistance to farmers includes the free provision of 10 hydroponic systems to one island per year. The project originated from a past UNDP project to introduce hydroponics, and after the project was terminated, MoFMRA has continued the project with its own budget. Several of the agricultural islands visited by the JICA survey team have installed hydroponics systems with this support. Although the continuity after introduction varies from island to island depending on the user's knowledge level and motivation, as the figure below shows, there are good examples of systems that were introduced under the appropriate environment and continue to be used. The sign in the photo at right hand side in the local language that it was provided by MoFMRA.

Source: Survey team photo

Figure 3-5 Hydroponic Cultivation System provided by MoFMRA

HAC also provides seedlings to each island, albeit on a small scale. The procedure is for island councils to compile requests from island residents and apply to the MoFMRA. After approval by the MoFMRA, instructions are sent to HAC and the corresponding seedlings are delivered to the island for free of charge based on the request. However, with HAC's limited staffing and budget, it is not practical to meet the nationwide demand. Under such circumstances, the discussion with HAC shared the idea that future seedling production should be conducted on each island. For example, on AA. Thoddoo Island, LAC is producing and selling seedlings as a business, and such

an example could be applied to other islands.[43]

As a research institute, HAC provides technical guidance and materials to farmers, and also conducts agriculture-related research activities, some of which contribute to improving producers' productivity. One is conducting tests to compare varieties and confirm cultivation techniques, and providing information to farmers based on the results. The crops tested are generally grown by domestic farmers and include melon, passion fruit, eggplant, tomato, chili, watermelon, sweet corn, and sorghum. At the request of a local farmer, sorghum is being tested to see if it can be used to feed goats.

In addition to cases where HAC independently selects test varieties based on requests from farmers, HAC also conducts tests at the request of AgroNat and is currently conducting tests on cucumbers. In addition, HAC is conducting comparative tests of rainwater and RO water for hydroponic cultivation with respect to its varieties and cultivation methods.[44]

Seedling Production

Variety Testing

Source: MoFMRA

Figure 3-6 Activities of the HAC

In addition, at the request of the government from a perspective of food security, different varieties of taro seeds have been imported from Kenya, and researched about virus-resistant varieties. The next step is actual on-farm cultivation on two islands in the Gaafu Dhaalu atoll and on Gn. Fuvahmulah.[45]

(2) Technical assistance by AgroNat

AgroNat is to provide technical guidance and supply materials and equipment to the contract farmers. AgroNat staff are stationed on the islands where contract farmers are located, and are

[43] According to the MoFMRA report, a total of 1,287 strains were produced in 2021, of which 894 were offered.
[44] However, there are pH meters and EC meters, which are the minimum required for hydroponic solution management, but no other analyzers.
[45] Normally, virus-free tissue culture seedlings are imported for disease control, but here the seed potatoes are imported as it is. In the Maldives, as in neighboring countries, various viral diseases are widespread. Production of seedlings under such circumstances requires, as a minimum measure, the production of virus-free strains (the basic technique of producing infection-free seedlings through tissue culture). There are currently no plans for such a feature in the HAC.

mandated to respond to farmers' inquiries about cultivation techniques on a daily basis. Consultation on such cultivation techniques is also available to non-contract farmers. A handbook for farmers is available, using technical information from MoFMRA and other sources in teaching cultivation techniques.[46]

One staff is supposed to be assigned for every 15 contract farmers, and as of May 2023, a total of 32 staff were assigned to 18 islands. The staff are hired among the islanders and are trained by an Agronomist at the AgroNat headquarters before their starting services.

In order to facilitate consultation with contract farmers, a database for monitoring farmers' production has been developed and a mobile application (AgroNat app) for data collection has been provided to contract farmers. Contracted farmers can upload production data and photos of their crops on a regular basis, and the objective is to provide advice as appropriate based on such basic information. Since it is a mobile application, it is expected to spread without much resistance across the country, where smartphone penetration is adequate even among the elderly.

Although the supply of materials and equipment is subject to fees, the cost is lower than what can be procured on the open market. In addition, AgroNat is linked to the Zakat Nafaa Program, a women's business support scheme of the Ministry of Islamic Affairs, and farmers who use the program are provided with the necessary production equipment, seeds, fertilizers, etc. for initial agricultural production at no cost.[47]

Other priority initiatives of AgroNat Community Farming are being prepared to make farmers experience modern agricultural technology. As for the inhabited islands, preparations are currently underway on five islands (four in Noon Atoll and one in Laamu Atoll) with a total area of 100,000sqft/island. All islanders are qualified to participate in the project, regardless of whether they are AgroNat contract farmers or not, and it is envisioned that they will learn drip irrigation and other technologies under a one-year contract and try them out on their own plots on the island. The program is also planned to be implemented on uninhabited islands, with three uninhabited islands already leased from the government and currently under development. In the case of uninhabited islands, anyone can participate, including farmers and companies (both foreign and domestic) from the surrounding islands.

Status of development of leased agriculture islands by AgroNat

① Gaadhoo island (Laamu Atoll): The island is surrounded by a lagoon and is 70 ha in size. The plan is to prepare 64 plots of 20,000sqft on 40ha of agricultural land. The climate change impact study and EIA have been completed, basic infrastructure (e.g., por supply) is already in place, and jetty is currently under construction. AgroNat aims to begin accepting applications for the program around September 2023.

[46] https://agronational.mv/en/post/83(see May 2023)
[47] A program of assistance to the poor launched jointly by the Ministry and the Ministry of Economic Development in February 2022. Up to MVR 150,000 will be provided by the Zakat Fund to selected households according to the guidelines.

② Gan island (Gaafu Dhaalu Atoll): With the ownership obtained in December 2022, this island will be opened to farmers with not only land but also agricultural infrastructure such as irrigation facilities. Nevertheless it will require a larger infrastructure investment than Gaadhoo Island due to its larger size. EIA is currently underway.

③ Mulidhoo Island (Haa Alif Atoll): just acquired, EIA and infrastructure work is still in progress.

2) Business Support

In terms of management support, the above business plan preparation assistance and loan application support by the BCC are also provided within the agriculture sector. The use of SDFC loans, in particular, is a hurdle for farmers who are not in the habit of keeping sales and profit records and have difficulty making business forecasts, and assistance from a third party such as BCC in developing a business plan is an important SME support.

With regard to results, of the number of actual cases of assistance provided by BCC in Table 4-3, those provided to the agricultural sector included 27 cases of assistance in applying for SDFC loans and just one case of assistance in developing a business plan. Regarding SDFC loan application assistance, it is extremely low for the agricultural sector as it accounts for only 1.6% among all applications to SDFC loans. The reason is probably because BCC only targets SMEs for assistance, and individual farmers who are not registered with the Ministry of Economic Development are excluded from the program, resulting in a low number of consultation results.

3) Sales Promotion Support

In terms of sales promotion support for general farmers, AgroNat, as mentioned above, purchases all crops from contract farmers and sells it to customers including resorts.

Table 3-4 Overview of AgroNat Contract Farmer System

- AgroNat, in cooperation with island councils, conducts a briefing session for farmers on the island to explain the details of the contract. Provide farmers who agree to the contract with agricultural materials and purchase their produce. AgroNat staff are stationed on the islands with contract farmers, allowing for face-to-face interaction.[48]
- The purchase of the entire production is determined at a fixed price over the two-year contract period. The price will be determined by reference to the market price for each crop, which is published by MoFMRA and agreed upon in advance with the contracting farmer. Regardless of market price fluctuations, AgroNat purchases the entire amount grown at that price for one year.
- The target crops are 17 crops that AgroNat encourages production of due to their import substitution effect: pumpkin, banana, papaya, sponge gourd, snake gourd, okra, Maldivian cabbage, watermelon, cucumber, eggplant, lettuce, green beans, melon, tomato, capsicum, Chinese cabbage, and butternut.
- AgroNat has prepared guidelines for crops to be grown under contract with AgroNat, and requests farmers to grow crops according to these guidelines. The guidelines describe not only the cultivation procedures, but also the distance between plants. When any symptom of disease is

[48] Volunteers will be selected and hired by AgroNat from among the islanders.

detected, it is possible to contact AgroNat for advice on how to solve.

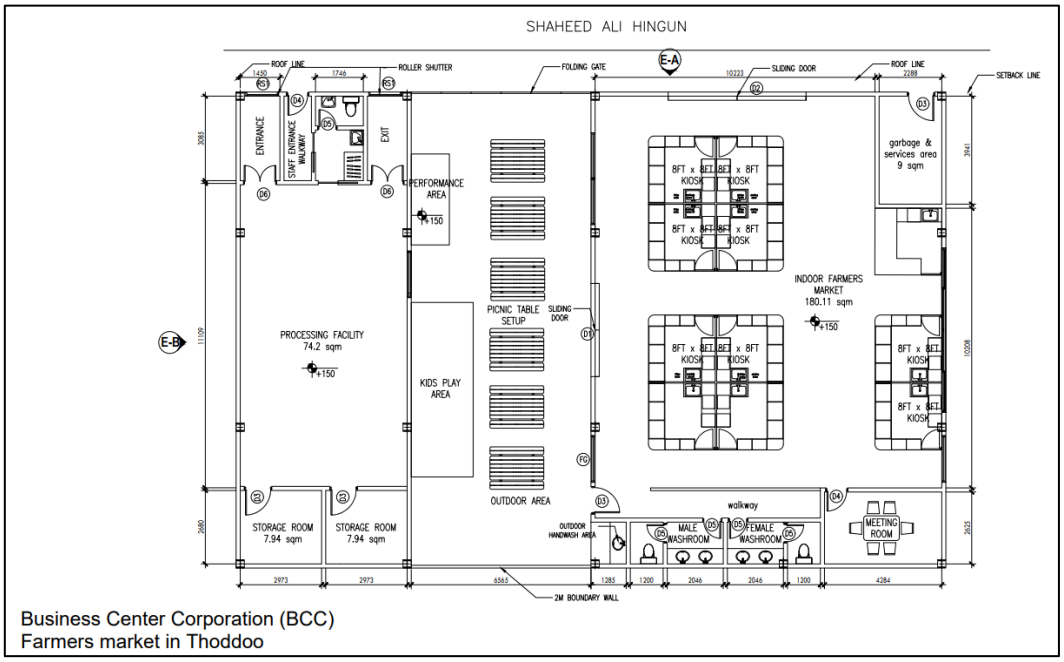
- Contract farmers are required to sell their entire crop to AgroNat and are not allowed to sell to other customers on or off the island. However, if the contract can be made on a plot-by-plot basis, and a farmer has more than one plot, crops produced outside of the plot contracted with AgroNat can be sold to others.
- Materials are provided at lower than market rates through a system in which AgroNat focal point on each island place orders with AgroNat headquarters (Malé) based on the details of orders from contract farmers. Payment is made on a credit basis. After AgroNat purchases the crops, sales vale minus the cost of materials will be paid to farmers.
- The farmers are not aware of where their crops are actually soldbecuase the purchased crops are sold to the market under AgroNat's responsibility. Sales are basically made to the surrounding islands, or any unsold items will be sold in Malé.

Source: AgroNat

As part of its efforts to strengthen its sales promotion support, AgroNat has built nine refrigeration facilities throughout the country within the framework of SEEDS. Since the current volume purchased from contract farmers is too small to be stored and the entire volume can be transported on the same day as cultivation, and therefore, none of the nine locations are in operation. Operations will be considered to begin on islands where production exceeds the daily transportation volume or where transportation is difficult to arrange.

To address transportation issues related to sales promotion, AgroNat has plans to own its own boats. As it is called Agro Boat, the design of the boat has already been completed, and the public procurement procedures has just begun. Though all crops from contract farmers is currently transported to Maré using private transporters, owning their own boats will enable transportation from the agricultural islands to the surrounding resorts, building more effective supply chains.

In order to support the development of sales channels at the island level, BCC is in the process of establishing a facility called Farmer's Market on AA. Thoddoo Island, based on the same concept as the SME hub. The SME hub was established to provide support to SMEs in general as part of SEEDS activities. In the second phase of SEEDS (PDSAE), which focuses on the agricultural sector, Farmer's Market will be established to provide marketing support to agricultural producers. The Farmer's Market will be set up to provide marketing support to agricultural producers.



Source: BCC

Figure 3-7 Layout of BCC Farmer's Market

As shown in the figure above, the layout of the facility is divided into a processing space (left side) and sales booths. There are a total of 10 sales booths, which can be rented as sales booths only or together with processing space. The latter has the advantage of reducing food loss by allowing unsold fruits and vegetables to be processed. The land for construction is being leased from the island council of AA. Thoddoo, and the initial costs, including construction, will be funded by PDSAE, while the operating costs will be borne by BCC. Tenant fees have yet to be determined. BCC's objective is not to generate revenue but to promote SMEs, and therefore fees will be set accordingly. The facility is currently under construction and is scheduled to begin operations in September 2023, with tenant recruitment to begin around August prior to that. Applicants must be farmers registered with the MoFMRA and SMEs registered with the MED.

4) Lease of agricultural land

The leasing of farmland to islanders by island councils on inhabited islands is another form of administrative support. The cost of land acquisition is not burdensome because farmland is obtained at no or low rates. Not all applicants can acquire the land because land of islands are finite, and however all procedures are carried out at the island level and are not complicated for the users.

3.1.3 Administrative Support Issues

As mentioned before, this chapter provides an overview of the institutional support currently provided. The following section describes issues in the provision of these current support functions and services.

1） Technical Assistance

In Maldives, it is common for farmers to learn cultivation methods from information exchanged among neighbors within the island or from relevant information obtained personally from social media platform such as YouTube, etc. Information obtained in such a way is not necessarily appropriate for farming in the natural environment of Maldives, and there is a risk that inappropriate information may spread. In addition, producers face a variety of problems in their individual agricultural activities on a daily basis, and to solve these problems, technical assistance is needed to respond to individual inquiries from farmeres. In order to promote agriculture in Maldives, where the natural environment is unique, it is important to provide appropriate information to farmers throughout the country at the right time to promote agriculture, mainly crop production.

The first major player in technical assistance to producers is the HAC, and however due to lack of human and financial resources, it has not been able to provide sufficient support. Especially in Maldives where financial problems are severe, as the number of islands to be supported is large, and their locations are widely spread from north to south, it would be very costly for HAC staff to visit the target islands to provide training to producers. On the other hand, there was a plan to invite producers to HAC for a six-month training program, but it was difficult to implement because it was difficult for local farmers to leave their residence for such a long time for the training.

Lack of funds has also been an issue, leading to a lack of equipment. Although HAC has applied to MoFMRA for the budget needed to purchase the equipment, it was denied because the ministry's overall budget is also limited. Besides, HAC requested assistance from FAO, including the provision of equipment. This was however never approved, and there has not been a project supported by donor agencies, including FAO[49].

There are also human resource challenges, and HAC is not able to provide support to all islands that request training due to a lack of personnel, which is why HAC selects about 25 islands each year from those that have requested it. HAC has had JICA volunteers assigned in the past, and although their specialty was poultry farming, HAC appreciated the help so much that it requested JICA to assign a volunteer in 2022, and assigning one volunteer is planned.

Even in the islands of the northern region where the HAC is located not many farmers have participated in any kind of training programs, including those by the HAC. The results of a survey conducted by MAP on the target islands showed that 60% (168) of the 279 respondents had never participated in the program. Since the northern region of Maldives having fewer resorts needs industrial development, it is reasonable to place HAC in the region. However, the important issue is how to disseminate appropriate information to a large number of producers because existing or

[49] No support for capacity building of HACs has been provided, but there is a track record of individual participation in training programs abroad. In addition, as part of the current MAP activities, a development plan for the HAC has been formulated, which may lead to the provision of equipment and capacity building support in the future.

potential agricultural islands are located all over the country and need technical assistance.

Although it would be desirable to have an agricultural specialist in each island council, the Maldives has very little human resources who have agricultural background and expertise because agriculture is not treated as an academic discipline from primary to higher education, and the agricultural sector has few employment opportunities. With the support of donor agencies, there are efforts to train general farmers to become agricultural extension agents through training abroad, but this is not a nationwide effort.50

AgroNat, another player that provides technical assistance, has been working with island councils to hire its focal points from among the islanders to communicate with contract farmers. Nevertheless, it has been difficult to find qualified candidates. One issue related to human resources at AgroNat's headquarters in Malé is that there is only one person (Agronomist) in charge of training the focal points and responding to inquiries that require their expertise.

In the situation where technical guidance to farmers is being provided by multiple organizations, the lack of close coordination has caused the situation that similar training has been provided separately to the same islands and farmers. While the resources of each organization are limited, they must complement each other to reach out to as many farmers as possible.

In such a situation, ICT-based measures for dissemination of agricultural technology information are considered effective, and digital tools for farmers has been developed with the support of FAO. However, FAO's support is limited to system development, and MoFMRA will take over the operation of the system, including its funding. One of the issues is the need for full-time staff to update the content distributed through the system and to respond to inquiries from farmers. Nevertheless, MoFMRA does not currently have such extra manpower. Through demonstrations with the prototype version of the digital tool, certain positive evaluation has been obtained from farmers, and it is necessary to establish a system for appropriate operation in the future.

[50] There are cases where resorts employ foreign agricultural specialists, such as Sri Lankans, when their own cultivation is done on the island.

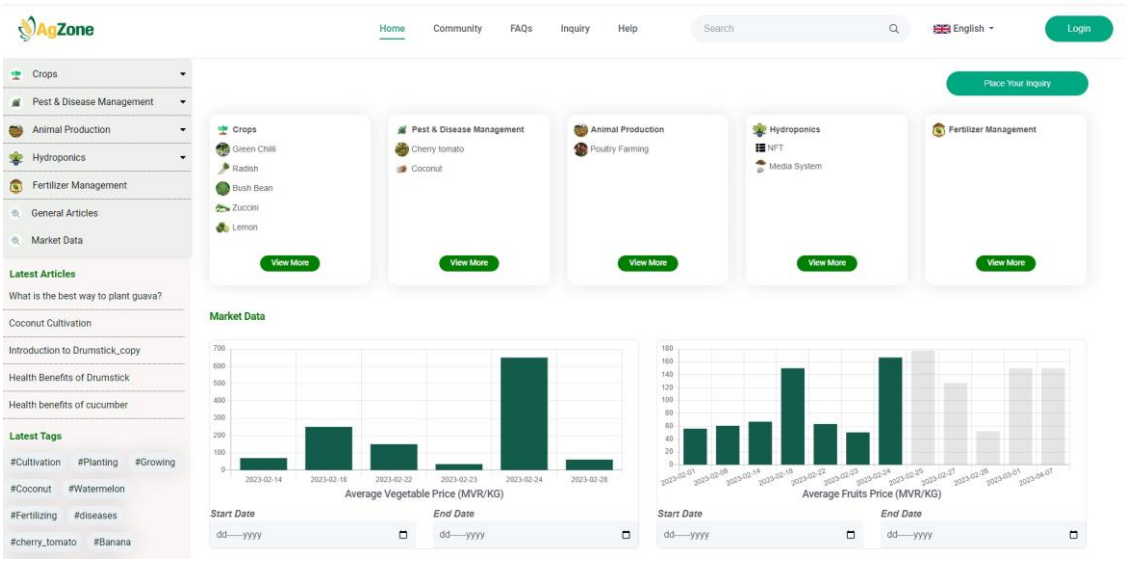


Figure 3-8 Agricultural Extension Digital Tools (AgZone)

2） Quarantine function

Plant diseases and pests are introduced through (1) seeds, (2) seedlings, (3) fruits and vegetables, and (4) inputs such as cow dung, which are brought in without inspection. Without these measures, the latest pests and diseases are freely introduced into the country. Though MoFMRA has the function to conduct checks at the time of importation with respect to plants, it is not established for vegetables and fruits. The government used to control the species circulating in the country, and however since the role was transferred to the private sector, it has been outlawed.

As for the current system regarding the quarantine function, the related legal framework is the Plant Protection Act 2011, but there is no accompanying Regulation, and there is no support for the quarantine services currently in place. The Maldives has also ratified the International Plant Protection Convention (IPPC) but has yet to make concrete efforts based on the Convention.

Next, as the implementing agency for the quarantine function in the Maldives, the Animal and Plant Quarantine Unit has been established under the jurisdiction of MoFMRA, with an office in the Malé Airport. A total of eight people, including administrative and other staff, are assigned to the quarantine; two technical staff are assigned to plant quarantine, and four to animal quarantine. In terms of jurisdictional structure, plant quarantine belongs to the "MoFMRA Plant Protection Bureau" and animal quarantine belongs to the "MoFMRA Veterinary Bureau.

The majority of fruits and vegetables are classified as food, and the Maldives Food and Drug Authority (MFDA) under the Ministry of Health inspects them upon importation. Because the MFDA checks for health effects, no work is done that should be done in phytosanitary, such as

disease or insect contamination.[51]

The method of inspection at the phytosanitary unit involves random sampling to check for disease. The inspection method is visual inspection to check for insects or disease, but no specific instrumental analysis is performed, and there is no way to check for viruses or disease. Interviews with producers who have experience importing plant seedlings confirm that inspections are conducted only by visual and documentary verification. Since any plant can be imported as long as it is not an embargoed variety, it is questionable whether the current quarantine system can effectively fulfill its quarantine function, and importers are concerned that they may be unintentionally introducing diseases. On the other hand, the farmer's experience is that the detention period for inspection at the quarantine unit took a long time, resulting in the death of half of their plants, and therefore, it is considered an issue to improve the inspection capacity of the quarantine unit and the detention facilities. As the photo below shows, plants subject to quarantine are stored and inspected in the same space, which is not an appropriate environment, considering the risk of disease transfer.

Source: Survey team photo

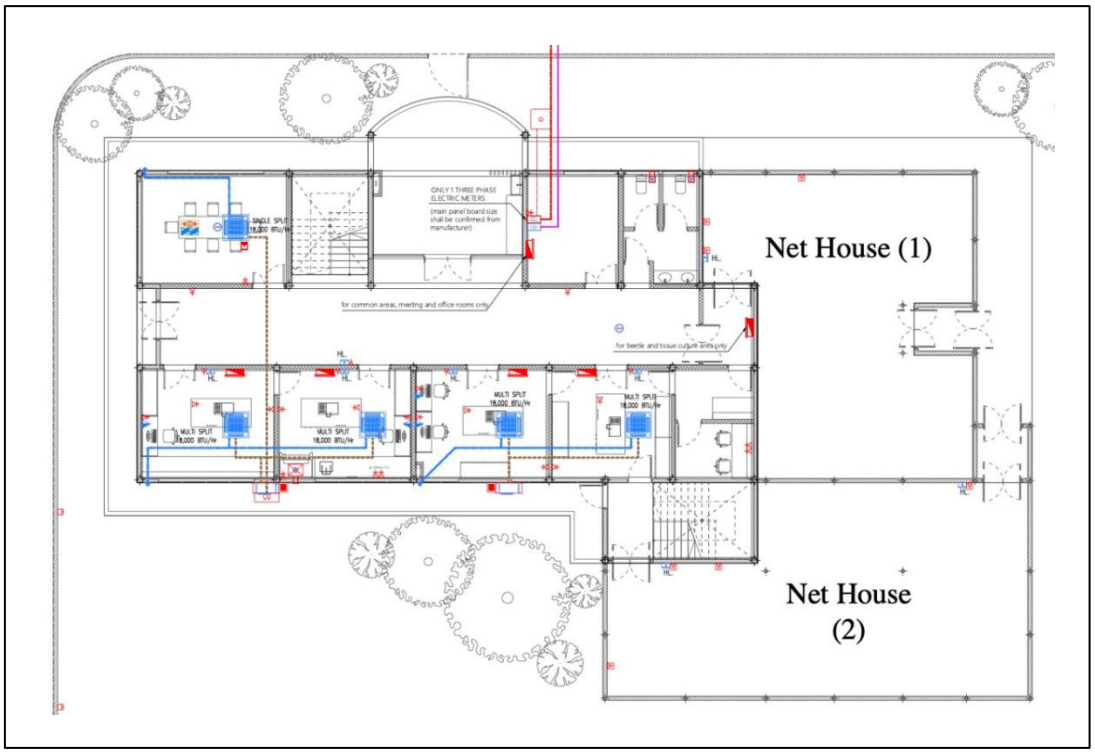
Figure 3-9 Quarantine Unit

3） Research and Analysis Functions

The most serious challenge faced by producers is damage caused by pests and diseases. In the Maldives, there is no laboratory or other facility for diagnosis of ecosystems and pests, so producers have no choice but to make a visual diagnosis of the damage to their crops. In the absence of adequate domestic facilities, some companies that produce agriculture on leased uninhabited islands send samples to India and other foreign countries for testing, at their own expense. However, soil is difficult to send, making a thorough survey and analysis difficult. If facilities with investigation and analysis functions can be established at the central level, serious cases can be prioritized, disease names can be identified, and countermeasures can be considered and taken.

[51] The reason for this is not clear, but it is supposed that the MFDA (with more than 20 officers), a larger organization, is in charge, probably because of human and financial reasons of the Animal and Plant Quarantine Unit.

Under these circumstances, MoFMRA is planning to establish a research facility on the southern island, Gn. Fuvahmulah. The facility's functions and research targets are (1) soil analysis (testing), (2) tissue culture, and (3) plant pathology, and none of the functions have yet been started up, as the facility is under construction. The reason why Gn. Fuvahmulah was chosen as the site for the installation is that, in addition to the lack of land at HAC, Gn. Fuvahmulah has an airport and a large population that can provide adequate human resources. The layout of the facility building is shown in the figure below. Net House (1) and Net House (2) will be constructed for tissue culture seedling cultivation (acclimation) and plant pathology (probably related to biological control), respectively. Construction costs will be covered by SEEDS support.



Source: MoFMRA

Figure 3-10 Schematic diagram of the research facility

Regarding the equipment to be installed in the facility, the necessary equipment for soil testing has already been obtained with the support of the Government of India and is currently being stored at the Gn. Fuvahmulah City Council. For (2) and (3), equipment such as microscopes, clean benches, and culture equipment will be procured with the support of MAP. In order to establish appropriate research and analysis functions, it is necessary not only to set up facilities and equipment, but also to assign and train experts who can properly use these facilities and equipment.

4） Sales promotion

Market access for general farmers is also recognized as an issue at the policy level, and similar comments were heard in interviews with producers. To address this challenge, AgroNat is

working to build a supply chain through its contract farmer program, but with about 700 member farmers, the national impact is not significant considering that there are at least 7,000 farmers in the country. Since the introduction of this system, AgroNat has been working with the councils on each island to encourage farmers to participate through explanatory meetings, but not all farmers who have been invited to participate have signed contracts. The main reason for the refusal to participate is that contract farmers are obligated to sell their entire production to AgroNat, and the purchase price offered by AgroNat is often lower than the actual market price throughout the year, making them hesitant to sign contracts. Some contract farmers do not comply with the conditions and sell their products to other customers than AgroNat. For that matter, the State Trade Organization (STO[52]) is buying crops from individual farmers at prices higher than those offered by AgroNat.

In addition, although the objective of the program is to establish a supply chain, the crops purchased by AgroNat are then sold to distributors and resorts under AgroNat's responsibility, and the contract farmers do not see any consumers, and the program has not yet developed the farmers' marketing capacity. Given the lack of transportation and high costs, the supply chain does not necessarily need to go through Malé, and it is desirable to build a supply chain at the regional level within the same atoll by selling to nearby resorts, etc. AgroNat also hopes that, as a result of the supply chain establishment support, after the two-year contract period, if the contracted farmers have the ability and channels to sell their products through the support, they can form producer groups on each island and sell directly to the public. One concrete way to do this is to work with MAP's efforts to support the formation of producer groups on the northern atoll islands.

3.2 Investment Inducement Measures and Investment Performance in the Agricultural Sector

In order to develop the agriculture sector as an industry with the aim of economic diversification, private capital inflows are vital, and also for introducing advanced agricultural technology, attracting foreign investment in the agricultural sector, is considered effective. The following section provides an overview of the trends in foreign investment in the Maldives, the procedures to be followed by foreign companies to invest in the Maldives, the measures and initiatives of the government of Maldives to promote investment, and the business area in the agricultural sector where investment of foreign companies is expected.

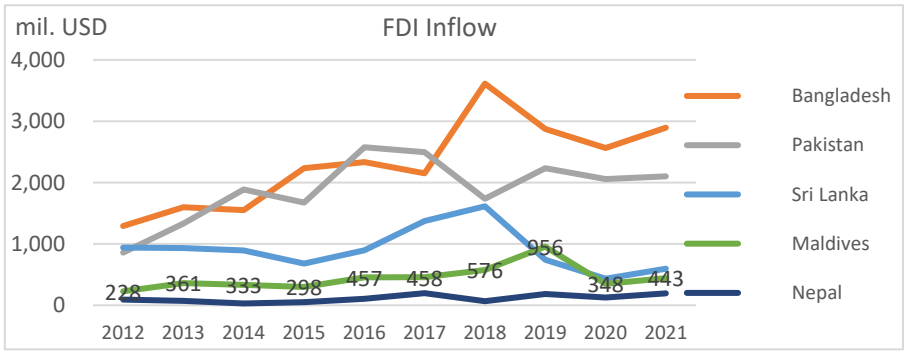
1) Investment Performance

The figure below shows the inflow of foreign direct investment into the Maldives. Compared to

[52] Abbreviation for State Trade Organization, a state-owned company established in 1964 to import and procure essential goods on behalf of the government for the purpose of food security in the Maldives. Currently, the company is expanding its business and is also engaged in wholesale and retail business in the country.

the data for neighboring countries in the South Asian region, excluding India, the amount of FDI inflows to the Maldives is relatively small. As of 2021, Sri Lanka is at the same level as the Maldives as a result of a significant reduction in inward investment due to uncertainty in the business environment caused by the domestic economic crisis.[53]

FDI inflows in the Maldives have remained flat over the past decade, although the amount of FDI inflows in the Maldives increased sharply in 2019 due to large projects. According to the UNCTAD report, FDI inflows to the Maldives plunged 64% in 2020 due to the decline in the tourism sector, which is a major industry and accounts for much of the FDI breakdown, and the resort expansions planned for 2020 and 2021 have been postponed, and as a result, affiliated companies have been forced to review their investment plans.[54]



Source: UNCTAD

Figure 3-11 FDI inflows

Regarding investment in the Maldives by Japanese companies, according to data published by the Ministry of Foreign Affairs of Japan, the number of bases of Japanese companies in the Maldives is as shown in the table below. As of 2021, the total number of cases is 15, 14 of which are joint ventures, and most of them are partnerships with local companies rather than 100% foreign investment.

By industry, "Lifestyle-related services and entertainment" accounted for the largest number of 6, followed by "Finance and insurance" and "Accommodation and food services," suggesting that many of the companies are expanding in businesses related to the tourism sector, which is a major industry in the Maldives. There is no Japanese companies operating in the agricultural sector.

Table 3-5 Number of Japanese Companies Operating in Maldives (2021) ~

Total (number)				15
Breakdown (1)	**Corporate structure**	Overseas branches, etc. of Japanese companies		0
		Local corporations wholly owned by Japanese companies	Company	1
			Branch	0

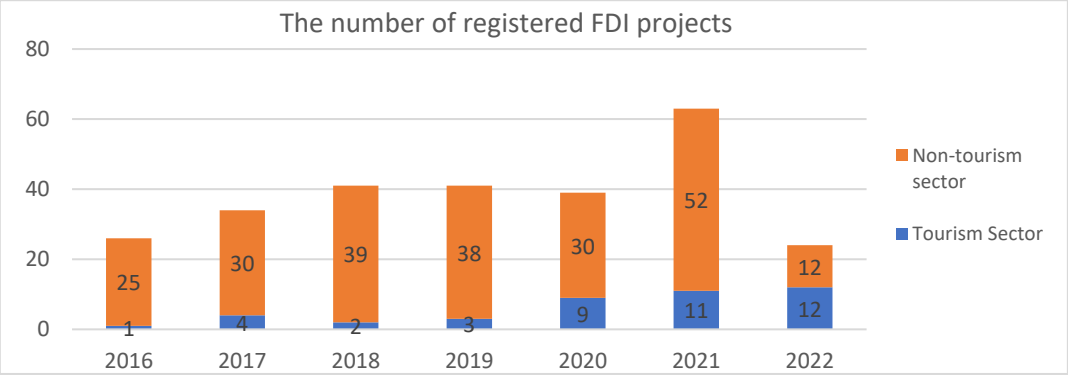
[53] India, with its large economy, has by far the largest FDI inflow, and other countries are omitted because it is difficult to compare.
[54] No country breakdown data has been organized for FDI in the Maldives (MED interview May 7, 2023).

			offices, etc.	
		Joint ventures (local corporations in which a Japanese company has a direct or indirect investment of 10% or more)	Company	12
			Branch offices, etc.	2
Breakdown (2)	**Type of industry**	Fishing		1
		Construction		1
		Transportation and postal services		1
		Wholesale and retail		1
		Financial and insurance		2
		Lodging and food services		2
		Lifestyle-related services and entertainment		6
		Services (not elsewhere classified)		1

Source: Ministry of Foreign Affairs, "Survey on the Number of Japanese Companies Operating Overseas (2021).

In reviewing the FDI inflows by sector to confirm the potion limited to the agricultural sector, the survey team then reviewed the list of projects approved by the Ministry of Economic Development in the past. Since this data is based on registered investments, it is not clear whether or not a substantial amount was actually invested, and thus not appropriate to be compared with the above data based on actual results. However, it is possible to obtain an indication as to how much of the FDI inflows has occurred to the agricultural sector among all sectors.

The chart below shows the number of foreign investment approvals in the past. First, in terms of overall numbers, 30 to 40 foreign investment projects are approved annually. Then, as a percentage of the total number of agricultural projects, there were only a total of three projects in the seven years since 2016. On the other hand, the tourism sector, which is the main industry in the Maldives, accounts for a large portion of the total, and as the figure below shows, a certain number of investments are always in the tourism sector after 2020, and for 2022, half of all investment projects are related to the tourism sector.



Source: Ministry of Economic Development

Figure 3-12 Number of foreign investment approvals

2) Foreign Investment Related Systems and Procedures

The requirements for investment in the Maldives by foreign companies are defined for each sector. The table below is an excerpt from the list of sectoral requirements published as an attachment to the Maldives' Foreign Direct Investment Policy (FDI Policy), which only includes those related to agriculture. Investment by 100% foreign capital is allowed for A1 crop cultivation and related activities. Not all sectors allow 100% foreign investment, only 30% of all categories of subsectors (Class Details) are allowed to be invested solely with foreign capital, and agricultural crop production can be seen as a preferential target for foreign investment. However, for agriculture-related manufacturing industries such as agro-processing (C2 in Table below), the ratio of foreign investment in investment projects is limited to a maximum of 75%, and JVs with domestic companies are assumed.

The minimum investment is then set at USD250,000 for the first five years for crop cultivation and related activities. Although this is also stipulated at a relatively low level compared to other sectors and subsectors, the average investment of $50,000 annually is a reasonably large investment for crop cultivation in the Maldives, where land area is limited. If it is the development of a leased uninhabited island, a minimum of $250,000 is not difficult to reach, as the construction of jetty and infrastructure will inevitably require a certain amount of investment activity. Yet, foreign investment in small-scale agriculture on inhabited islands is not expected to reach that scall.

Table 3-6 Foreign Investment Requirement by Sector

	Section Details	Class Code	Class Details	Maximum % of Foreign Shareholding	Minimum initial investment for 5 years in USD	Maximum duration of the FDI Agreement	Entry Route*
A	Agriculture, Forestry and Fishing	A1	Crop cultivation and related service activities	100%	250,000	Upto 50 years	AA
		A2	Forestry	Closed	N/A	N/A	N/A
		A3	Poultry / Animal production and related service activities	100%	1,000,000	Upto 50 years	AA
		A4	Aquaculture / Mari Culture	100%	1,000,000	Upto 50 years	GA
B	Mining and quarrying	⋮	⋮	⋮	⋮	⋮	⋮
C	Manufacturing	C1	fish products	75%	1,000,000	Upto 50 years	GA
		C2	agricultural products	75%	1,000,000	Upto 50 years	GA
		C3	other food products	100%	1,000,000	Upto 50 years	GA
		C4	beverages	100%	1,000,000	Upto 50 years	GA
		C5	textiles	100%	1,000,000	Upto 50 years	AA
		⋮	⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
I	Accommodation and Food Service activities	⋮	⋮	⋮	⋮	⋮	⋮
		I7	Integrated Tourism(development, operation & management)	100%	1,000,000	Upto 50 years	AA

Note: AA: Automatic Approval; Automatic Approval is granted if the conditions listed in the table above are met.
GA: Government Approval; Some projects require approval from the relevant agency of the Maldivian government.
Source: Prepared by the research team based on FDI policy.

Foreign companies wishing to establish a business presence in the Maldives are required to follow the procedures below, including obtaining a Foreign Investment Approval.

Obtaining Foreign Investment Approval

- Fill out the prescribed application form and submit it together with the required documents to the Ministry of Economic Development.[55]
- The application documents are checked. Automatic Approval takes 2 business days and Government Approval takes 5-14 business days.
- After approval, the Ministry issues and send an approval letter.
- Pay an administration fee of USD5,000 to the Maldives Inland Revenue Department and submit a copy of the receipt to the Ministry of Economic Development.

Company registration

Next, the company is registered in one of the following three ways Registration is completed in one business day after submitting the required documents and application form to the relevant department of the Ministry of Economic Development.

- Re-registering an existing company as a foreign company
- Establishment of new company
- Acquisition of shares from local companies

Signature for Foreign Investment Approval

After the above company registration procedures are completed, the foreign investment approval is signed by the Ministry of Economic Development.

Once a foreign investment approval is obtained, the following procedures are required to start a business. Land acquisition is done after consultation with and approval by the relevant island council. Acquisition of land is not a condition for foreign investment approval, and land acquisition does not have to be completed at the time of the above procedures.

Construction permit

Councils registered with the Building Consent Authorities Registry (BCA) deploy administrative staff available to check submitted documents and issue construction permits at the island level. In the agricultural sector, a construction permit is required if the project involves the installation of greenhouses.[56]

Customs Registration

In order to obtain duty-free treatment for imported materials, approval must be obtained from the President's Office after registration with the customs office.

[55] The required documents are presented on the portal for businesses (business.egov.mv/Home/Investments).
[56] According to the website, 154 island councils are currently registered. https://planning.gov.mv/en/registries/building-consent-authorities-registry

Employment of Foreigners

There is a quota (limit on foreign employment), and the agency in charge is the Ministry of Economic Development.[57]

3) FDI promotion policy

Measures to induce investment in the agricultural sector include tax exemptions for agricultural inputs. In May 2019, the MoFMRA issued a list of 191 items classified as tax-exempt agricultural inputs to encourage and ease investment in agriculture. This was done to mitigate and promote the development of the agro-industry, and the list includes seeds, fertilizers, and pesticides, as well as equipment and machinery that can be used in the processing of fresh produce.[58]

In order to receive duty-free treatment, it is needed to become a registered farmer with MoFMRA and apply in advance for the materials and equipment before importing. Imports from this list will be granted duty-free treatment without expiration. The list covers materials and equipment used in the agricultural sector and does not include items that can be resold or converted to other sectors, such as generators.

Equipment and materials that are not included in the list, such as RO equipment and generators, but are declared in advance as necessary for the initial investment, may be exempted from taxation for a period of time (e.g., five years) specified in the business plan submitted in advance, if approved by the Technical Committee. After that period, the tax exemption is no longer available, but in some cases, such as when special factors such as the Covid-19 pandemic make it impossible to procure the relevant materials and equipment during that period, the Ministry may be consulted and an exemption may be granted.

In addition to tax exemptions for agricultural materials, other measures to attract foreign investment include land leases for up to 99 years, tariff exemptions (for large projects only), no foreign exchange restrictions, and no restrictions on profit remittance.[59]

4) FDI Promotion Activities

Invest Maldives under the Ministry of Economic and Development, in cooperation with diplomatic missions abroad, conducts business forums and online events for foreign countries to disseminate information on the investment environment and promising industries in the Maldives. In India, investment forums were held in Mumbai and Delhi. There have been business missions from abroad ; in February 2023, the Maldives hosted an investment forum for a diplomatic mission from Cambodia. At the same time, there was also a mission from China, and in that event, interviewingthe participating Chinese companies in advance about their requests, and provided information intensively on the sectors of their interest. At those two events, approximately 10

[57] The agricultural sector employs a large number of Bangladeshis and others, but it is clearly beyond the scope of the sector and illegal. Quotas were established to address such situations.
[58] See Attachment 3.
[59] Embassy of the Republic of Maldives "Maldives Investment Guide".

company representatives participated in BtoB discussions about future investment opportunities.

For Japan, the Embassy of the Maldives in Japan may collaborate with Japanese stakeholders to organize investment promotion events. In December 2020, the Embassy of the Maldives in Japan and the Japan External Trade Organization (JETRO) jointly held an investment promotion seminar online, which was attended by over 100 businesspeople from the Japanese side, and the relevant ministries and agencies from the Maldivian side, including the Ministry of Economic Development, MoFMRA, Ministry of Tourism, and others, which provided information. Japanese companies already operating in the Maldives also took the platform to share local business-related information obtained through their actual business activities.[60]

5) Promising Areas in the Agricultural Sector

The Maldives seeks foreign investment in value addition through organic and processing, large-scale egg production, poultry farming, smart agriculture and vertical cultivation, and other investments that will increase production capacity. According to data from Invest Maldives, foreign investment is expected to contribute, especially in the areas shown in the table below.

Table 3-7 Sectors where foreign investment is expected

1. Climate smart and precision farming technologies	Opportunities are open for partnerships, which can bring in technologies to improve harvests, and introduce new and adoptive post-harvest Opportunities are open for partnerships, which can bring in technologies to improve harvests, and introduce new and adoptive post-harvest technologies such as mango, coconut, papaya, and chili.
2. Infrastructure development investment in agriculture	The government welcomes investments in the development of market infrastructure such as modern storage facilities which would address issues of food The government welcomes investments in the development of market infrastructure such as modern storage facilities which would address issues of food safety and hygiene, reduce wastage, and improve profitability along the agricultural value chain.
3. Transportation	The geography of Maldives demands a complex transportation mechanism to develop and sustain agriculture as a feasible economic activity. Opportunities exist for investment in the establishment of a mobile marketing and haulage ferry service "Agri-Boat", to Opportunities exist for investment in the establishment of a mobile marketing and haulage ferry service "Agri-Boat", to link producers to markets with purpose-built

[60] Ministry of Economy, Trade and Industry website
(https://www.meti.go.jp/press/2020/12/20201223003/20201223003.html) See April 2023

	transportation vessels.
4. Commercial poultry and animal farming	Opportunities are open for investors to develop commercial poultry and animal farming in selected islands, to cater to the lucrative tourism sector and Opportunities are open for investors to develop commercial poultry and animal farming in selected islands, to cater to the lucrative tourism sector and the rapidly growing domestic market, currently catered to by imports.

Source: Invest Maldives

Currently, with the cooperation of UNDP, a study called "Invest Mapping" is being conducted to identify promising industries and sectors in which the Maldives should promote private investment. Effective investment promotion activities utilizing the survey results are expected.

3.3 Current Status and Issues in Agricultural Finance

Except for companies operating on leased agricultural islands, the main agricultural producers in the Maldives are individual farmers engaged in agriculture on inhabited islands. Traditional open field cultivation is still the main cultivation technique, and there are not many modern agricultural techniques such as field cultivation or hydroponics, which require a certain amount of initial investment, in the country as a whole. Labor costs account for nearly 50% of production costs due to low labor productivity caused by inadequate irrigation facilities and work equipment such as mowers and cultivators. Since initial investments are required to increase labor productivity, such as greenhouses to shelter from rain and wind and hydroponic cultivation equipment, there is a need to expand agricultural finance. While the number of individuals and families involved in agriculture is still limited, and increasing the number of individuals and families involved in agriculture is an important pillar of agricultural development in the Maldives, borrowing is essential for individuals with limited financial resources to engage in agriculture and to introduce modern agricultural technology from traditional methods of cultivation, and therefore the role of agricultural finance is very important.

According to data from the Maldives Monetary Authority (MMA), by sector, loans to SMEs are 30% for tourism, 30% for commerce, and 25% for fisheries, with agriculture accounting for less than 1% of the total. One possible reason for the low amount for agriculture, i.e., the lack of widespread agricultural finance, is that farmers do not rely on loans. From the perspective of the SDFC, the main reasons are (1) the low financial literacy of farmers and (2) the habit of borrowing money from middlemen and relatives in the supply chain. The current status and challenges of agricultural finance are discussed below.

1） Agricultural finance players and various services

The SDFC and the Islamic Development Bank (IsDB) are two institutions that provide loans to the agricultural sector. In particular, SDFC works with MoFMRA to offer loan programs tailored to the characteristics of the agricultural sector. The table below provides an overview of

Dhanduveri Nafaa, one of SDFC's various loan programs, which focuses on the agricultural sector, as described in Table 4-2.1

Table 3-8 SDFC Agricultural Loan Summary

summary	• The loan can be borrowed up to MVR 2 million at an interest rate of 6% (annual interest rate), which is lower than the market rate (12-30%). • The repayment period is deferred for up to seven years.
use	• Use of technology in agriculture (e.g., urban agriculture, protected agriculture, vertical farming) • Poultry & Livestock • Agroforestry Nursery • Businesses related to high value-added
Application Process	• All applications are done online. There is a dedicated portal site (in English) where necessary documents can be submitted. • If the applicant agrees, the SDFC will be able to obtain personal information of applicants from other organizations such as MIRA. • The applicant will apply to the SDFC for the loan. Documents to be submitted vary depending on whether the amount borrowed is up to or over MVR 100,000.
Screening Method	• After an application is submitted, the review process takes place in two stages. First, after the application is received by SDFC, the documents are forwarded to MoFMRA, the ministry in charge, for technical evaluation. The investments and their future earnings projections are checked for adequacy. A feasibility analysis is then conducted at the SDFC and a loan decision is made.[61] • Less than MVR 100,000 is no equity requirement or collateral, and there is no review by the technical committee. For amounts over MVR 100,000 and up to MVR 2 million, equity requirements and collateral are required, and the aforementioned Technical Committee review will apply. • Although the borrowers are primarily farmers, they are not in the habit of keeping records regarding their daily sales and earnings, making it difficult to screen them for loans. Even under such circumstances, in order to improve access to finance by farmers, SDFC makes comprehensive financing decisions based on information other than financial statements, such as documents showing farmland holdings that indicate production capacity.

[61] Documents for Submission https://sdfc.mv/Download/SubmitDocs/required_docs/Required Documents for Dhanduveri Nafaa loan (More than 100,000) V2.pdf

	• AgroNat contract farmers are considered to have lower business risk because farmers have guarantee to sell all of their produce at a fixed price, making it easier to make financing decisions.

On the other hand, the support for the purchase of agricultural materials through credit provided by AgroNat is also a financial service. As mentioned above, AgroNat provides irrigation equipment, fertilizers, seeds, and seedlings to the contract farmers, and when the farmers sell their crops to AgroNat, AgroNat deducts the amount from the sales price. This system not only makes it easier for farmers to manage their cash flow and business operations, but also makes it easier for them to manage the earnings of each crop.

2） Agricultural Finance Usage

Since its establishment in 2019, a total of 3,756 loan applications have been submitted to the SDFC (as of May 2023), of which 159, or 4% of the total, are related to the agricultural sector. In addition to the aforementioned Dhanduveri Nafaa, loans related to the agricultural sector include start-up and expansion loans among the various loans listed in Table 3-2.

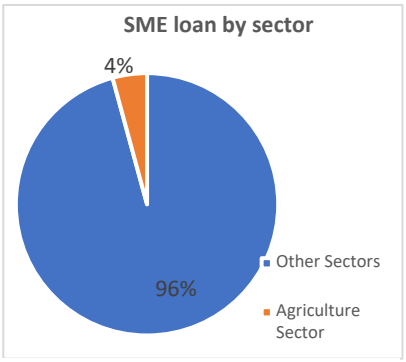
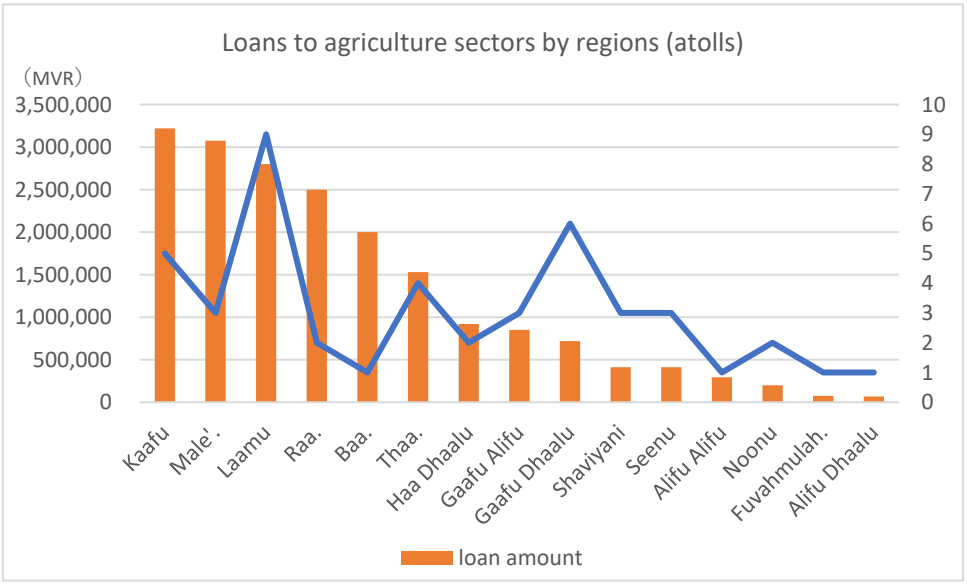


Figure 3-13 SME loan by sector

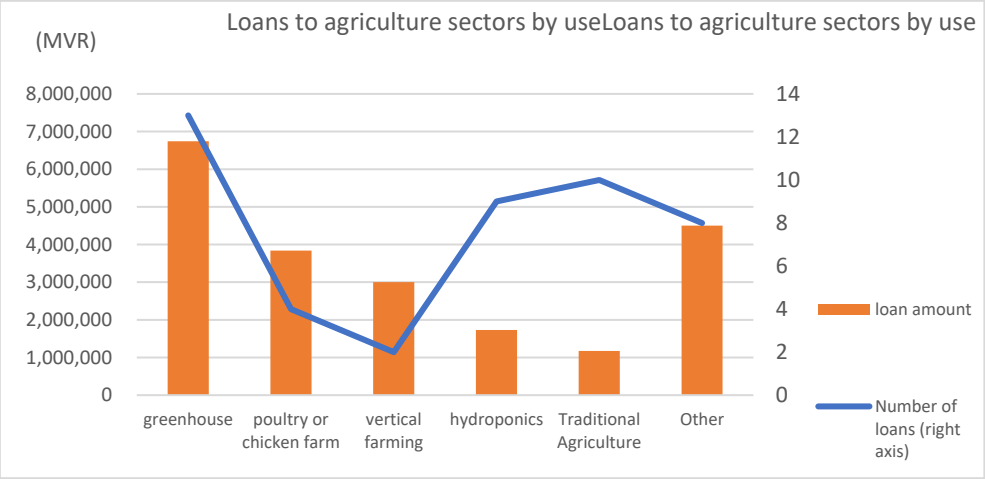
Of the total 159 loan applications related to the agricultural sector, 46 have been approved for financing, amounting to approximately MVR 21 million in value terms. By region, the situation differs by atoll, with Laamu Atoll having the highest number of loan decisions (9 cases).



Source: Prepared by the survey team based on SDFC data.

Figure 3-14 Loans to the Agricultural Sector by Region

The table below shows a breakdown of the types of technologies and equipment SDFCs are targeting for introduction in their agriculture-related loans, with green houses being the largest in terms of both number and amount of loans. In terms of the number of cases, in addition to hydroponics technology, there is also a relatively large number of introduction of technology and equipment necessary for traditional farming, although the details are not clear. Others include the installation of hydroponics and irrigation systems.



Source: Prepared by the survey team based on SDFC data.

Figure 3-15 Loans to the Agricultural Sector by Use31

Of the total of MVR 21 million that have been approved for financing, MVR 16.4 million have already been executed. On the other hand, there are some cases where have faced defult, and according to information from the SDFC, 4.9% of all agricultural sector-related loans are non-performing.32

Table 3-9 Examples of SDFC Loan Utilization

Application example 1: Crop production (company) ● On an agricultural island in Addu Atoll, five producers started a joint venture to produce and sell agricultural products to resorts, and received funding from SDFC. They plan to build a 20,000 sqft green house and grow 4,000 cucumber plants with the loaned funds. ● Although the SDFC loan application required collateral, it would be relatively easier to meet that requirement by applying as a group or corporate entity rather than as an individual.
Application example 2: Service industry for farmers (company) ● a company in K. Kaashidhoo Island provides support services to farmers by providing equipment and manpower for preparing and harvesting farmland. SDFC loan was utilized to procure materials and equipment necessary to implement the project. During the application process, the applicant submitted a business plan and a

repayment plan, and as a result of a preliminary investigation, the applicant explained that it is expected to have enough customers.

- In addition to producers, there were examples of SDFC loans being used for related businesses in the agricultural sector.

Note: We did not meet any individual farmers receiving loans from SDFC during our field research.

3） Challenges and Measures for Agricultural Finance

During the agricultural island visit by JICA survey team, farmers who had experience applying for SDFC agricultural loans were interviewed to identify issues. Furthermore, based on the results, discussions were held with SDFC to discuss the measures that have already been taken and possible future improvements.

(1) Assistance with loan application procedures

The first issue is the application process. Since SDFC does not have regional offices, applicants are required to apply online, and in situations where face-to-face assistance is not available, such as at the counter, it is difficult to understand the information and documents that are required. Maldivian farmers are predominantly in their 40s or older as an age group, and many are elderly, which is another factor that may discourage them from applying if they are not IT literate.

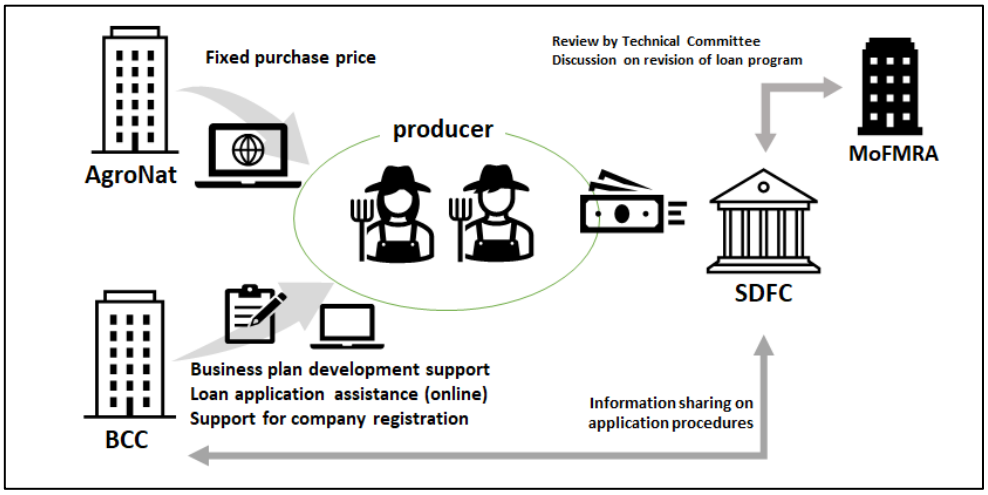
Due to the geographical constraints of the Maldives, it is impractical and inefficient to establish an in-person contact point accessible to all producers. Therefore, it is necessary to create an environment and support that facilitates the process for producers, based on the premise of online application. In this regard, it makes sense for BCC, which has regional offices throughout the country, to provide SDFC loan application support. However, as mentioned above, of the 159 applications for SDFC loans to the agricultural sector, BCC assisted with only 27 applications, or 17% of the total, and the reality is that most applicants have been completed without BCC support.

SDFC is considering establishing one small contact office in the north and one in the south, although the location has not yet been determined. In addition, they are considering assigning SDFC representatives to island councils and will discuss with the respective councils. The method would be to either appoint from among island council staff or send personnel from SDFC, and one island council has already expressed interest. While it is difficult to have SDFC personnel on every island for a short period of time, SDFC is well aware of this challenge and is working internally on a daily basis to reach out to as many farmers as possible.

(2) Assistance with company registration and business planning

SDFC loans are designed for SMEs, and one of the requirements for application is Business Registration. Individual farmers are basically excluded from the list because they are not registered as enterprises. In order to promote agricultural finance in the current situation, where loans to the agricultural sector are provided by SDFC only, farmers have no choice but to register their enterprises, and the involvement of BCC, which also provides assistance in registering enterprises, is necessary. In addition, although farmers are required to submit a business plan when applying for a loan, they usually do not have records of their production activities, such as production items and quantities, and sales prices and quantities. The business planning support provided by BCC will play an important role in this regard. SDFC is also considering adding a bookkeeping function to the portal site for loan applications. It allows farmers to keep their books online, eliminating the need to keep handwritten books or purchase their own software.

According to SDFC, when reviewing loans, it can be an advantage that the applicant is a contract farmer for AgroNat, because there is always a guarantee that the entire crop produced will be purchased. In formulating a business plan, the ability to foresee sales prices in advance as a contract farmer can facilitate the formulation of a business plan in the face of the risk of large fluctuations in market prices. In fact, as mentioned above, Laamu Atoll, where SDFC has the largest number of loan projects, is the most active area for AgroNat and has a large number of contract farmers. AgroNat's contract farming system has disadvantages in that the contract price may be lower than the actual market price, and the provision in the contract that the farmer must always sell to AgroNat prevents the producer from benefiting from market price hikes, but as mentioned above, it is believed to be beneficial in the medium to long term if it facilitates access to financing, increases productivity by introducing new agricultural technology, and attracts new customers. The relationship between the various agencies assisting with SDFC loan applications is shown in the figure below. This mechanism is expected to further increase the number of loans in the future.



Source: Prepared by the survey team

Figure 3-16 Support structure for SDFC loan applications

(3) Improve financial literacy

Long-term efforts are needed to improve the financial literacy of ordinary farmers. In the Maldives, money-related topics are gradually covered from the primary education level, and it is expected that as the level of education rises in the local islands, a minimum level of financial literacy will be developed, albeit over time.

Another reason why there have not been many cases of SDFC loans is the lack of awareness of the loan program. Interviews on the agricultural islands also confirmed that some producers and island councils were unaware of the existence of the loan program. In discussions with MoFMRA officials there was a consensus that there is a need to actively raise awareness of the loan program nationwide in the future. It is necessary to disseminate information from the center to the rest of

the country through the media, etc., to inform producers about SDFC loans, including their benefits and procedures. In addition to one-way information dissemination from the center, it is also desirable to work with island councils to confirm the needs of producers on the island and to develop proposals for loan applications at the local level as well.

(4) Expansion of production scale

Since most producers in the Maldives are small family-owned farmers, and the size of their owned plots is not large, even if they borrow on a stand-alone basis to introduce new technologies, the effect in productivity is not likely to be considerable.

It is desirable to borrow and introduce modern agricultural technology when several producers jointly produce and sell their products by forming an association or other producer group. If the scale of production can be expanded and sales to resorts potential as large and regular customers can be made, it will be easier for SDFC to develop a business plan and repayment plan, and easier for SDFC to provide financing.

In addition, financial institutions that provide loans need to conduct post-loan monitoring, but it is clear that the geographical situation in the Maldives makes it difficult to properly conduct such work with individual small-scale farmers, and in fact, similar opinions were expressed by SDFC staff. In such cases, if they borrow as a producer group, financial institutions will have the advantage of having a centralized contact point, which will make monitoring easier.

(5) Introduction of agricultural insurance

In the Maldives, as mentioned above, damage caused by pests and diseases and natural disasters often prevent the harvest from being as expected, and in many cases, the production costs are too high to generate income. The SDFC has to be more cautious about the agricultural sector, which is less predictable in terms of recovery than other major industries such as tourism, leading to a more time-consuming examination process. One effective measure to address such issues would be the application of agricultural insurance.

The first agricultural insurance in the Maldives was put into service in March 2023. Allied Insurance, one of the largest insurance companies in the country, offers insurance products for individual farmers that can be applied to cover damages caused by natural disasters (torrential rains, wind storms, droughts, floods/tsunami, landslides).[62]

The company's insurance coverage would make it easier for SDFC to pass the loan approval process. The company has approached SDFC to sign an agency agreement to promote agricultural insurance. Once that is decided, it is expected that synergies between SDFC loans and the company's insurance policies will also be discussed.[63]

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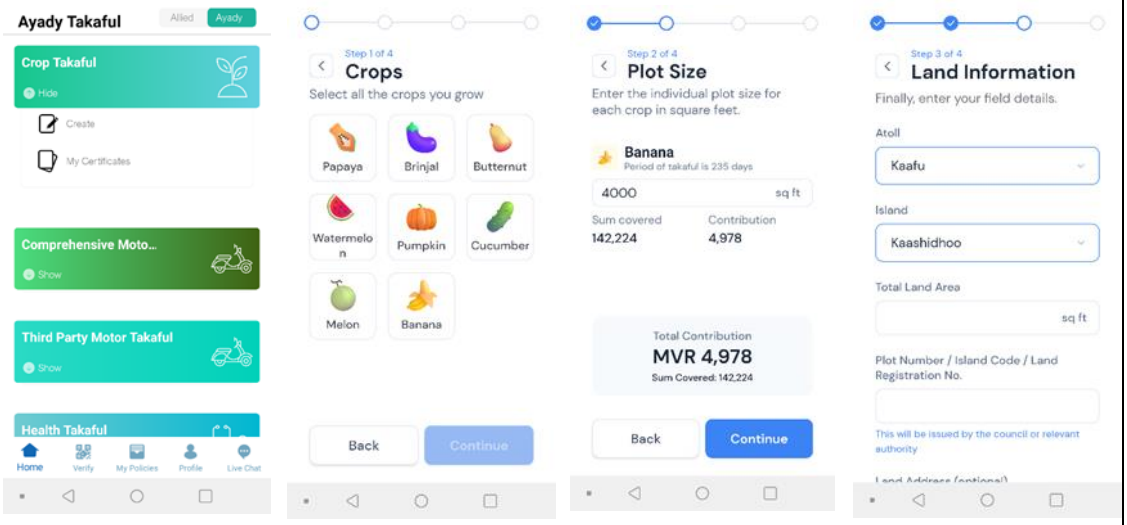
[62] https://psmnews.mv/en/118432 (see March 2023)
[63] The company had similar discussions with SDFC two years ago, but at that time SDFC was not yet offering agricultural loans.

Agricultural Insurance (Crop Takaful) from Allied Insurance

The amount of compensation is the amount corresponding to the cost of production, not the loss (value) of the product. Based on the production cost per unit area per crop obtained from AgroNat, the compensation amount (production cost) is calculated from the size of damaged area.

Considering the fact that farmers do not keep books or even keep invoices as a matter of custom, the insurance company tried to minimize the information requested from applicants, asking only for personal information, the target crop, and the scale of production. Applications are made through the company's dedicated application.



Source: Survey team photo

Figure 3-17 Allied Insurance's Agricultural Insurance Application Form

The application can be downloaded free of charge to a smartphone, and when opened, the procedure is available from the home screen on the left. Select the target crop on the first page, enter the field size on the next page, and the premiums will be displayed. On the last page, enter your location and other personal information to complete the application.

To date, promotions have been conducted on AA. Thoddoo and K. Kaashidhoo islands, but as of May 2023, no contract has been signed. The main reason for that as a result of the promotion on the two islands was that the harvest season has already passed after catering Ramadan demand. Furthermore, other comments received from farmers were that they need guarantees against production losses, not production costs.

(6) Institutional design for farmers with limited financial resources

According to a representative of the Bank of Maldives, lending in the Maldives is based on Asset Based Lending, in which loans are made using liquid assets as collateral. Under such circumstances, the investment requirements and collateral requirements are one of the factors hindering the spread of SDFC loans. While dual-income farmers can meet such requirements based on their income from their primary job, full-time farmers are often forced to abandon their

loan applications because they are engaged in small-scale agricultural production and do not have much income or savings to begin with and lack financial resources. The design of the system needs to be more accessible to farmers who are considering borrowing to introduce modern agricultural technology to increase productivity and, ultimately, profitability.[64]

Therefore, in order to promote the introduction of modern agricultural technology necessary for agricultural development, MoFMRA and SDFC are discussing a modification of loan program to simplify the loan approval process by limiting the use of the loan to the introduction of specific agricultural technology. Technology Package, and the table below shows a comparison with the current system.

Table 3-10 Summary of Proposed SDFC Loan Program Improvements (Technology Package)

loan amount	current	Details of Discussions
Less than MVR 100,000	No investment equity requirements, no/ collateral, and no review by a technical committee.	No change
Over MVR 100,000, up to MVR 2 million	Investment Equiry requirements or collateral is required and reviewed by the Technical Committee.	Loans limited to specific agricultural technologies with no capital contributionequiry requirements. No review by the technical committee is required. (Technology Package)
		Minimum of MVR 100,000, with the exception of the Techonology Package scheme, which requires equiryinvestment requirements or collateral and is subject to review by the Technical Committee.

[64] The maximum loan amount, which previously was RUR 75,000 without equity requirements or collateral, has been increased to the current MVR 100,000 at the request of the MoFMRA.

Chapter 4. Collection of Information related to Producers

This chapter will identify the current situation of agricultural producers in the Maldives, classified according to their production environment, and identify the challenges they face. Producers can be divided into several categories, each with different characteristics, and their strengths and weaknesses in agricultural production will be analyzed individually. Regarding the challenges, we will organize the challenges perceived by the producers, especially the individual farmers who are the main producers, and the challenges when looking at Maldivian agricultural production from an objective perspective, which will lead to the "support by the government" section in the next chapter.

4.1 Classification of Producers and Crops

First, to give an overall picture of crop production, this section will introduce the classification of producers and the main crops produced.

4.1.1 Classification by Production Entity and Production Location

Table 4-1 below shows the production environment and characteristics of the individuals and companies that are production entities. While individual growers produce in their own backyards and on farmland leased by the Island Council, businesses have a variety of options. Most of the small and medium enterprises (SMEs) that conduct agricultural businesses do so by acquiring farmland on resident islands under a land lease agreement from the island council. In a limited number of cases, companies operating indoor plant factories were also identified in Malé. There are 52 uninhabited agricultural islands managed by MoFMRA, 70% of which are operated by companies. Agricultural development has also begun on resort islands under the jurisdiction of the Ministry of Tourism, adding to the category.

Producers	Location	Scale of production	Type of market	Type of farming	Model cases
Individual producers	Backyard garden	☐ 200-5000 sqft./ plot	• House-use • Local market • Neighboring island	1. Pot farming 2. Vertical farming 3. Hydroponics 4. Shading trees	All island 1A
Individual producers	Registered farm plot	☐ 2000- 20,000 sqft. / plot	• Local market • Neighboring island • Male market • Resort / city hotel via cooperatives or group	1. Soil Cultivation 2. Pot farming 3. Hydroponics	Thoddoo Kaashidhoo Vaadhoo Hitadhoo 1B
SMEs	Registered farm plot	☐ 20,000- 100,000 sqft. / SME	• Local market • Neighboring island • Male market • Resort / city hotel via cooperatives or group	1. Soil Cultivation 2. Green house 3. Pot farming 4. Hydroponics	AMCS Fresh Yield Agro-service 2A
SMEs	Inside of building	☐ Details Unknown	• Retail shop • Resort • Individual direct sale	1. Plant Factory (Hydroponics x LED)	Habitus pvt. 2B
Large Sale Enterprises	Uninhabited islands	☐ 5 ha ~ 99 Ha / Island	• Male market • Retail shop • Resort	1. Soil Cultivation 2. Green house 3. Agro-forestry (long term crops)	Seagull Fantasy Theefaridhoo Medhukun'-burudhoo 3A
Resort	Resort island	☐ Details Unknown	• Resort for customers for Staffs	1. Pot farming 2. Net house 3. Green house 4. Hydroponics (Aqua ponics)	Hideaway Resort The Residence 3B

Source: Prepared by the survey team

Figure 4-1 Production Entities and Agricultural Production Environments

Category 1: Agricultural production by private producers on inhabited islands

1A: Individual growers growing crops in their backyards. It is common and practiced on all inhabited islands, and some producers are profitable on a small scale through vertical and hydroponic cultivation.

1B: A case in which an individual producer conducts agricultural production on a plot leased from the island. In many cases, the land is divided among island residents as their rights, and may be cultivated by the landowner or leased to others, including foreigners. Farmland may be leased for a short term of one or two years or for a longer term of 10 years or more, depending on the island.

Category 2: Agricultural production on inhabited islands by companies

2A: A case in which a company on or off the island acquires farmland under a paid lease agreement with the Island Council for production. Invest in green houses, etc., hire foreigners, and produce on a larger scale.

2B: A case in which a company conducts agricultural production in a plant factory. The company uses LEDs, hydroponics, and air conditioning to practice cultivation in artificial environments that is not affected by natural conditions and does not cause transportation losses after harvest.

Category 3: Agricultural production on uninhabited islands by companies

3A: A case in which an individual or company leases an uninhabited agricultural island managed by MoFMRA for agricultural production. It may be operated by an agricultural distributor or resort for the purpose of strengthening its core business, or it may be operated solely for production.

3B: A case in which a resort company conducts agricultural production on the island. Vegetables, herbs and fruits are grown and provided to guests and resident staff. In some cases, production is contracted to a landscape management company.

Classification 1 (individual producers) is explained in detail in Section 4.2 and 4.3 of this chapter, and Classifications 2 and Classification 3 (firms) in Section 4.4.

4.1.2 Crop Classification

The government of Maldives has selected a total of 17 crops as promising crops for import substitution, and AgroNat is helping to increase domestic production through its contract farmer system. In order to examine the possibility of creating agribusiness based on the 17 crops in this survey, the survey team will identify issues in the agricultural sector and examine JICA's support measures for agricultural promotion. In analyzing the characteristics of this crop, Chapter 2 compares domestic production and import volume to confirm the impact of import substitution. Here the survey team summarizes their characteristics in terms of cultivation from the following perspectives (Table 4-1). In addition to the 17 crops, the survey team also added taro/yam and coconut, which are considered important for food security and promising crops for agribusiness in the Maldives.

① Plant subjects: characterized by a high percentage of Cucurbitaceae, Brassicaceae, and Eggplantaceae due to the influence of the Maldivian food culture. The high percentage of cucurbits in particular and their continuous cultivation is one of the causes of the spread of certain pests and diseases.

② Differences in growing season: Short-term crops represent crops grown for less than one year. It has the advantage of being able to flexibly select and grow crops according to market trends and changes in the environment. Short-term crops are grown mainly in the short-term contract plots due to their limited duration. Long-term (permanent) crops include tree crops such as coconut and papaya, and crops that are propagated successively by underground stems such as banana and taro. Adaptability to special environments, such as the palm family, which grows in salt water, and the taro family, which prefers wetlands, is another characteristic of long-term crops.

③ Transport Applicability: When aiming for import substitution, crops with low storability for transportation from overseas are considered a priority. Vegetables such as lettuce and cucumbers, whose quality declines significantly after harvest, have been confirmed to be of high interest to consumers due to the low quality of imported products.

④ Input of materials (fertilizers and pesticides): Short-term crops are preferred because of their high yield per area and profitability on limited farmland. Another reason is the short payback period. On the other hand, because cultivation is done on an individual basis, the spread of pests and diseases through slides is remarkable. It is generally known that legumes, permanent crops such as taro, banana and coconut are resistant to disease and have low production costs and good profitability.[65]

⑤ Hydroponics: Leafy crops such as lettuce, cucumbers and melons are suitable for hydroponics, and their stable unit prices, which are higher than those of other crops, are also behind the application of hydroponics.

⑥ Salt tolerance: In the Maldives, where salt damage is caused by storm surges and other factors, crops that can grow in salt water are mixed in with some of the windbreaks. In addition to coconut, screw pineapple, which is not listed in the table, is another important salt-tolerant agricultural product.

⑦ Potential for domestic seedling production: Currently, due to the lack of seedling production of ornamental plants as well as vegetable fruit trees, even seedlings that can be produced domestically are often imported from overseas. From the aspect of disease and pest management, there is a need to strengthen seedling production and quarantine in the Maldives, and MAP plans to introduce facilities for disease and pest surveys and tissue culture seedling production, which will be the core of these efforts, in the southern region of Gn.Fuvahmulah.

[65] Yields have been reduced due to exotic pests in coconuts and exotic virus diseases in taro.

Table 4-1 Classification and Characteristics of Major Crops

17 crops Recommended by AgroNat			Crop-specific characteristics related to sustainable production					
	Name of Crops	Family	Crop period	storability	Chemical input	Adaptability of hydroponics	salt resistance	Domestic seedling
1	Pumpkin	Cucurbitaceae	Short					
2	Sponge gourd	Cucurbitaceae	Short	Low				Major
3	Snake gourd	Cucurbitaceae	Short	Low				Major
4	Watermelon	Cucurbitaceae	Short					
5	Cucumber	Cucurbitaceae	Short	Low		High		
6	Melon	Cucurbitaceae	Short	Low		High		
7	Butternut	Cucurbitaceae	Short					
8	Chinese cabbage	Brassicaceae	Short	Low		High		
9	cabbages	Brassicaceae	Short					
10	Eggplant	Solanaceae	Short/Long	Low				
11	Tomato	Solanaceae	Short			High		
12	Capsicum	Solanaceae	Short/Long					Major
13	Lettuce	Asteraceae	Short	Low		High		
14	lady's finger	Malvaceae	Short					Major
15	Long bean	Fabaceae	Short		Low			
16	Banana	Musaceae	Long	Low	Low			Major
17	Papaya	Caricaceae	Short	Low				
Important crops contributing to food security								
18	Taro・Yam	Araceae	Long		Low			Major
19	Coconut	Arecaceae	Long		Low		High	Major

Source: The survey team

4.1.3 Issues in Crop Production

This section describes the challenges in agricultural production in Maldives. In particular, this section summarizes the current status of issues that need to be taken into account in order to sustain agricultural production in the Maldives in the future, as the lack of freshwater resources and soil degradation due to agricultural production become apparent, which is a unique issue in the Maldives.

1) Ecosystem Conservation and Pest Control

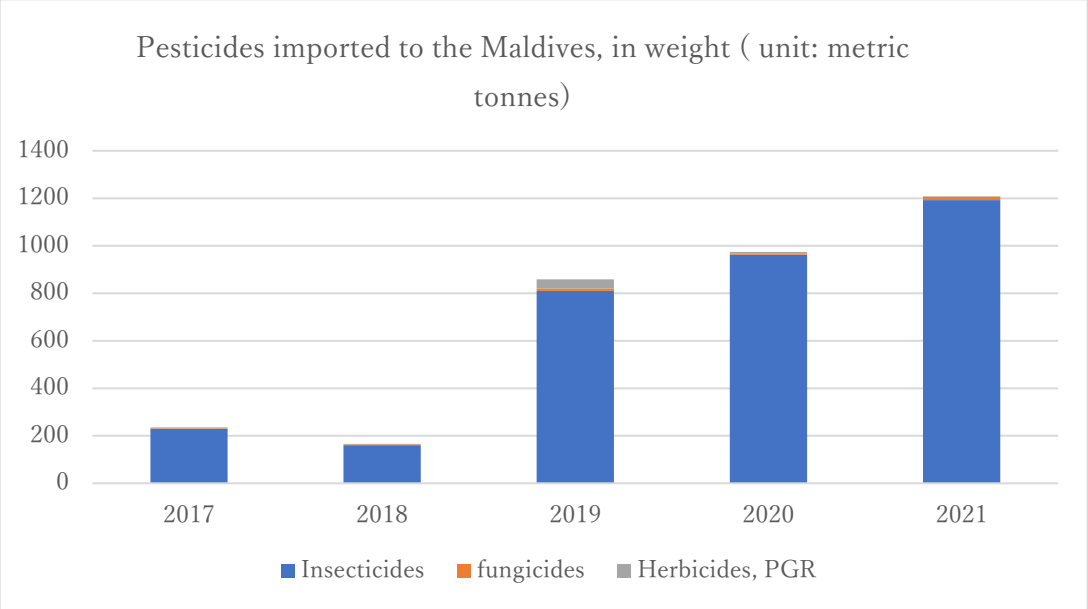
(1) Spread of disease and insect infestation

The islands of the Maldives are composed of fragile ecosystems, with the FAO report "COMMON PLANTS OF MALDIVES" showing that 60% of the vegetation is composed of non-native plants, some of which are invaders that are displacing native species. The same is true for insects. In recent years, the exotic coconut beetle and whitefly, which feed on coconut palms and other plants, have had a serious impact on insect damage, and the rapid expansion of damage is causing a growing sense of urgency. As for existing ones, including exotic pests, it is generally believed that a decrease in natural enemy insects and antagonistic microorganisms is the cause of these infestations, so it is important to control the use of pesticides to preserve the ecosystem.[66][67]

[66] https://www.apfisn.net/wp-content/uploads/2018/11/Common-plants-of-Maldives.pdf
[67] Ministry of Agriculture data: White fly and sooty mold infestation in Maldives , Integrated control of coconut hispid beetle Brontispa longissima

(2) Increased use of pesticides

Since 2000, agricultural development has been promoted by policy, and the use of fertilizers and pesticides has spread through the sale of fertilizers and pesticides by trade corporations. It is believed that the democratization policy since 2008 has freed agricultural inputs as a business for the private sector and at the same time eliminated import tariffs on agricultural products, resulting in an increase in the variety of imported agricultural products, which has increased the frequency of introduction of external pests and diseases, thereby increasing the demand and import volume of agrochemicals. The volume of insecticide imports since 2016 is 160 tons, while 1,292 tons were recorded in 2021. This number includes pesticides other than those for agricultural use, e.g., those used on resort property.



Source: Baseline Assessment on National Use of Chemicals and Associated Risks 2022[68]

Figure 4-2 Pesticide Imports in the Maldives

(3) Island Council (case study of AA. Thoddoo)

AA. Thoddoo is the second largest agricultural island after K. Kaashidhoo in terms of value shipped to Malé, and is the island that brought the pesticide challenge to the attention of the Maldivian public.

AA. The policy is to develop Thoddoo Island through organic agriculture and tourism. More than the superficial aspect of improving the image of tourism on the island, their actual thinking is: "This island is the only land left for the residents of this island. There is no other way forward than to aim for sustainable use and continuous production on this island, and agriculture as an industry with increased value. To achieve this, producers must move away from the current

[68] Baseline Assessment on National Use of Chemicals and Associated Risks 2022 (https://www.environment.gov.mv/v2/en/download/17999)

destructive agricultural practices, restore the rich ecosystem, and enrich the island through the production of valuable agricultural products". In the past, offers to procure agricultural products, such as from Hilton Resorts, have been turned down because of the lack of measures to address environmental impact, which is the reason why the transaction has not been initiated. Council members are developing the infrastructure by setting policies and using a variety of funding sources for the necessary resources. Based on this circumstance, the council members are promoting the development of infrastructure such as a safe agricultural water supply network, agricultural land for model companies, and simple agricultural analysis equipment.

(4) Agrochemical Sales

On many inhabited islands, agricultural material dealers are responsible for selling pesticides. According to K. Kaashidhoo's Agricultural Materials Retailer, sales operators are not required to obtain any special certifications or permits, and there are limited opportunities to learn relevant knowledge. When interviewed at pesticide retailers in this survey, a type of pesticide whose manufacture and sale was banned in the EU in 2016 was found on store shelves. The drug was banned because of its scientifically proven impact on the ecosystem, especially on bees, which are responsible for pollination. Retailers do not have that knowledge, and import channels are not clear.

(5) Feasibility of adopting Good Agricultural Practices (GAP)

In general, the functions assigned to the government to monitor quality, including the safety of agricultural products, include conducting surveillance, such as soil and water testing, quality testing of materials such as fertilizers and pesticides, and post-harvest inspections.

The central government is developing infrastructure, including the strengthening of quarantine units and analytical capabilities, to provide these enforcement functions. Issues include the shortage of technicians to operate the equipment, securing funds for implementation, and operating the equipment as a paid service.

2) Groundwater Conservation and Agricultural Water Supply

(1) Groundwater Challenges

While some islands have been suspected of groundwater contamination and salt damage, many councils explain that there are no problems. A study conducted by the Maldivian Ministry of Environment revealed that groundwater EC levels are clearly elevated in agricultural production areas, with one possible cause being nitrogen pollution from fertilizers and the other being salt damage. The Ministry of Environment is not equipped to monitor groundwater contamination and salt pollution, and the each island council is not yet able to provide scientific figures on the situation. On the other hand, the movement toward understanding the current situation is accelerating, as evidenced by the introduction of soil analyzers through the MAP project and the start of activities to raise awareness about the nitrogen cycle and the proper use of nitrogen

fertilizer.[69]

As a rule, the resort and uninhabited agricultural islands do not allow agricultural use of groundwater or marshland development, and companies strive to secure water for agricultural use through rainwater harvesting and seawater desalination by RO. However, it is difficult to actually match the cost of RO water production with agricultural production, and the Council of AA.Thoddoo, which is focusing on the method of using treated domestic wastewater for agricultural use.

(2) Challenges of hydroponics in the Maldives

Figure 4-3 calcium deposited in the hydroponics unit

Hydroponics has been promoted as a policy measure for more than a decade as part of water conservation efforts. Hydroponic units are distributed free of charge to each island, and R.Vaadhoo is one of them. According to MoFMRA engineers, groundwater contains calcium ions from corals, which inhibit plants from absorbing inorganic nutrients used in hydroponics, and therefore, rainwater or RO water that does not contain these ions is necessary for hydroponics. In addition, the hydroponic solution used at HA. Maafahi, one of the leased agricultural islands, sometimes causes a rise in water temperature depending on the air temperature, resulting in nutrient absorption disorders in lettuce and other plants. To address the issue, the procedure in the island take some measures to lower tempreture, such as introduce an air-cooling tower or putting a cooler in the circulation pump room.

(3) Trial of water-saving cultivation

As a reason mentioned above, spreading water-saving cultivation is expected. Fresh Yield, a start-up company based in S.Meedhoo, aims to promote a water-saving cultivation technology called “Auto-pot”. Unlike circulating hydroponics, “Auto-pot” is a water-saving hydroponics system that does not generate residual wastewater because of its solution replenishment system. With the support of the company, resorts have begun to use this technology using RO water, and on inhabited islands, demonstrations are being conducted using rainwater.

Table 4-2 Irrigation and Rainwater Use in “Auto-pot” Cultivation (water-saving cultivation)

House area	20,000sqft(1848m2)	Rainwater acquisition (dry season)	140 t / year (February)
Number of cucumbers	4,000 shares	Rainwater acquisition (rainy season)	462 t / year (October)
Monthly Irrigation	240t /4000 shares	Shortage occurs during dry season, consider RO	

Note: Southern precipitation: February (dry season): 75.9 mm/month, October (rainy season): 250 mm/month[70]

[69] Electrical conductivity: also used as an indicator to determine increases or decreases in salt and nitrogen concentrations in water and soil.

[70] https://www.meteorology.gov.mv/climate: Southern (GAN Island) annual precipitation is 2,218 mm, theoretical acquisition recoverable from house 1848 m^2.

From the above estimates, it can be inferred that during the rainy season, rainwater necessary for cultivation can be secured, whereas during the dry season, there is a shortage of about 50%. This result clearly shows that even if water-saving cultivation techniques are introduced, water sources other than rainwater are necessary. RO purified water and sewage reprocessed water have been focused on as alternative water sources to groundwater. There are plans to install the former on all inhabited islands to secure water for domestic use. As an example, Addu City also supplies RO water to businesses, but the price is MVR 100-130/t and is currently not intended for agricultural use. The latter has been put to practical use in some resorts, but the current situation is not yet at the stage of discussing the use of reprocessed water, as the spread of sewage treatment facilities is currently an issue for the inhabitant islands.

(4) Groundwater Use Control Measures

Permanent crops such as coconut, banana, and breadfruit do not require irrigation except in the early stages of growth because they have direct access to groundwater. On the other hand, the large amount of groundwater pumping that causes salt damage is thought to be caused by irrigation of short-term crops, especially concentrated during the dry season.

Traditional cultivation methods also confirm attempts to conserve water. In traditional watermelon cultivation, the technique is to create compost in the soil by burying organic matter or charcoal in a cylindrical shape and sowing watermelon seeds around the edges of the compost. This is thought to be a device to reduce runoff of fertilizer components and the amount of irrigation water by preparing a medium with enhanced water retention properties in the soil.

		
A banana orchard with a high groundwater table. Almost no irrigation is needed. (K. Kaashidhoo)	Traditional watermelon seeding method. Currently burying cattle manure instead of compost production.	Watermelon cultivation preparation work for Ramadan. Pumping large volumes of water in a short period of time

Source: Survey team photo

Figure 4-4 Groundwater Use Control

Taro/yams cultivation using wetlands (Cultivation cases that do not use groundwater)

In S. Hithadhoo, located in the western part of Addu city, large-scale taro/yam cultivation continues today using traditional methods. 80% of the households maintain plots of about 400 sqft and harvest 800 kg/household per year. In GA. Kondey, cultivation continues in the low marshy areas of the island.

		
Taro cultivation in a wetland plot located in the center of S. Hithadhoo, Addu. Approximately 1,500 households use the service.	Artificially dug yam plots. Stable groundwater levels are important. (GA. Kondey)	Yams are harvested at 7 months and planted immediately after harvest. It has been lotus-crafted for many years. (GA. Kondey)

Source: Survey team photo

Figure 4-5 Cultivation in wetlands

3) Adverse Effects of Importing Materials and Possibilities of Domestic Production of Substitutes

In the Maldives, the introduction of modern agriculture was promoted by the MoFMRA as a policy measure after 2000. Until 2008, agricultural materials had been sold at official prices by the STO (State Trading Office), which meant that agricultural materials whose quality was verified by the government were sold to producers at stable prices. After 2008, the new administration eliminated tariffs on agricultural imports, further expanding agriculture's reliance on agricultural materials imported from abroad. According to several producers, the introduction of chemical fertilizers and pesticides increased productivity, but after a few years, productivity declined. The reasons for this are thought to be soil degradation and ecological disturbance. Current challenges include inadequate quality verification systems and import inspections, which has resulted in inappropriate organic fertilizers and pesticides, as well as plant seeds and seedlings being imported and distributed in the market. Based on these circumstances, the following describes the current status and potential for the production of imported substitutes in the Maldives: 1) compost (to replace imported cattle manure), 2) biological control materials (to replace inappropriate chemical pesticides), and 3) tissue culture and grafted seedlings (to replace imported seedlings).

(1) Potential for Compost Production

Moves toward domestic production of compost have been identified throughout the country. As mentioned above, the background to this is soaring prices due to increased transportation costs, uncertain quality, and environmental effects such as nitrogen pollution and ecosystem disturbance. For agricultural production in sandy soils, it is important to use organic matter such as compost in order to prevent nutrient leaching and improve soil water retention.

More and more islands are starting the compost production practiced in the advanced case AA.Ukulhus. K.Kaashidhoo Island Council has sent council staff to AA.Ukulhus with the island's budget to plan for compost production in K.Kaashidhoo. R. Vaadhoo helps individuals create

compost and encourages the reduction of household waste and its use in vegetable gardens. Since compost production from food waste is mandatory in resort islands since 2023, electric composters are being introduced. Compost production is also important as an attempt to stop the customary dumping of food wastes into the ocean and to convert them into resources. However, due to the aspect of lack of economic viability, active activities are limited to a few islands.

(2) Domestic Seed and Grafted Seedling Production

Disease management and introduction of disease-resistant varieties necessary to increase agricultural productivity involves 1) identification of appropriate seedstock and 2) introduction of technologies that can be multiplied in the short term. Inadequate functioning, especially with respect to 2), has led to an increase in seed imports and the risks associated with the diseases and insects brought in. Specific methods under consideration include seedling technology using tissue culture, propagation by cuttings, quality improvement by grafting, and disease management related to native crop succession.

MoFMRA had promoted native varieties in the past. Endemic Chilean seeds are not commercially available, and therefore farmers obtain the seeds by purchasing the fruit from islands with a good harvest. Such methods can lead to the spread of disease through the seed, so properly produced and properly treated seed needs to be distributed. Viral diseases of taro have also become a problem, and resistant varieties from Kenya have been introduced. The dissemination of new taro varieties requires seedlings, and tissue culture technology is inadequate, so dissemination has been slow. MAP is already planning to install the necessary equipment in Gn. Fuvahmulah, and training of technicians is required.

(3) Possibility of Domestic Production of Biological Pesticides

MoFMRA has a history of attempting to introduce natural enemies (parasitic bees) and insect parasitic fungal products such as Metharizium against the important pest coconut beetle. Although these are mentioned in extension materials, there have been no ongoing pest control activities. Therefore, in the future, it is expected that the private sector will combine its material production function with the management function of the government, and establish an extension support system that farmers can use on an ongoing basis. Southeast Asian countries, including Japan, have experience in biological pest control, and it is expected that an international research team will be formed and that MoFMRA will collaborate with companies in the Maldives for material production.

Examples of palm pests (difficult to control with insecticides due to drug resistance, etc.)		Natural enemy insects (biological pesticides)
(i) Rugose spiraling whitefly (a type of whitefly)	(ii) Brontispa longissima (Kimne black-naped beetle)	(iii) Tetrastichus brontispae (A type of hymenopteran.)

Sources: (i), (ii) Photo by survey team (AA.Kaashidhoo), (iii) Image provided by Can Tho University (Vietnam)

Figure 4-6 Crop Pests of the Family Palmaceae and Effective Natural Enemies

4.2 Agricultural Production by Individual Producers

According to MoFMRA data, farmers registered with the Ministry are located on a total of 84 inhabited islands. Although the definition of an agricultural island is not clearly defined, if an agricultural island is defined as island where even one farmer exists and some kind of agricultural activity is taking place, it can be said that about 45% of all inhabited islands are agricultural islands.

4.2.1 Production System

(1) Agricultural land

Agricultural production by individual producers is currently limited to the inhabited islands, and is conducted in (1) backyards (backyards of private homes) and (2) agricultural land which is distributed by the Island Council for each household. In some cases, the management of coconut fields and other agricultural lands owned by the Island Council are outsourced to individual farmers. In S. Hithadhoo, Addu city in the southern Maldives, the cultivation of taros (yams) in wetlands is thriving, with wetlands leased by the Island Council to more than 80% of all households, and the cultivation of taros continues, mainly for self-consumption.

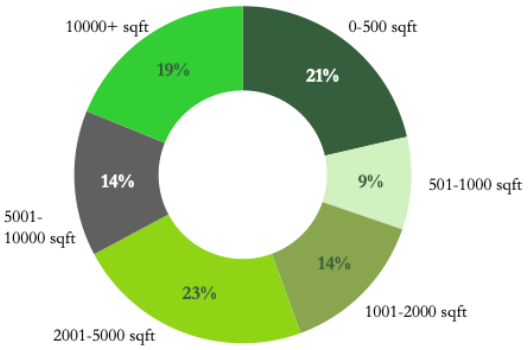
Modern agricultural development through the leasing of farmland began as a government policy after 2000. The goal was to convert from traditional subsistence farming to more productive modern agriculture using purchased fertilizers. In K. Kaashidhoo, the survey team also observed cases of people changing jobs from fishing and resort construction day jobs to agriculture during the same period. On the other hand, in recent years, due to decentralization and policies aimed at making the island's economy independent, there has been a trend toward increasing income by leasing farmland to island residents (including fishermen) who had been reluctant to engage in agricultural production, and the food insecurity caused by the Corona disaster and the economic collapse of Sri Lanka have accelerated this trend. Agricultural production zones have been

identified in the LUPs on each island, which are being developed under central initiative, and it is expected that agricultural production opportunities will be further provided to island residents and businesses in the future.

Basically, farmland is leased free of charge, and the area is set per household, with the general rule being that the more people in a household, the more farmland is distributed. Their size varies from island to island. Table 4-3 shows the agricultural land area interviewed from island council and residents, where the survey team visited. There are various land size from 1,200 sqft at R.Inguraidhoo to 20,000 sqft at S.Meedhoo. The average size per household on the inhabited islands visited in this survey was less than 7000sqft.

Table 4-3 Agricultural land area per inhabited household

inhabited island	population	Average Household farmland (sqft)	main industries
HA. Baarah	1,039	4,000	fishing
HA.Utheem	566	2,000	sightseeing
HDh.Finey	380	170	agriculture
HDh. Nolhivaran	1,904	5,000	agriculture
AA. Thoddoo	1,532	11,500	agriculture
K. Kaashidhoo	1,848	22,000	agriculture
R. Angolhitheem	349	3,000	fishing
R. Inguraidhoo	1,222	1,200	unknown
R. Maakurathu	878	2,000	unknown
R. Hulhuduffaaru	1,133	3,000	Construction , Fishing
F. Nilandhoo	487	5,000	agriculture
GA. Kondey	275	10,000	fishing
Meedhoo/Addu	1733	20,000	fishing
average		**6,836**	



Source: Agriculture survey 2019

Figure 4-7 Plot Area and Ratio by Plot Size

This did not differ significantly from the Agriculture Survey 2019 results shown in Figure 4-7. For islands with large parcels such as S.Meedhoo, in response to the recent increase in the number of residents who wish to own farmland, the committee is considering changing the parcel size to 10,000sqft and renting it for a fee so that the farmland can be given to the farmers who are willing to secure profitability.

On traditional inhabited agricultural islands such as K. Kaashidhoo, it is customary to cultivate same leased farmland for many years, they can plant long-term crops such as bananas and coconut palms in distributed farmland. Those crops are mainly planted on the boundaries to form buffer plots with adjacent fields. On the other hand, the small plots newly leased as a policy in recent years have a specified period of time, such as one year, which does not create incentives for long-term investment such as border planting and irrigation pipes, and as a result, productivity remains low. Consolidation of farmland also requires negotiating privately with adjacent land tenants.

		
Adjacent fields are separated by shade nets. (R.Inguraidhoo)	Bananas are used for relatively large field boundaries. (K.Kaashidhoo)	Coconuts are also used to border even larger plots. (Meedhoo/ADDU)

Source: The survey team

Figure 4-8 Farmland in inhabited islands

(2) Agricultural water

Kinds of water used for agricultural production on inhabited islands are mainly groundwater and rainwater, with some islands promoting the use of RO water.[71]

(1) Groundwater: Surface groundwater can be pumped from a depth of 0.5 m to 2 m below the ground surface and is typically irrigated directly using gasoline engine pumps. Pumping of groundwater is prohibited on uninhabited islands (leased agricultural islands and resorts).

(2) Rainwater: As an essential water resource for island life, rainwater is collected and stored from the roofs of homes and public buildings. Since groundwater use is limited on uninhabited agricultural islands, cisterns have been developed to collect rainwater from the roofs of buildings and greenhouses for use in agriculture. Even on inhabited islands, rainwater is being used for hydroponics, etc., where the quality of groundwater is deteriorating, and the minerals contained in groundwater are having a negative impact.

(3) RO water: Refers to fresh water obtained from seawater by reverse osmosis. As groundwater contamination has become increasingly serious and the number of islands unsuitable for domestic use has increased, it has been decided that RO plants will be constructed on all inhabited islands in Maldives, and construction is progressing sequentially. Small RO water purifiers are already installed in homes and used for food and beverages. Industrial prices are expensive at MVR 100-130 /t.

(3) Energy

Currently, the primary energy requirement for agricultural land is fuel (gasoline) for engine pumps used for groundwater pumping. According to a young producer (28 years old) of HDh. Nolhivaran, 1L of gasoline can irrigate 1,000L of water. Except for a few islands, there is no electricity supply to the farmlands in visited inhabited islands, leading to residents' dissatisfaction.[72]

[71] This survey was conducted in Thoddoo, Kasshidho, and Meedhoo.
[72] In GA. Nilandhoo, each field is supplied with electricity and irrigation using electric pumps is practiced.

Since the demand for electric power is expected to increase in the future, such as in the case of AA. Thoddoo, where there is a smart island concept to install fiber-optic cables throughout the island, diversification of power generation, such as solar and wind power, is planned when RO facilities are installed. Existing power plants are aging and power shortages may become apparent.

		
AA. Thoddoo Fueling Station attracts two companies and expects to right-size prices. MVR 20/L is the market price.	RO water purification plant with wind power generation (K.Kaashidhoo)	Gasoline Engine for Lifting Pump (Gemanafushi)

Source: JICA Survey Team

Figure 4-9 Energy Supply in inhabited islands

4.2.2 Farmer

According to MoFMRA data, there are 7,613 nationally registered farmers (52.7% of them is women). The largest number of respondents was AA. Thoddoo with 920, followed by K. Kaashidhoo with 764. Since foreign workers are not included, the actual number of workers is estimated to be larger than this figure.

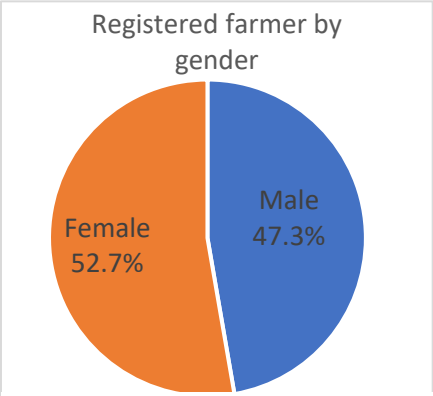


Figure 4-10 Registered farmer by gender

Agricultural workers in agricultural production by individual producers can be divided into three categories: (1) full-time farmers, (2) part-time farmers, and (3) foreign workers.

(1) Full-time farmers

It was observed that the number of full-time farmers who make a living from agriculture is particularly high on resident islands that have traditionally been engaged in agriculture with little income from fishing or tourism. For example, GA.Nhikandhoo has 208 households engaged in agriculture, compared to about 500 actual residents. The island prioritizes the use of plots by full-time farmers who are willing to manage their business by charging a fee of MVR 50/month. Producers acquiring large plots of about 20,000 sqft in K.Kaashidhoo and S.Meedhoo are full-time farmers. These inhabited islands are characterized as traditional agricultural islands where commercial agriculture started in accordance with the agricultural promotion policy after 2000.

(2) Part-time farmers

While many farmers in AA.Thoddoo are identified as full-time farmers, some producers are also identified as guest house owners or retail store owners. On one of the fishing islands, GA.Gemanafushi, male fishermen also work in the fields on Friday when fishing does not take place. On an agricultural island HDh. Nolhivaran, one young farmer made a U-turn and took a job as a civil servant at the island's hospital, and he was engaged in farming as a dual job. In such cases, the crops were watered before his work in hospital and harvested and shipped in the evening.

(3) Foreign workers

Cultivation by foreigners can be seen mainly on the inhabited islands near Malé. Mostly cases where Bangladeshis are employed by Maldivian landowners, cases where the landowners left the island and are entrusted with the management itself, and cases where lands are bundled and foreign workers are hired to manage it on behalf of the Maldivian landowners are observed. It is thought that there are few foreign workers on the inhabited islands in the north and south, and that they are mainly employed and engaged by companies on uninhabited agricultural islands and resort farms.

4.2.3 History of Entry in Agriculture Sector

The histories of entry into agriculture obtained from the interviews in this survey is summarized below. To understand the human resources that will support commercial agriculture in the future, it is important to understand how young people in particular are currently entering the agricultural sector and what are the challenges for them.

As successor

Case 1: K. Kaashidhoo (33 years old, male)

After graduating high school, he studied business administration while working in prison as a government employee. He aspires to run an agricultural business in his hometown of K. Kaashidhoo and has been elected Secretary General of the Island Council at the end of 2022. He works concurrently as a public servant, acquiring farmland and organically growing bananas and papayas while managing his father's coconut grove. He is self-taught in agricultural technology and is particularly interested in organic farming.

Case 2: K. Kaashidhoo (29 years old, female)

Until last year, she worked for a seafood processing company. Still, her interest in smart agriculture and agro-processing led her to teach himself the techniques, build her greenhouse at home, and install hydroponic cultivation facilities. She plans to start a smart farming and coconut oil business in that women on the island can be involved.

As an improvement in household income

Case 1: K. Kaashidhoo / (male, age 50s)

Until 2002, he was a day laborer in the fishing industry and resort construction, but his income declined and he decided to take up farming.

At that time, the Ministry of Agriculture began to promote the use of chemical fertilizers and pesticides, so they started with agriculture using agricultural materials. There was no knowledge of traditional agriculture. Opportunities to learn agricultural techniques were limited, and even today, they lack basic cultivation techniques such as diagnosis of pests and diseases and crop rotation systems.

As migrant labor from abroad

Case 1: AA. Thoddoo / (Bangladeshi, male)

A landowner (Malé resident) of AA. Thoddhoo has hired him 10 years ago in charge of farming. He learned agriculture under the guidance of a Maldivian farmer (AA. Thoddoo resident), a relative of the landowner.

Case 2: K. Kaashidhoo / (Bangladeshi, male)

Two years ago, a worker placement agent arranged a job in the Maldives for him. At the time of registration, the agent promised him factory work, but in reality he was given no other option but to work in agriculture. Since he has paid a hefty registration fee to the agent, he cannot abandon his job even if he is dissatisfied.

As a side business

Case 1: AA. Thoddoo / (34 years old, male)

He graduated from a university in India and worked for 5 years in the IT hardware development department of Maldives Transport Contracting Company (MTCC) and made a U-turn home to his hometown AA. Thoddoo in 2018. Started managing a guest house and restaurant, and from 2021, started poultry farming business. The reason for entering the market was that the tourism industry stopped due to the Corona disaster, and at that time he learned that the Maldives imported a large amount of chicken eggs. Elected as Director of LAC and assumed management responsibility.

Case 2: HDh. Nolhivaran / (29 years old, male)

He studied in Malé and went to work in a U-turn a few years ago. He started farming while working as a government employee at a hospital on the island. Perform agricultural work before or after official working hours. Utilizing his previous contacts, he secured sales channels, including resorts. The company aims to expand its farmland in order to secure production.

A unique phenomenon in the Maldives is that many young agricultural entrepreneurs are U-

turners. These young people have gained advanced education and experience through their professions and have returned to their home island because they recognize this as a social issue. Their interests vary from preserving the natural environment and culture, or food security and self-reliance on their home islands. Young agricultural entrepreneurs do not necessarily have a degree in agronomy but rather understand the potential of agricultural production technology and distribution and marketing through various opportunities and take concrete actions. Some young people also wanted to be members of these startups but did not leave the civil service and commuted from Malé to the island for the weekend to participate in their activities, as their profitability was not inevitable.

It is rare for farmers with agriculture skills to participate in agriculture, and the survey team observed cases where people from different industries, such as fishing and construction, entered agriculture without sufficient educational opportunities, in line with the agricultural promotion policy since 2000.

4.2.4 Production and Profitability

1) Production in the Backyard

Backyard crop production is considered a traditional agricultural culture. The backyard area varies from island to island, ranging from 200 sqft on R.Vaadhoo to about 2,000 sqft on S. Hithadhoo . Taking advantage of the unique backyard environment, various crops grown for subsistence and marketing purposes are listed in the table below.

Table 4-4 Major Crops Produced in Backyards

Cultivation Method	Typical crop name	Feature
Pot culture	Chile, copi leaf, eggplant	Cultivation with medium, regardless of soil quality
Hydroponics	Lettuce, cucumber, melon	Some inhabited islands with hydroponic unit assistance[73]
Land planting (short-term crops)	Beter leaf, corn, and green beans,	Resident island with good quality crop soil
Land planting (long-term and permanent crops)	Banana, lemon, coconut, breadfruit,	Resident island with relatively large back yard

Crops are grown in a medium (compost mixed with washed coral sand) in a pot culture. Hydroponics grows crops by creating and circulating nutrient solutions with water-soluble chemical fertilizers. Both methods are used to produce backyard fruit and leafy vegetables,

[73] R. Vaadhoo: The Council is leading the way in agricultural production without the use of pesticides, and recommends circular agriculture, in which compost is made from household waste and used in agriculture. The project aims to revitalize the agricultural economy by attracting a city hotel (a resort on an inhabited island), diversifying the sales destinations of the island's farmers, and providing plots of farmland for lease to businesses.

allowing growers to utilize limited areas effectively. The ability to protect crops from the wind and rain because of the roof and walls of the dwelling is a strength of the backyard. Although the shadows of buildings limit the time that crops are exposed to direct sunlight, during the dry season, sunlight is considered strong and sufficient for growth. In particular, vertical cultivation units, which will be introduced in the future, yield more than three times the standard yield per unit area.

		
Copi-leaf (Kale): sold at MVR 3 to 5 per piece.	Bitterleaf: preference crop, sold at MVR 85 / 50 pieces.	Breadfruit, a traditional crop that provide shade.
		
A type of curry leaf: 5 pieces for MVR 15.	Hydroponic and vertical growing units are made in China (R. Vaadhoo)	Raising poultry: for own consumption and for sale on the island (MVR500/ bird).

Source: Survey team photo

Figure 4-11 Production in the backyard

Women dominate production, and no foreigners are hired for cultivation. At K. Kaashidhoo, an attempt to improve backyard economics was identified, with a female entrepreneur building her 800 sqft greenhouse, importing vertical hydroponic units from China, and starting water-saving lettuce cultivation using rainwater.

Table 4-5 SWOT Analysis: Production in the Backyard

Internal factor	**Strength** ✧ High labor productivity: use of free time, no need to travel to the field ✧ Low infrastructure investment: existing infrastructure such as electricity and water available ✧ Some crops, such as Bitter leaf and hydroponic lettuce, which can be used vertically, are expected to be profitable. ✧ Chickens, rabbits, and other livestock can be raised with leftover food and vegetable residues.	**Weakness** ● Seedling production is difficult on a small scale. Challenges in efficient production such as seedlings. ● Lack of seedling supply business and home garden support business as a public service. ● Stable shipments are impossible with small-scale production. Lack of sales channel support services suitable for irregular production.
External factors	**Opportunity** ✧ Isolated environment, limited impact of pests and diseases from other sources. ✧ Traditional subsistence crop production. Livelihood improvement measures as a culture. ✧ Attempts to promote sales of surplus agricultural products through group information exchange via SNS are becoming more common.	**Threat** ● Less housing area allocated to the younger generation, backyard area will decrease in the future

Compared to other farming systems, input costs are relatively low due to the ability to utilize spare time and existing infrastructure. Therefore, it is considered one of the agricultural production activities that will continue to be persistent and profitable in the future, despite its small scale. Producing leafy vegetables and herbs in alley gardens is also common in cities such as Hulumalé, helping to reduce household expenses.

2) Production in leased plots

As mentioned above, individual producers may acquire farmland from the Island Council according to the island's own rules. Items that vary from island to island include area, contract length, land lease rates, and infrastructure. Residents seeking to engage in agricultural production prefer long-term contracts that are favorable for capital borrowing and infrastructure investment.

AA. Thoddoo and others, which have not allowed long-term contracts in the past, are also changing their systems in response to requests. Some inhabited islands, such as K. Kaashidhoo, where traditional agricultural inhabitants are customarily allowed to extend their contracts and continue to use the same farmland for many years. It is reported that due to the growing interest in agriculture, S.Meedhoo is planning to divide the 20,000sqft free-lease field into 10,000sqft and change it to a paid-lease field starting this year. The Council believes that by leasing the land for a fee, producers who are willing to generate profitability can acquire farmland at an advantage. Below are the cultivation methods and characteristics in the loaned plots.

Table 4-6 Cultivation Methods and Crop Examples

Cultivation Method	Crops Grown
Pot culture	Chili, eggplant, papaya
Hydroponics	Lettuce, cucumbers, melons (mostly grown in greenhouses)
Paddy moist all year due to improper irrigation	Taro Yam,
Soil cultivation (short-term crops)	Chinese cabbage, kopi leaf, cabbage, eggplant, passion, etc.
Soil cultivation (long-term and permanent crops)	Papaya, banana, coconut,

Note: Permanent crops are found in S. Meedhoo and K. Kaashidhoo and are grown in long-term rental plots.

The loaned plots are primarily used for short-term crop production with soil tillage. The contracts are short-term contracts of about one year, so they are not suitable for the cultivation of permanent crops such as coconuts. Permanent crop cultivation is also observed on some inhabited islands, where customary long-term use of plots is permitted. Traditional cultivation methods, including watermelon cultivation, are unique to the sandy soil. Irrigation is often done by hand, and water-saving sprinkler tubes are becoming popular in some areas.

Papaya (AA. Thoddoo)

Cucumber (AA. Thoddoo)

Watermelon (planted in the ground)

Source: Survey team photo

Figure 4-12 Production in loaned plots

On the other hand, greenhouses are desired to protect crops from the effects of rain, wind, and other weather conditions. In addition, the use of nets to protect fruit trees from flying foxes (commonly known as fruit bats), which are considered a pest to fruit trees, and other measures are being taken. Many growers use imported products from China, but in some cases, the solid

solar radiation unique to the Maldives causes high temperatures in the greenhouses, affecting the growth of the crops. The Addu City Council-funded loan program aims to promote greenhouse for training for producers, which will be built jointly by the National University and APC and will train growers using greenhouses. There are plans to build a model of smart agriculture in AA. Thoddoo, including greenhouse cultivation, and to implement an attempt to provide learning opportunities for growers[74]

		
Plastic greenhouses used for melon cultivation (S. Meedhoo)	Cucumber cultivation in shade net house (HDh. Nolhivaran)	APC Green House Installation Support Program Component Storage (Addu)

Source: Survey team photo

Figure 4-13 Production in facility cultivation

A SWOT analysis of the agricultural production conducted on the leased plots is presented in the table below.

Table 4-7 SWOT: Production in leased plots

Internal factor	**Strength** ✧ Free farmland and groundwater ✧ Possibility of scaling up ✧ Free cropping plan	**Weakness** ● Negative effects due to proximity to neighboring fields, poor windbreak netting, and chemical dispersal. ● Lack of Conscious conservation of soil fertility and the environment (especially in the case of short-term contracts) ● Lack of basic agricultural technology and learning opportunities ● Lack of hands-onguidance by technical extension staff

[74] ADDU Peoples' Cooperative Society: currently focuses on programs to support solar power installations. The loan source is supported by the ADDU City Council to APC at 1% interest.

External factors	**Opportunity** ✧ Possibility of infrastructure expansion in the future ✧ More Convenient Cultivation Environment ✧ Preferential treatment for full-time farmers through paid rentals ✧ Possible to expand scale through land transactions ✧ Possible to improve workability by supplying power	**Threat** ● Increased costs due to soil degradation and water pollution

Traditional seed culture remains in the rental plots, with a succession of native species such as chili, okra, beans, and loofah. Chile growth, in particular, favors the Maldivian variety. On the other hand, it has become customary to import fruits and seeds from other islands, causing the introduction of diseases through seeds. Some producers requested training on seed collection and disease.

Black bean	Lady's Finger	Chile

Source: Survey team photo

Figure 4-14 Native Crops for which Seeds are harvested

3) Profitability

(1) Production-related expenses

Agricultural production in the Maldives is supported by various imported materials. The recent surge in marine transportation costs has led to price increases for various materials. The status of fertilizer, plant pest control materials, agricultural water, electricity, labor, and material transportation costs associated with the major production costs are shown below.

[Fertilizer]

Chemical fertilizer	Imported from Thailand, India, EU, etc. Because of its high cost, cattle manure is often used as the primary fertilizer in field crops, and chemical fertilizers are used for additional fertilizer. Water soluble chemical fertilizers required for hydroponics are mainly imported European products.
Cow dung	Imported from Sri Lanka and India. Wholesale price in Malé is MVR 65 /25kg,

	Resident Island retail price is MVR 120 /25kg (Addu) and the burden of domestic transportation cost is a burden for distant producers. One of the causes of seeds and insects brought in from abroad.
Household garbage composting	Garbage is mixed with grass and wood ash, fish meal, and seaweed to process and produce compost at home and in the council. R. Vaadhoo Council is attempting to sell to producers at MVR 2/kg.
Grass ashes	Grass on public land was burned and the resulting grass ash was used as fertilizer. Currently, open burning is prohibited and use is limited.
Food Residue Composting	Composting of resort food residues will be mandatory starting May 2023. Operating costs for electric composters, which are increasingly being introduced, are as follows Residue throughput 500 kg/day, 45 kwh generator fuel consumption: 14L diesel oil (MVR 240) per hour, MVR 5,760/day. The fuel cost for 100 kg of compost yield requires MVR 5,760.[75]

		
Various chemical fertilizers sold at agrochemical retailers (Malé)	Indian dried cow dung piled up at the harbor (AA. Thoddoo)	Electric composter installed at the resort (The Residence)

[Plant control materials]

Chemically synthesized products	Many insecticides are imported, and chemicals are sold from Thailand, India, and Sri Lanka. The variety of drugs is small, and products labeled in foreign languages are still on the store shelves. Continued use of the same drug is common.
Derived from medicinal herbs	Tobacco and Neem leaves are traditionally used. There is no custom of squeezing Neem Oil and Neem berries are not used. Most Neem Oil on the market is imported from India.
Natural enemy material	Anti-insect parasitic fungi such as Metarhizium are commercially available. No sales of insect-based natural enemy materials, such as parasitic bees, which are difficult to produce and preserve, were identified.

[75] This cost has been a burden to the resorts, and some resorts have explained that they will consider alternatives.

		
Insecticide (Thai description)	Neem Oil	Insect Parasitic Bacterial Preparations

[Agricultural water for irrigation]

Underground water	Agricultural water commonly used on inhabited islands. The water is pumped from a well in the field by an engine pump and irrigated by hand using a hose. It is believed that increased irrigation during the dry season causes the groundwater table to drop, leading to seawater contamination. In K. Kaashidhoo, microbiological and nitrogen contamination of groundwater is revealed, and public water supplies are being used for agriculture.
Rainwater	Backyard: rainwater is collected from the roofs of houses and public buildings and stored in rainwater tanks. Mostly for hydroponics.[76] Leased plots: rainwater from greenhouses for mainly for hydroponics.
RO water	Fresh water made from seawater by the reverse osmosis membrane process. Production costs: fuel cost MVR 60/t water (not including cost amortization of capital investment)
Treated wastewater	Reuse of treated septic tank water at Hideaway and other resorts. It is used for greening trees and resort plantations.

		
Pumping groundwater from a well (R. An'golhitheemu)	Stormwater collection and storage from public facilities (R.Vaadhoo)	RO water production equipment, producing pure water by passing pressurized seawater through a membrane inside a cylinder (Hideaway Resort)

[RO public water supply] (Unit: MVR/t)

Resident price	Minimum unit price (less than 100 tons/month): 22, Maximum unit price (200 tons/month or more): 95

[76]Suitable for hydroponics because it does not contain ions such as calcium that inhibit nutrient absorption.

Business price	Minimum unit price (less than 100 tons/month): 100, Maximum unit price (200 tons/month or more): 135

* ADDU City unit price, unit price also increased due to increased usage. Business prices include agricultural businesses.

[Power]（Unit MVR/kwh)[77]

Resident price	Minimum unit price (<100kw): 1.5, Maximum unit price (>600kw/month): 4.25
Business price	Minimum unit price (<100kw): 3.25, Maximum unit price (300kw/month or more): 6.00
Administrative agency prices	Minimum unit price (<100kw): 4.5, Maximum unit price (>600kw/month): 7.5

[Agricultural labor costs] (Unit: MVR/month)

Foreigner (inhabited Island)	6500/month (including meal subsidy 1000 + housing subsidy 500) / AA.Thoddoo
Foreign (Agricultural Island)	6,000 per month (meals and housing provided free of charge)/Sh.Medhukun'burudhoo
Maldivian Administrator (Agricultural Island)	15,000/month (meals and housing provided free of charge)/Sh.Medhukun'burudhoo

[Material transportation costs] (exapmle of February 2023)

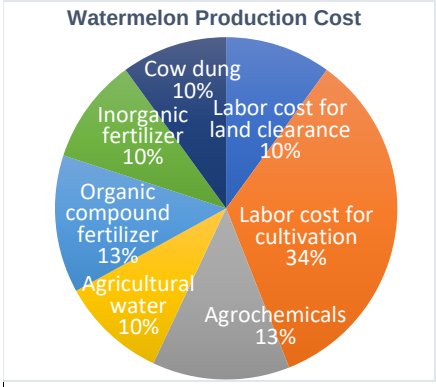
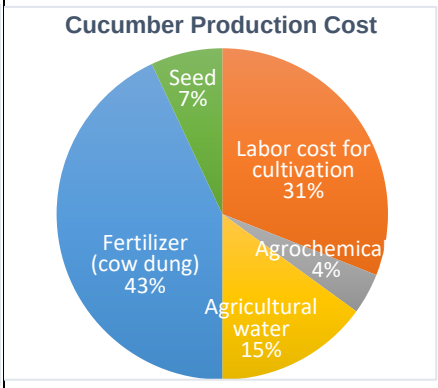
Transportation Cost: Colombo -> Malé	USD 125/t (MVR 1,920)	Transportation cost: MVR 1.92/kg
Transportation Cost: Malé -> Addu	USD 125/t (MVR 1,920)	Transportation cost: MVR 1.92/kg
Cattle manure retail price (Malé)	MVR 63/25kg (MVR 2.52/kg)	Retail price difference (MVR 2.48) includes transportation and retailer fees
Cattle manure retail price (ADDU)	MVR 125/25kg (MVR 5.0/kg)	

(2) Production Cost Structure

The cost structure for production varies by crop type. Below is a comparison of the cost structure of cultivation, using watermelon and cucumber, the main crops in the Maldives, as examples.

[77] AA. Thoddoo electricity prices and business prices apply to agricultural businesses as well.

Table 4-8 Comparison of Cultivation Costs and Revenues

	Watermelon		Cucumber	
Cultivated area	10,000 sqft		15,000 sqft	
Growing season	90 days		75 days	
Cultivation Method	alley		alley	
Island name	AA. Thoddoo		AA. Thoddoo	
				
Total wages	8,500	44%	7,000	31%
Total Fertilizer	6,500	33%	9,750	43%
Seed and seedling pesticides	2,500	13%	2,350	11%
Agricultural water	2,000	10%	3,420	15%
Total Expenses	19,500		22,520	
Harvest	1,500kg	Unit price MVR 15/kg	1,400kg	Unit price MVR20/kg
Sales	22,500		28,000	
Earnings	3,000		5,480	

Labor and fertilizer costs, including land preparation costs, account for 74% to 77% of total costs. The rate of return, calculated based on the assumed production costs and sales price, would be 10-20%. Lowering labor and fertilizer costs, which account for about 75% of the total, is a means of improving the rate of return.[78]

Agricultural production in the backyard is done by family labor and does not require time to travel to and from the field, which gives it an advantage with respect to labor costs compared to rental plots. Pest infestation is also limited, and production is generally not dependent on chemicals.

4.2.5 Challenges and Prospects as Perceived by Individual Producers

The following information obtained from the interviews on the agricultural islands summarizes the challenges and prospects perceived by individual farmers.

[78] K.Kaashidhoo pays foreign workers MVR 300-700 /1000 sqft for cleaning and plowing after harvest.

1) Land use issues
2) Issues related to cultivation technology
3) Sales issues
4) Issues related to non-native introductions and seedling production
5) Issues related to domestic production of agro-processing and agricultural materials
6) Concerns about foreign workers, expectations for young human resources

1) Land Use Issues and Prospects

(1) Lower incentives for long-term investment due to short-term lending

In order to implement productive agriculture with low labor costs, it is necessary to build infrastructure such as greenhouses and irrigation systems, but such investments cannot be made on farmland under short-term contracts. Short-term contracts also make it difficult to care about soil degradation and soil contamination, which is problematic for encouraging sustainable agriculture.

(2) Improved access to finance through long-term loan certification

On inhabited islands, where short-term land use contracts are the norm, residents have been calling for the Island Council to recognize long-term contracts and issue a title document evidencing the contract as an official document. One of them, Island Council of AA. Thoddoo plans to start a long-term contract of 15 years or more after the time when the previous short-term contract expires in March 2024. From a financial standpoint, it is also believed that the ability to prove long-term contracts will increase confidence in producers and help them obtain loans.

(3) Necessity of abandoned farmland management

While some islands are reported to lack of space for agriculture, other inhabited islands are dotted with abandoned plots. In the case of HDh. Nolhivaran, the Island Council received criticism from some residents who would not give up their land without producing enough, while young farmers wanted to expand their scale. In AA. Thoddoo, where resale of land use rights is common, leasing and renting is done among residents without going through the Island Council. Similarly, K. Kaashidhoo, where land is leased and rented between individuals, including foreigners, plans to make it mandatory from 2023 to link land registers with GPS data and to display the landowner's name and contact information for each field.

		
Short-term contract plots require new simple wells to be	Infrastructure, including electricity, is provided by	Long-term contracts allow for the cultivation of bananas and

installed each year, which is inefficient. (AA. Thoddoo)	producers for plots with long-term contracts (GA. Nilandhoo)	other crops that provide a stable source of income (K. Kaashidhoo).

Source: Survey team photo

Figure 4-15 Infrastructure and Permanent Crop Cultivation Associated with Long-Term Contracts

2) Lack of Knowledge about Agricultural Production Technology

A lack of agricultural technical literacy among individual producers in general has been noted. On some islands with advanced agricultural technology, the following is a description of rudimentary technical issues and producer perceptions observed during visits to producers who were involved in commercial agriculture for the first time in recent years.

(1) Recognition of diseases and pests

Insufficient diagnosis of the disease made it difficult to understand the cause of the spread of the disease, and it was often observed that the disease was needlessly sprayed with chemicals and no improvement was seen. For example, one grower, who needed to rotate crops with other families to reduce thrips that prefer cucurbits, continued to grow cucurbit crops on the same plot. Other growers were unaware of the characteristics of the virus disease and incorrectly understood it to be a nutrient deficiency. On the other hand, many growers understand that continued use of insecticides reduces the number of natural enemies and that repeated application of the same chemical can confer chemical resistance on insects.

On the other hand, insect damage to the coconut palms that form the island's landscape is a concern for all islanders, including the island council. The infestation of coconut beetle (Brontispa longissimi), spiraling whitefly (Aleurodicus disperses), and other essential pests of palm crops, growers and councils, such as K. Kaashidhoo, have expressed the need for action. The Council and growers such as K.Kaashidhoo have been calling for action on the infestation. Although the MoFMRA provides support for coconut planting to rejuvenate coconut, the seedlings are imported from India and other countries, and it has been pointed out that such seedling imports are related to disease infestation.

Since it is difficult to control the disease with chemicals due to drug resistance and other factors, the application of biological control technology is required. Many producers complain that they need someone on the island they can consult with regarding pest diagnosis. According to the MoFMRA, inquiries from producers to the HAC are similarly related to pest control, with the background that producers are concerned about inappropriate pesticide application due to lack of diagnosis, unnecessary cost increases, and the impact on the human body and the environment. On many inhabited islands, there are few personnel directly on site to check for pests and provide guidance, and they are not adequately able to assist producers in solving their problems.

		
Photo of an invasive pest (ladybug) provided by the Island Council (AA. Thoddoo)	Damaged coconuts by Brontispa longissima (HA. Utheemu)	Spiraling whitefly (K. Kaashidhoo)

Source: Island Council and survey team photo.

Figure 4-16 Pest and disease damage

(2) Lack of knowledge of chemical use by producers and agricultural material retailers

Producers are informed by agricultural supply retailers about the use of scientific pesticides. However, According to the manager of the material store, there are no pesticide sales licenses or associated periodic inspections by government agencies on the quality of the products sold.

On the other hand, as mentioned earlier, as plant control by chemicals becomes more difficult, interest in biological control is increasing. The strategy of low pesticide and organic cultivation was heard especially from young producers and Young Island Council members[79], as they are concerned about the health hazards to producers due to the excessive application of pesticides. Some producers are also experimenting with the application of traditional pest control techniques and new biological control methods. Neem is a medicinal herb that grows wild on all islands and, like tobacco leaves, has traditionally been boiled for pest control. In recent years, Neem oil has been imported and sold from India, and the number of producers using it is increasing[80].

		
Bangladeshi workers spraying a mixture of several pesticides. (HDh. Finey)	General seedling raising. Disease-resistant rootstocks are generally used for cucurbit crops. (HDh. Nolhivaran)	Neem trees: interest in pressing oil from the discarded fruit is high (S. Meedhoo).

Source: Survey team photo

Figure 4-17 Pesticide Use

[79] The Island Council of AA. Thoddoo has stated externally its intention to work on the conversion to organic agriculture at the island level in the future.
[80] Indian cendan (Azadirachta indica)

(3) Lack of experience of fertilization usage

The use of dried cattle manure is common, but some producers were identified as lacking knowledge and experience in its use. R. Inguraidhoo confirmed that there is a need for training on how to use cattle manure from producers who do not understand composting. It was also understood that there is no one on the island to teach the villagers about basic techniques, and that they are engaged in production while listening to stories based on the experience of their elders.

(4) Lack of interest for water resources and water quality

As AA. Thoddoo producers use engine pumps to pump up groundwater to irrigate their fields, the amount of groundwater used is increasing as agriculture expands. As groundwater decreases, surrounding seawater may intrude into the underground freshwater layer, and there is concern that crops may be damaged by salt damage due to continuous irrigation with groundwater containing a small amount of salt. There is no limit to the amount of groundwater that can be used on the island, and it is thought that the actual situation is that more water is pumped up than necessary. In addition, since groundwater has a high calcium ion concentration and a high pH, it should be careful to use inorganic fertilizers. In particular, when using a water-soluble inorganic fertilizer for hydroponics, it is necessary to use rainwater or RO water that does not contain calcium ions. Regarding the use of water resources, which is the basis of agricultural production, it is desirable that producers will be made aware of these groundwater use issues.

		
Chemical fertilizers are sold in small packages and lack proper usage labeling. (HA. Utheem)	Chile with excess nitrogen. Lack of basic understanding of plant physiology. (HA. Utheem)	Calcium in groundwater deposited in hydroponic. Involved in inhibiting the absorption of chemical fertilizers. (R. Vaadhoo)

Source: Survey team photo

Figure 4-18 Issues related to fertilizer application and water quality

(5) Lack of Understanding of seedling production

To prevent the spread of diseases and insects, it is necessary to understand the appropriate growing environment for each crop and the quality required of seedlings. For example, it is crucial to understand that tomatoes are susceptible to soil diseases, that grafted seedlings are common, and that they prefer dryness. As shown in the photo on the right, it is not growing healthily,

Figure 4-19 Disease caused by excessive humidity (tomato)

perhaps because it is grown outdoors where it retains moisture.

3) Lack of sales channels and prospects

With the exception of the agricultural islands near Malé, many of the resident island producers expressed a desire to sell their products outside of the Malé market. The first reason was that it is difficult to generate profits unless the products are sold directly without intermediary distribution, and it is impossible to do business with intermediary distributors because production is not stable, and sales are irregular. A producer in S. Hithadhoo, Addu, suggested that the establishment of a direct sales market (farmers market) would provide a sales channel for local produce to local users. In HDh. Nolhivaran, an attempt to form a direct sales network between producers and consumers, including those on neighboring islands, using SNS (Viber group) was confirmed. In GA. Kondey, a Maldivian former resort worker represents the island in collection and sales, and some complained about the monopolistic approach.

4) Seed shortages of ornamental plants and traditional crops

(1) Imports of fruit tree and ornamental plant seedling

One of the agricultural products sought by the tourism sector is ornamental plants. They are needed for the greening of new resort and guest house construction and subsequent regular maintenance, and the scarce seeds and seedlings are imported from abroad. Similarly, imports of seeds and seedlings of the traditional crops coconut, banana, and taro yam are frequent due to the shortage of seeds and seedlings. It is understood by producers that pests and diseases are introduced into the country through the importation of these seedlings, contributing to crop damage.

		
Potted bougainvillea produced by individuals are sold to resorts and surrounding islands for MVR 500-800/pot. (K. Kaashidhoo)	Directly imported guava saplings (half died during the import process). Growers want to buy domestic seedlings (Hithadhoo)	Because yams are harvested and the tops of the potatoes are replanted, virus infection is also spread through seed potatoes. (GA. Kondey)

Source: Survey team photo

Figure 4-20 Seedlings Expected to be Produced Domestically

(2) Pest and weed damage due to importation of untreated cattle manure

As mentioned above, the introduction of pests and weeds on imported vegetable fruits and seeds has had a serious impact. Producers in GA. Gemanafushi testified that certain weeds have developed since they started using imported cattle manure. On K. Kaashidhoo, islanders

submitted a report on the environmental impact of these weeds on productivity and rampant open burning. According to the report, Buddhist historic sites on the island have also become infested with non-native weeds, changing the traditional landscape.[81]

		
Producers struggling to weed out invasive weeds that thrive all over the area. (GA. Gemanafushi)	It multiplies rapidly because it roots from fragments cut by weeding. (GA. Gemanafushi)	Weeding is more difficult in fields where stones (corals) have accumulated on the surface. (K. Kaashidhoo)

Source: Survey team photo

Figure 4-21 Damage Caused by Weeds

5) Expectations for domestic production of production materials, challenges and prospects for high value-added through processing

Producers voiced that the rising price of fertilizer is putting pressure on their profits. The main reason for this is believed to be the rising cost of international and domestic maritime transportation. According to a materials retailer in Addu city, when they imported composts from Sri Lanka in February 2023, they paid USD 125/t for ocean transportation and almost the same amount for domestic transportation, totaling USD 250/t (MVR 3,850/t). The retail price of cattle manure in Addu city is MVR 5,000/t. Considering that the import duty is 0%, the import cost to retail price accounts for 77%. On the other hand, the retail price in Malé is MVR 2,600/t, and the transportation cost (and MVR 2,000/t) is 77% as well. Compared to farmer purchase prices of cattle manure in other countries, such as Japan (MVR 616/t, Kagoshima) and Vietnam (MVR 924 /t), cattle manure in the Maldives is more expensive, and it is understood that producers are paying more for transportation costs. Other essential media materials for hydroponics and pot culture include coconut fiber and coco peat, many of which are imported. Against this backdrop, there are growing expectations for high-quality, inexpensive domestic products to replace many imported production materials.

The Maldives has been identified as having agricultural products and agricultural residues with processing potential. Some of these are shown in Table 4-9.

[81] Sadha Haneef / Tech-Seed. 2022. weed growing problem in K. Kaashidhoo

Table 4-9 Agricultural Production Raw Materials Available in the Maldives

Coconut pulp	Biochar, culture medium, hydroponic culture medium, activated carbon
Banana pulp	Mushroom cultivation medium (waste mycorrhizal compost), feed, hydroponic liquid fertilizer
Food waste	BSF protein, feed (chicken, fish), biological treatment compost
Fisheries processing residues	Liquid fertilizer, BSF protein (feed), fermented liquid fertilizer

Some growers have begun attempts to produce culture medium materials from coconuts, but on a small scale and with no added value such as functionality, they have not been able to sell their products. In addition, trunks that are cut down after the banana harvest and bananas that cannot be sold are left in the field.

Some young entrepreneurs have begun to discuss the possibility of using these wastes as a resource. For example, the production of high-quality culture media and hydroponic culture media, and edible mushroom production from banana fiber are being considered. On the other hand, some young entrepreneurs have been identified who are considering marketing these agro-processes especially to the tourism sector (processed foods, cosmetics, crafts). Developing the product on its own poses challenges in terms of technology and equipment, and the company envisions opportunities to learn from its involvement with foreign countries and joint development through business matching.

Coconut shell processing equipment. Production of coco peat as a raw material for culture medium (K. Kaashidhoo)

Coconut eaten by rats. Biochar feedstock (AA. Thoddoo)

Banana trunks: raw material for mushroom beds, composted after production (HA. Baarah)

Source: Survey team photo

Figure 4-22 Available Agricultural Residues

6) Concerns about foreign workers, expectation for young generation

(1) Concerns about foreign workers

On an agricultural island near Maré, there is widespread concern about the mainly Bangladeshi workers. As mentioned earlier, there is a perception among Maldivian producers that the

Bangladeshi community has essentially gained power from production to control of intermediate distribution, as Maldivian landlords have left the management and production of agricultural land to Bangladeshi laborers. As a countermeasure, some landowners are replacing Indian workers, and some entrepreneurs are trying to produce and sell directly to consumers by Maldivians. Such activity was limited to the outskirts of Malé and was not heard on the inhabited islands away from Malé that were visited during this survey.

(2) Outflow of young generation to resorts, expectations for U-turn talent to play an active role

Young talent leaving the islands to work at resorts is a social phenomenon found in the majority of atolls. As the resorts require a certain level of language skills, young people are in demand, and many of them are said to be working alone, leaving their wives and children behind on the island. Employment opportunities on the resident islands are limited, including council-related and public corporations responsible for public infrastructure, and salaries at the resorts are high, with a minimum monthly salary of USD 560 (including foreigners), and can be over USD 2,000 for some positions. According to island residents, one of the reasons for the high divorce rate in the Maldives has to do with this single-parenting. The resort management (Hideaway) also recommends that staff return home regularly due to these social issues. A young farmer who is a dual-use farmer explained his efficient farm management plan by specializing in crops that require less daily labor, such as coconuts, bananas, and papayas. If regular return trips from the resort become possible, the possibility of engaging in agriculture as a dual job can be expected.[82]

On the other hand, some young people living in Malé are hoping to make a U-turn to the island. The high cost of living in Malé and feeling suffocated by life in the city are the main reasons, but there are also other reasons for not making a decision, such as the island's educational environment, medical situation, and lack of jobs that provide cash income. As described in the entry process, successful cases of U-turns include those who obtained regular jobs on the island as public servants and engaged in dual-use farming, and those who combined guest house management and farming. Except in the case of successors who have accumulated agricultural know-how in their families, young people have no opportunities to learn agricultural know-how, and it is presumed that such services are expected to provide them with such vocational training while continuing to work in the mallees.

4.2.6 Formation of Union Organizations

An agricultural production cooperative named Cooperative Society already exists in the Maldives. However, there are few cases of sustainable business continuity for a variety of reasons. Some donor agencies are taking advantage of the lessons learned and are supporting the formation of another union organization. In the Maldives, where land resources are limited, it is widely recognized that joint production and sales is an effective way to establish supply chains with large

[82] According to UN Demographic Yearbooks 2021, the Maldives has the highest divorce rate in the world.

customers. Below is a summary of each union's organization.

1） Cooperative Society

Following the implementation of the Cooperative Societies Act (Law No. 3/2007) in 2007, a three-year project (Support to Integrated Farming) supported by UNDP from 2011 and the IFAD-funded Fisheries and Agricultural Diversification (Through the Fisheries and Agricultural Diversification Program (FADIP) (2008-2014), the following five cooperative organizations were formed and expected to play the following roles: management, finance, farm management, agro-processing, value addition and packaging, and marketing. The following five cooperative organizations were formed through the FADIP: 2008-2014.[83]

- Addu Meedhoo Cooperative Society
- Funaadu Development Cooperative Society
- Faafu Magoodhoo Cooperative Society
- Laamu Farmers Development Cooperative Society
- Tribia Cooperative Society Agriculture

Unlike other business entities, the Cooperative Society is open only to Maldivians and has an average of 200 farmers as members, who purchase the produce and share in the profits. The project's support has helped to encourage participation in the agricultural production system of the island's communities through the formation of cooperatives. However, most of the above union organizations have since ceased to function. Reasons include: (1) the departure of key personnel and the difficulty of handling administrative tasks; (2) the motivation for formation was grant aid, and external funding ceased when the support ended; and (3) a sense of ownership over the management did not develop. In some of the above cases, some of the organizations were able to enter into sales contracts with the surrounding resorts, but after the above support projects ended, the resorts did not agree to continue the contracts and lost customers, resulting in the loss of sustainability as a cooperative organization in some cases.

<u>Addu Meedhoo Cooperative Society (AMCS)</u>

AMCS is the only one that has continued to exist after the above support project ended, and is widely recognized as a success story in Maldivian union organization. FAO was considering a project to support the establishment of new union organizations in other regions in 2019, modeled after AMCS.

Figure 4-23 Pick-up Truck of AMCS

Around the same time as it was formed in 2011, the Island Council leased a 20,000 sqft plot to a producer under a 10-year contract, encouraging large-scale production activities; in 2015 a collection point was built with the support of IFAD and

[83] SAARC Agriculture Centre (2020), "Family Farmers' Cooperatives Ending Poverty and Hunger in South Asia."

produce was collected from the backyard and leased plots.

The main sales destination was Shangri-La Resort, which shipped 2-3 tons of bananas, cucumbers, watermelons, melons, Chinese cabbage, and green beans, the main shipped agricultural products, by boat every week. At its peak, annual sales reached MVR 5 million. The business model was to collect the union's margin as MVR 3/kg and redistribute the amount to members after deducting expenses.

However, the union's activities are currently inactive, as customer resorts have not recovered from the effects of the Covid-19 disaster and the number of customers to whom they sell their products has been limited. Registered cooperative farmers have developed their own sales channels and use land-based resorts and MTCC's transportation services to sell within the atoll and to nearby islands.

2） Island Farmers Forum

The Island Farmers Forum, formed with the aforementioned MAP support, is a so-called voluntary association of farmers. Unlike Cooperative Societies, it is an informal organization, but its purpose is to purchase, produce, and sell products together, and although it requires registration, there are no membership fees or other obligations.

The concept is not to force to form producer groups in order to enhance the sustainability of the organization by utilizing the lessons learned in the aforementioned Cooperative Society, but rather to value the independence of the farmers and encourage them to understand the necessity of such groups through dialogue with individual farmers, resulting in the voluntary formation of groups is encouraged. In fact, the MAP implementation unit under the MoFMRA visited the islands to establish IFFs and elect their representatives, and IFFs were established on a total of 24 of the 26 target islands. However, due in part to the Corona disaster, which has stalled MAP activities and made it difficult to provide support to established IFFs, no concrete production activities have yet been implemented.

During the visit to Hdh. Nolhivaram island, IFF leaders and participating farmers were interviewed for this survey. No concrete efforts have yet been made, mainly because the IFF has not been able to gather sufficient quantities of produce, although the purpose of the IFF is to sell the produce jointly. A joint IFF meeting was held on HDh. Hanimaadhoo in 2022 under the auspices of MAP, and the IFF has raised the issue of insufficient electricity supply in agriculture. The IFF has confirmed that it is interested in introducing modern farming techniques, such as hydroponics, from the current traditional farming methods, to increase production and develop sales channels through joint sales

Figure 4-24 Interview to IFF

3） Formation of producer groups led by companies

The purpose of the cooperative organization is joint production and sales, and to establish a profitable business model to maintain sustainability, it is essential to have people with an entrepreneurial spirit, but it is not easy to find such people among the farmers on the island. It is also difficult for an organization to continue to operate without outside intervention with a high degree of autonomy and initiative. Because of this unique situation in the Maldives, the survey team have identified a small number of examples of private companies taking the lead in island-level activities to connect individual farmers and establish supply chains with the surrounding markets as an island.

A young entrepreneur who was the representative of the aforementioned AMCS has established a company with a total of five acquaintances, and they have already built a green house and plan to cultivate crops. First, the company aims to achieve a stable supply, and then to achieve a sales agreement with the resort, and furthermore, to start management that will allow the company to purchase from the traditional AMCS members.

4.3 Contract Farmers who Enter into Contracts with AgroNat

As mentioned above, the Agricultural Corporation (AgroNat) has been supporting farmers since 2020, when the company was established, with the main objective of building supply chains. The main support activity is to enter into contracts with farmers who wish to do so and purchase the entire crop produced at the contract unit price determined based on AgroNat's offer. Of the 18 islands where contract farmers are located, as indicated in Chapter 2, the survey team visited four of them to interview council members and the contract farmers involved. The following describes the history of AgroNat contract farmers' participation, profitability, and challenges of the program.

1） Background of Entry and Actual Activities

Since AgroNat's establishment in 2020 and the introduction of the program, AgroNat has been working with Council members on each island to provide briefings to farmers on the islands. At the information sessions, existing farmers and islanders interested in agriculture are briefed on the contract conditions and benefits of the contract farmer system, and those who wish to apply are invited to do so. However, it seems that the purchase price, which is of most interest to farmers, is generally offered after the application is submitted, and many farmers withdraw their applications because they are not satisfied with the offered price.

As specific examples, on the island of HA.Baarah, about 25 people applied to join, but only 7 of them eventually signed up, and on the island of HDh. Nolhivaran, about 20 people applied, but only 5 of them actually signed up. While many islanders withdraw from the program because they do not benefit from market price fluctuations, as the purchase price offered by AgroNat is often below the market price, the farmers who still chose to join the program were motivated by the ability to purchase materials and equipment on credit, and by the ability to obtain advice from

AgroNat staff in the community.

The most common crops grown are cucumbers, watermelons, eggplants, papayas, and melons. All contracted crops are obligated to be sold to AgroNat, but there is some flexibility in the contracting method, which allows for contracts on a parcel or crop-by-crop basis. While some farmers contract with AgroNat for all of their cultivated land, others contract for only a portion of their farmland and sell the produce from the remaining parcels to resorts and other entities themselves. In fact, one of the AgroNat farmers the survey team interviewed was growing cucumbers in three rows of cultivation equipment, of which only two rows were contracted to AgroNat. Another farmer grew eggplant, watermelon, and papaya, and contracted with AgroNat only for papaya. Cultivation is done with advice from AgroNat staff, and the staff is notified when the harvest is ready for delivery. Payment is made by remittance from the Malé headquarters in about two weeks after inspection.

The farmers the survey team interviewed said that AgroNat's full purchase of their crops has eliminated their concerns about sales, allowing them to focus solely on production, and has improved their profitability by eliminating unsold products that they would have had to sell at the market themselves. The company has also improved its profitability by eliminating unsold products that would have occurred if it had sold them to the market on its own.

2） Profitability

Profitability varies widely from one contract farmer to another. The reason may be the difference in production costs among farmers, given that the selling prices are comparable. The majority of the farmers interviewed for this report indicated that selling to AgroNat was not profitable due to the low unit price. In particular, for farmers with sales channels other than AgroNat, there are comparable, and sales prices are often higher than AgroNat's contract unit prices in the recent past, leading to the conclusion that selling to AgroNat is not beneficial in terms of profitability. In fact, there are contract farmers who sell to other customers, including surrounding islands, because sales to AgroNat are not profitable.[84]

On the other hand, a farmer who answered that he was profitable said that he could expect to earn MVR 25,000 per harvest of watermelon, at a production cost of MVR 10,000, which was enough to generate a gross profit.

While there were few benefits in terms of selling prices, the majority of the respondents rated the unit price of agricultural inputs that could be procured from AgroNat as lower than the general price. However, when purchasing in large quantities, it may be cheaper to buy at the market.

3） Challenges

The first issue to be addressed is the setting of the unit purchase price. Trading prices of

[84] As examples, the market price for watermelon is MVR 15-25/kg compared to MVR 10/kg, and the market price for cucumber is MVR 30-45/kg compared to MVR 20-25/kg.

agricultural products in the Maldives are prone to supply-demand imbalances throughout the year, and trading prices fluctuate accordingly. AgroNat sets its purchase price from contract farmers based on the previous year's market price data, but if the previous year's level is lower than the current year's, the market price will often be below the market price throughout the year. However, AgroNat will collect the produce at the farm and will not incur packaging or transportation costs. It is important to note that farmers may not understand this point and compare their prices with the prices they bring to retailers.

Second, the staff stationed on the island is responsive. The staff are supposed to provide advice on cultivation techniques as well as services related to the purchase of crops and the supply of materials, but many contract farmers were dissatisfied with this aspect of the program. The frequency of visits to the farms gradually decreased immediately after the contract was signed, and thereafter there was no communication at all, and the cultivation manuals that were supposed to be provided did not arrive. AgroNat's resident staff are hired from among the islanders, and it is not always possible to secure sufficient personnel in terms of experience and ability.

There are challenges in delivery of agricultural materials procured from AgroNat. The contract farmers interviewed reported that there were frequent cases where the agricultural materials they ordered either did not arrive on time or, when they did arrive, the quantity ordered was not met. In addition, the cost of purchasing materials is deducted from the purchase price of the produce, but the credit system is not sufficient (MVR 500-850/month), and the inability to order the necessary quantities is also a complaint.

		
House and irrigation facilities were installed under contract with AgroNat. The original funding was provided by Zakaat Fund free of charge. (HDh. Nolhivaran)	Purchased engine pumps and irrigation pipes from AgroNat, but noted that the price description was unclear (GA. Gemanafushi)	Cucumbers are grown and sold to AgroNat for profit. (HA. Baarah)

Source: Survey team photo

Figure 4-25 AgroNat Farmers in Production

4.4 Commercial Agricultural Enterprises

Commercial agriculture by companies takes place on inhabited, uninhabited, and resort islands. One difference from individual agricultural production is the collection of land rent and lease fees.

On resident islands, land rent must be paid to the Council when using farmland for corporate use, and the same as for individuals when using farmland leased as individual farmers, such as individual SMEs, as a corporation. In particular, leased agricultural islands need to aim for a production scale that is commensurate with the return on investment, because in addition to lease payments, the company needs to make long-term investments in its own cultivation and logistics infrastructure. Since the number of Maldivian agricultural technicians is extremely small, there are many cases where foreign technicians such as Sri Lankans are active in leased agricultural islands and resorts. The following table shows the production entities and characteristics for each category.

category	Production entity (individual or company)	Main Agricultural Engineer	Land rent and lease fee
4.4.1 Inhabited Islands	Businesses by residents and off-island businesses,	Engineers hired by Maldivian enterprises	Corporate farmland: paid for Rental farmland: free of charge and at low cost, as well as for individuals
4.4.2 Uninhabited agricultural islands	Private business, tourism, agricultural distribution	Sri Lankan Engineer, Traditional Agricultural Islander	Lease rates as determined by the MoFMRA
4.4.3 Resort islands	tourist enterprise	Engineer of cultivation management companies, foreign technicians employed by resorts	Lease rates as determined by the Ministry of Tourism

4.4.1 Corporate Agriculture on Inhabited Islands

There are companies that lease agricultural land from the Island Council for business use and agricultural production. Agro-service, described below, is one example. Many of these companies operate a core production business, but also provide support services to agricultural producers and plan future production with partner farmers. Partnering with farmers is considered essential in order to increase their ability to sell their products to resorts and other customers.

Agro-service (HDh. Finey)

The company built four greenhouses on part of its farmland (5 ha) on HDh. Finey Island, acquired in 2012, initially as a demonstration farm, including a demonstration of imported seeds, and is now aiming to sell cucumbers exclusively to resorts. HDh. Finey was chosen because (1) there are no islands near Malé with sufficient land, (2) the population is small for the size of the island and there is room for expansion with little possibility of conflict with the islanders, and (3) the land rental fee is low.

In its role as a demonstration farm, it connects with more than 1,000 farmers nationwide via a chat group and disseminates useful information for free of charge as needed as a result of the demonstration,. Demonstrations are being given to farmers on the proven varieties (which can ensure sufficient yields in the natural environment of the Maldives).

Source: Research Team

Table 4-10 SWOT Analysis: Resident Island Enterprise Agriculture

Internal factor	**Strength** ✧ Medium- to long-term land use and agricultural investment possible ✧ Investment can be made to improve labor productivity, such as irrigation facilities, allowing for more competitive agricultural production ✧ When union functions are included, material procurement can be streamlined and production costs can be reduced ✧ If groundwater is allowed to be used, costs can be reduced compared to uninhabited islands and resorts	**Weakness** ● Insufficient resident human resources, dependence on foreign workers ● Land use fees higher than residents ● Discord among islanders due to being from outside the island ● Pressure to contribute to the island's economy

External factors	**Opportunity** ✧ Advantage in obtaining financial services ✧ Effective for resorts and other destinations that do not accept individual access and require a centralized point of sale ✧ Compared to uninhabited islands, basic infrastructure construction costs and labor costs are lower and more profitable. ✧ The scale of distribution can be expanded by working with individual farmers on resident islands.	**Threat** ● Decline in groundwater quality, agricultural use incompatible (some resident islands) ● Unsuitable for use of groundwater for hydroponics (due to calcium and salt content) ● Increased production costs with RO water being considered as an alternative. ● Unstable rainwater harvesting (dry season)

Unlike uninhabited islands and resorts, resident islands are allowed to use groundwater, and existing infrastructure such as ports, gas stations, and electricity supply can be used, which is considered advantageous in terms of production costs. Since privately owned farmland can be treated as if it were a contract plot for a company, the possibility of expanding the scale of farming by joining hands with partner producers is also considered a strength of corporate farming on resident islands.

Individuals on resident islands may register as enterprises (SME registration). The reason for this is that individual farmers can more easily access financial services by registering as a business. Since this process can be complicated for individual producers, K. Kashidhoo's startup Seed Tech offers a service to help individual farmers on the island register their businesses.

4.4.2 Corporate Agriculture on Uninhabited Agricultural Islands

MoFMRA is implementing a project to lease uninhabited islands to companies and individuals for agricultural production. Currently 52 islands are leased to companies or individuals. Many of the companies that invest in uninhabited islands are also involved in resort management and agricultural product distribution to support uninhabited agricultural island operations. Products is not limited to vegetables and fruits, but ornamental plant seedlings are also produced for the tourism sector and contribute to sales. The following table shows the agricultural islands surveyed in this survey, either by actual visit or by interview.

Table 4-11 List of Agricultural Islands Visited in This Survey

Atoll name/island name	area	Company Name	sales destination	remarks
HA.Maafahi	99ha	Seagull	In-house wholesale and retail	Employment of Foreign Engineers
N.Ferivaru	9ha	fantasy	In-house wholesale and retail	Facility melon cultivation
HDh.Theefaridhoo	55ha	Hideway	In-house wholesale and mallet market	Abandoned vegetable-based management and shifted to specializing in chicken eggs.
R.Lin'boakandhoo	19ha	Big Fish	Malé Market, Peripheral Islands	Cultivation and management by in-house employees with limited agricultural experience
GA.Funadhoo	23ha	Maritec	Malé Market	Employment of Foreign Engineers
Sh.Medhukun' burudhoo	47 ha	individual	Ornamental plant sales and landscaping orders to Malé market and resorts	Cultivation managed by experienced owner and agricultural engineer from AA. Thoddoo
R.Dheburidheytherey vaadhoo	19ha	Mariculture Maldives	Own Resort	Chronic loss-making operations due to low production and high administrative costs
Adh.Hukurudhoo	23ha	Hukurudhoo Investment	Nearby Resorts	Small-scale other items and RO water purification costs put pressure on earnings

A SWOT analysis of the agricultural activities on the leased agricultural islands was conducted, comparing them primarily with commercial agriculture on the inhabited islands, as shown in the table below.

Table 4-12 SWOT Analysis: Leased Agricultural Islands

Internal factor	**Strength** ✧ Large-scale agricultural production is possible ✧ Improved production through mechanization of agricultural work ✧ Crop diversification, possibility of implementing crop rotation ✧ Implementation of the right crop in the right place in accordance with the island's natural environment and planned ecosystem conservation, Practical possibility of recycling-oriented agriculture ✧ Regulation of fruits and vegetables brought into the country by a single company management system, an attempt to conserve the ecosystem.	**Weakness** ● Regulation of groundwater use.Use of RO, investment burden for rainwater use, burden for on-site power generation ● Illegal use of groundwater due to inadequate RO water purification costs, decreased production due to environmental degradation caused by salinity, and increased share of fixed shipping costs due to such degradation. ● Lack of agricultural literacy among business owners (because of the predominance of entrants from different industries)
External factors	**Opportunity** ✧ Increased needs for high quality eggs, ornamental plant seedlings, etc. targeted to the tourism sector ✧ Loan Program Support for Management Improvement Activities on Unmanned Agricultural Islands (Plan)	**Threat** ● High land lease fees ● Burden increases with the number of years of lending ● Decreased productivity due to soil degradation ● Increased animal damage (rats, etc.) and decreased yield due to ecosystem disturbance ● Ecosystem changes, spread of pests and diseases ● Lack of Maldivian agricultural technicians

For each of the weaknesses (or threats) listed above, the details are described as follows;

1) Decreased Productivity due to Soil Degradation

Considering the fragility of the ecosystem unique to the Maldives, experts on HA. Maafahi owned by Seagull designed agricultural production plots from various aspects, especially the planting of salt-tolerant pine trees as windbreaks and banana cultivation in the lowlands to reduce

groundwater use, and the overall plan was developed in consideration of overall balance. In recent years, windbreaks have been reduced, and last year, papayas were damaged by wind and rain, resulting in a decline in productivity.

2) Pest Infestation

Melons are grown in greenhouses at N. Ferivaru, owned by Fantasy. The company has achieved stable production by practicing institutional cultivation (pot cultivation), a method of suppressing soil diseases by replacing the growing medium. In recent years, the disease has grown outside of the culture medium, affecting melon production. Therefore, the introduction of biological plant pest control technology is being considered.

3) Ecosystem Change

Figure 4-26 Medhukun' burudhooPanoramic view of

On most leased agricultural islands, the creation of plots and the introduction of plants have decreased agricultural productivity due to changes in the ecosystem. On the other hand, some leased agricultural islands have achieved relatively stable production while considering ecological conservation. The picture on the right shows a panoramic view of Medhukun' burudhoo (47ha). The island has a vast long-term crop plot in the center, where coconuts, breadfruit, bananas, and other plants are planted with natural trees to preserve the ecosystem. At the same time, sales of ornamental plant seedlings for a resort construction project are another primary income of the island. In addition, the 48 staff members are self-sufficient in food to prevent the introduction of pests and diseases on vegetables and fruits from outside the island. The attempt to diversify production is the result of considering water conservation and contribution to ecosystem preservation. The background of this practice should be because the owner is a native of Sh. Feevah, a traditional farming island, and the it employs three field managers with cultivation experience from AA. Thoddoo, a leading farming island.

		
Water temperature is lowered for recirculating hydroponics	Pot-grown melons, trying to manage disease by	Agricultural island seedling production. Revenue from the

and plantings are made once a week for shipping (Ha.Maafahi).	changing media（N. Ferivaru)	sale of ornamental plant nursery stock exceeds that of vegetable fruit trees. (Sh. Medhukun'burudhoo)

Figure 4-27 Agriculture in Leased Agricultural Islands

4) Insufficiency of Water Resources and the Challenge of Scaling Up:

From the perspective of natural resource management, the use of groundwater is generally prohibited on leased agricultural islands. Rainwater and RO purified water are required for agricultural production. HDh.Theefaridhoo produced a variety of vegetables and fruits until recently, and however, high cost of producing RO water made it a high-cost operation that was not profitable[85]. Aa a result, the production cost of cucumbers has increased to MVR 40/kg, which is not profitable since the wholesale price of a typical cucumber is MVR 20/kg. As an alternative, they are concentrating their investments in poultry farming (egg production), where water and labor costs can be reduced. Feed is imported directly from Thailand (import cost: USD 0.5/kg[86]) instead of imports from Sri Lanka. Current production is 9,000 pieces/day, with plans to increase production to 29,000 pieces/day by adding an additional chicken coop in the near future. The wholesale price is MVR 3.5/each, while the competitor's imported eggs are priced at MVR 1.75/each, so the company differentiates its eggs, including the fact that they are fertilized eggs, and sells them to retailers and resorts. The company plans to pelletize chicken manure, a byproduct, and sell it as a domestically produced fertilizer.

Heifer chicken (chicks from Sri Lanka)	Feed: USD 0.5/kg (from Thailand)	Fertilized eggs: wholesale price MVR 3.5/ piece

Source: Survey team photo

Figure 4-28 Poultry Farming on Leased Agricultural Islands

4.4.3 Corporate Agriculture in Resorts

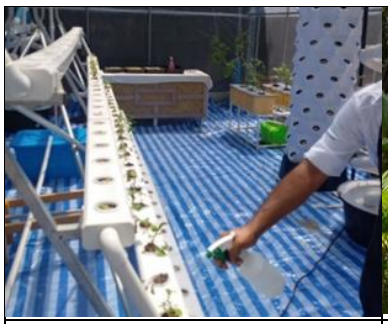
Agricultural production on resort islands has become common in recent years. The survey also revealed that agricultural production has started in 15 of the 23 resorts interviewed by this survey. Reasons for agricultural production on resort islands include the goal of partially replacing

[85] Cost of RO water produced at Theefaridhoo is MVR 40/t

[86] The retail price of similar imported poultry feed purchased by small-scale poultry operators in AA. Thoddoo is MVR 30/kg, compared to USD 0.5 (MVR 7.5)/kg in Theefaridhoo. Reference: Standard retail price in Japan USD 0.8/kg

expensive imported agricultural products and increasing traceability so that customers can have confidence in the quality of the products. The agricultural products produced at the resort is not only used to feed its customers, but also the employees who reside at the resort. Resorts produces vegetables such as lettuce, cucumbers, and herbs, for which freshness is especially important, and fruits such as watermelons and papayas. These vegetable gardens provide a place of activity for clients and help to increase the value of the resort.

Resort islands play an extremely important role as an outlet for domestic agricultural products. As mentioned above, the background is the over-dependence on imported agricultural products and the interest in domestic agricultural products, which is a growing market. The sales of resorts, which require more advanced cultivation techniques and higher quality, are recognized as having high potential for young entrepreneurs. The high-cost burden of imported agricultural products (i.e., the burden of losses) is presumably behind the resorts' willingness to take the time and effort to start production activities. As aforementioned, many resorts have started agricultural production, but the amount of production and the number of products are still limited, and it is still a potential sales destination for local producers.

		
Hydroponics making the most of a small plot of land (Milaidhoo Maldives)	Cultivation on a relatively large site (Amilla Maldives)	A spot for guests to enjoy (Vakkaru Maldives)

Source: Survey team photo

Figure 4-29 Agricultural Production on Resort Islands

Below is a SWOT analysis of agricultural production in a typical resort.

Table 4-13 SWOT Analysis: Agriculture in Resorts

Internal factor	**Strength** ✧ On-island consumption, few transportation losses ✧ Independent production planning to meet customer needs ✧ Differentiation by offering agricultural activities to resort guests	**Weakness** ● Limited cultivated area ● Limited water resources, limitation of use of underground water ● Limited agricultural technicians ● Serious damage to rats and other vermin

External factors	**Opportunity** ✧ Opportunities for compost production through mandatory composting ✧ Competition for resort customers ✧ Growing interest in local foods as a means of attracting repeat customers ✧ Increased interest in safety	**Threat** ● The spread of new pests and diseases due to the introduction of pests and diseases from off-island sources ● Inadvertent crop importation to meet the needs of diverse resort clients ● Excessive chemical application by resort landscape management for vermin and pest control[87]

For each of the weaknesses (or threats) listed above, the status and efforts of each company are as follows

1) Limited water resources

The difference between the inhabited and leased agricultural islands is that the ban on the use of groundwater is strictly enforced and expensive RO water systems are used for all aspects of daily life. In order to reduce the cost of water, some resorts have begun to treat domestic wastewater in septic tanks and then filter it through UF membranes for agricultural production and irrigation of green areas.

		
RO desalination plant in the resort (500t/day)	Wastewater from the villa is collected and membrane filtered for agricultural use	Introduction of water-saving hydroponic cultivation that enables cultivation with limited water[88]

Figure 4-30 Introduction of water reuse and water conservation technologies practiced at resorts

[87] One of the factors contributing to the recent increase in pesticide imports is the increased spraying in the tourism sector.

[88] Fresh Field (S. Meedhoo) has partnered with the company to conduct demonstration production and remote management of the Autopot system. In general, environmental management (disease and pest control) at resorts is outsourced to specialized companies, which provide technical support for agricultural production.

2) Seriousness damage by pests and vermin countermeasures

Animal damage in resorts, especially coconut eating by rats, is becoming more serious. Currently, a countermeasure is to wrap steel plates around the coconut trunks, but the effect is limited and effective measures have not yet been taken. On the other hand, netting over entire papaya and passion fruit plots has been successful against fruit feeding damage by bats.

		
A view of coconut, which is severely damaged by pests. Inappropriate method applications for food crops, such as insecticide trunk injection, have also been confirmed.	Coconut trunks wrapped with steel plates to prevent coconut feeding damage by mouses. No fundamental solution has been reached.	A papaya field with anti-bat nets.

Source: Survey team photo

Figure 4-31 Plant Protection as practiced at the Resort

3) Cost-sharing of electric composters

As mentioned above, electric dry composters consume enormous amounts of energy and are costly for resorts. The equipment installed at The Residence uses MVR 5,760 of fuel for a daily throughput of 500 kg. The resulting production cost would be MVR 57.6/kg compost if an estimated 100 kg of compost could be produced.

Considering that the price of compost that can be sold generally is MVR 2/kg, one can understand how expensive this amount is. Mandatory food waste compost production has just been imposed on resorts, but mandatory food waste disposal on resident islands is expected to be implemented in the near future. For this reason, the introduction of technology to convert food waste islands into resources at a reduced cost is expected.

		
Electric garbage disposal composter installed at the resort	Composting facility on the resort farm	Seedling facilities using compost

Source: Survey team photo

Figure 4-32 Compost-related Facilities Installed at The Residence Resort

Chapter 5. Collection of Information related to Customers and Supply Chain

In order to properly assess the growth potential of the agricultural sector in the Maldives, it is necessary to understand the demand for agricultural products in the country, and in this regard, it is particularly important to find a way to link up with the tourism sector and tourism-related industry, where the country has a comparative advantage.

This chapter will identify the preferences of customers in the tourism sector, who are assumed to import the majority of their food procurement, for agricultural products, and explore the possibility of building supply chains with domestically produced agricultural products.

5.1 Consumers of Agricultural Products in the Maldives

As mentioned in Chapter 2, the tourism sector is one of the key industries in the Maldives, attracting a total of over 1.6 million foreign tourists annually in 2022. According to the Visitors Survey 2021 by the Ministry of Tourism, the average length of stay per person is 8 days, which can be derived as 12.8 million person-days of food demand per year. The resorts, which are used by about 90% of the tourists visiting the Maldives, employ about 34,000 people, many of whom are live-in workers. Therefore, there would be a demand for 12.41 million person-days per year of food to feed employees. On the other hand, the Maldives has a population of approximately 530,000 people, which is considered to have a food demand of 193.45 million person-days per year.

In this simple comparison, the demand for food in the tourism sector is about 10% of the demand for food by people living and residing in the Maldives (general consumers). However, much of the food demand in the tourism sector relies on procurement from the agricultural commodity market, including imports, and it is necessary to consider the demand in the tourism sector (customers) in addition to general consumers when considering the demand for agricultural commodities in the Maldives. Therefore, this chapter attempts to organize the results of information collection on demand and purchase preferences for agricultural products separately for consumers and consumers in general.

5.2 Preferences in the Maldives Obtained Through (modified) Conjoint Analysis

5.2.1 Analytical Method

In confirming customer preferences, in this survey, in addition to interviews with customers and the general consumers, the survey team analyzed preferences using the (modified) conjoint analysis method. The method presents respondents with hypothetical options (in this survey, hypothetical crops) and asks them to respond with their preferred option, estimating what

domestic agricultural products would be in high demand by customers and retailers. The four target crops were cucumbers, lettuce, bananas, and yams. The reasons why each crop was selected as a target crop are shown in the table below.

Crops	Reasons for selection
Cucumber	It is already widely produced in the Maldives and production could easily be increased if demand and preferences are confirmed.
Lettuce	It is a high value-added crop when it can be produced and sold in the Maldives, due to its characteristics that make it difficult to maintain freshness. In addition, willingness of the tourism sector (especially resorts) to procure domestically was confirmed.
Banana	It is one of the crops that can be grown with relatively little labor, and is regularly used in the tourism sector, such as in resorts, and it is a crop with high potential for increased production if preferences are confirmed.
Yams	To investigate preferences in long-term crops, one of the staple foods and one of the typical long-term crops in the Maldives. It is also assumed that there will be a certain demand in the provision of locally grown crops at the resort.

Each alternative was also characterized by five attributes. The five attributes are listed below, along with details of the attributes and the reasons for setting them.

Attribute	Details and Reasons for Setting
Quantity	• Supply amount per week (kg / week). • To identify changes in preferences for increasing or decreasing the amount available for purchase.
Market Price	• Four levels of purchase price ranging from 50% to 200% of the market price at the time of purchase consideration. • To identify changes in preferences based on purchase price.
Freshness	• How many days after loading onto the carrier can the quality of the product be sustained for which it can be provided. The number of days is set at four different levels, depending on the crop. • To check for changes in preference due to freshness.
Packing	• The condition of packing for transportation is set by Cargo Box, Packing tape, Plastic bag, and Paper bag. • To identify changes in preferences due to packaging methods.
Safety	• The amount of pesticides used in the cultivation process is set at four levels: organic, underuse (half the appropriate amount), appropriate use, and excessive use. • To identify changes in preference with pesticide use.

Each respondent was also asked as a background question whether they grew their own produce, whether they used refrigeration facilities during transportation, and how often they purchased produce.

The survey received 218 responses (see table below for breakdown) and estimated their preferences. The capture rate of resorts and guest houses relative to the total number of resorts and guest houses throughout the Maldives (from Maldives Tourism Updates as of 13 April 2023) is also summarized in the table below.

Table 5-1 Breakdown of Respondents and Capture Rate in Conjoint Analysis

Respondent Attributes	Number	Total Number	Capture Rate

Resort	23	174	13.2%
Guest house	145	895	16.2%
Retailor	50	-	-

5.2.2 Summary of Conjoint Analysis Results

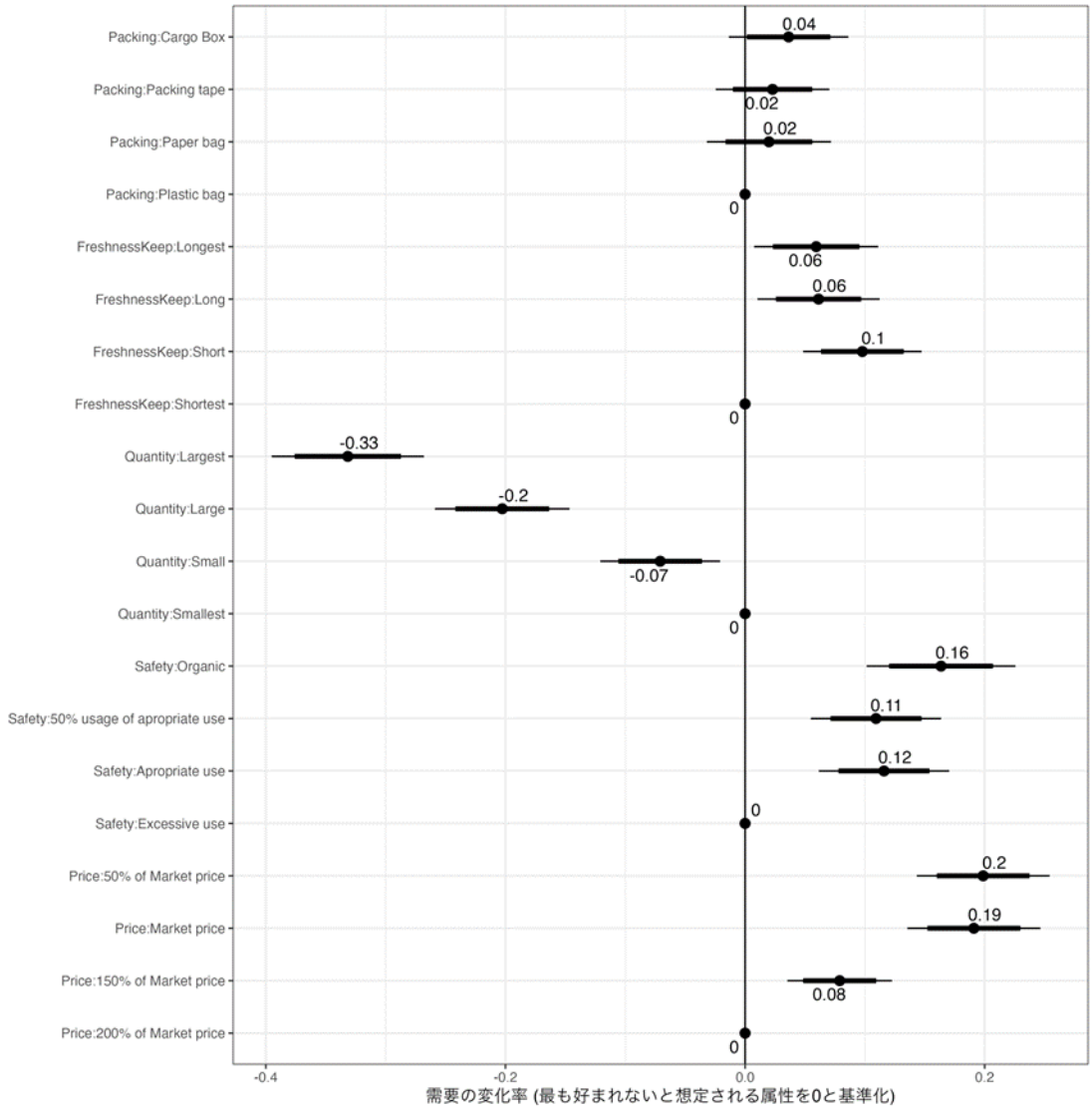
The details of the conjoint analysis are described in the analysis report by Associate Professor Kawata. A summary of the report is provided below. Since more than half of the respondents in this survey were guest houses (small businesses), it is necessary to note that the estimation results for the entire respondent population and the analysis derived from them may strongly reflect the voice of small businesses.

Results from background questions

- Over 60% of resorts produce their own agricultural products, while few guest houses and retailers do.
- Regarding the transportation of agricultural products, all business entities used refrigeration equipment during transportation, and all respondents from resort used it.
- While the majority of resorts procured agricultural products at intervals of four to seven days or longer, the majority of guest houses and retail businesses procured at intervals of three days or less.

Results obtained by estimating preferences for each attribute of the target crop.

For estimation, Prof. Kawada used the Average Marginal Component Effect (AMCE, Hainmueller, Hopkins, and Yamamoto 2014) to identify the average change in demand when certain attributes change. The figure below shows AMCEs from data compiled from all cases. The point estimator is represented by a point and the 95% confidence interval by a horizontal line, indicating a positive response (increased demand) as the estimated point and horizontal line move to the right and a negative response (decreased demand) as they move to the left, with the degree of response becoming stronger the further away from the center line (the level before the change).



Source: Analytical report by Dr. Kawata

Figure 5-1 AMCE Estimated for All Responses

Figure 5-1 confirms the following trends.

- Higher transaction prices reduce demand for goods. A decrease from twice the current transaction price to 1.5 times the current price would increase demand by about 8%, and an additional 12% if the price were to drop further from there to the current transaction price. However, even with a decrease from the current price, the increase in demand was very limited (about 1%). The current market price is firmly established as the actual market price, suggesting that further price reductions will not lead to a significant increase in demand.
- As for attributes other than price, the guarantee of safety has a significant demand-increasing effect. Demand increased by about 12% by stopping the excessive use of pesticides and switching to proper use, and by an additional 4% if the crop was organically grown.

- The increase in shelf life of food ingredients also has a clear demand-increasing effect, increasing demand by 6-10% compared to the shortest case.
- A clear demand reduction effect was observed with respect to the expansion of trading volume. One possible reason for this, as indicated by the descriptive statistics, is that many respondents have a high frequency of transactions in the first place. The company purchases at a high frequency, and thus a one-time increase in transaction volume is not very attractive. Furthermore, storage and other considerations may have made it rather less attractive.

5.2.3 Insights from Conjoint Analysis Survey Implementation

Through the interviews for the conjoint analysis, the following observations were made.

About setting attribute choices

- Since the choice of the attribute (supply) was based on the amount of production interviewed from the farmers, guest houses, in particular, faced a hard time choosing the preferred option, as both options presented were in quantities they do not usually purchase. Based on the size of the subject's business, it may have been necessary to change the options.
- Regarding attributes (packaging method), there was a case in which Paper Bag was understood to be cardboard. The packing options were set based on the interviews at the resort, but it would have been easier to proceed smoothly without causing misunderstandings if the survey team had confirmed that these were common expressions in the Maldives.

Interaction with respondents in the interviews

- In some cases, respondents could not fully imagine each option in the attributes (packaging method). Showing pictures and other images made the process smoother.
- Some respondents (mainly resorts) were interviewed using an online conferencing tool to screen-share their choices, but this did not present any obstacles. In cases such as the Maldives, where travel within the target region is costly and time-consuming, active use of online conferencing tools may be desirable.

5.3 Demand at the Resort, Preference for Crops Purchasing

In the Maldives, the statistical data on the distribution volume of agricultural products, as well as the production volume of agricultural products, is not well developed, so the survey team were unable to confirm statistical data that would enable us to grasp the volume of demand. However, the survey team were able to obtain information from the resort's procurement managers regarding minimum weekly purchases for several crops. From this point, the survey team attempted to calculate the demand for the resort as a whole. Furthermore, the survey team attempted to estimate the future increase or decrease in demand based on future resort development plans and the growth of the tourist population.

For preferences, the survey team report results from a conjoint analysis of 23 resorts. Furthermore, the qualitative information obtained from the interviews with the five resorts is organized.

5.3.1 Demand for Agricultural Products at Resorts

Estimates related to demand for agricultural products at resorts

The survey team were able to ask suppliers about the weekly procurement quantities they require for several crops at two of the resorts interviewed in this survey. Resorts may procure from multiple suppliers for each crop, and therefore the following estimates of resort demand were attempted, although they do not necessarily represent the demand for the resort as a whole.

Table 5-2 Estimation of Demand at Resorts

Crops	Requirement (kg/week)	Requirement per bed (kg/ week/ bed)	Assumption of demand (kg/week)	Assumption of demand (t/year)
Watermelon	900	2.63	108,043.03	5,618.24
Cucumber	200	1.64	9,037.82	469.97
Lettuce	100	0.82	29,989.13	1,559.43
Potato	250	0.73	18,075.64	939.93
Papaya	150	0.44	2,054.05	106.81
Chili	17.5	0.05	4,518,91	234.98

Note:
- Requirement of "Watermelon, Potato, Papaya, Chili" is coming from Resort A (570 beds, occupancy rate 60%).
- Requirement of "Cucumber, Lettuce" is coming from Resort B (204 beds, occupancy rate is 60%).
- No. of total beds is 41,081 (Maldives Tourism Updates as of 13 April 2023).

Source: Prepared by the survey team based on interviews with resorts.

The following approach was used to estimate demand at the resort. For watermelon, potato, papaya, and pepper, the weekly demand per bed and per week (kg/week/bed) was calculated from the number of beds and utilization rate, based on the weekly procurement rate (kg/week) obtained at Resort A (570 beds, 60% utilization rate). The total number of beds in the resort (from Maldives Tourism Updates as of 13 April 2023) was used as a reference to calculate the demand per week (kg/week) for the entire resort, from which the annual demand (calculated as 52 weeks) was estimated. For cucumber and lettuce, the same procedure as for Resort A was used to estimate the weekly procurement from the weekly procurement obtained at Resort B (204 beds, 60% utilization rate).

The table below compares the volume of demand at resorts estimated in Table 5-2 with the volume of imports delivered directly to resorts as identified by the Maldives Customs Service, from which it can be analogized that the percentage of direct imports is not necessarily high. As discussed below, the resort procures agricultural products through intermediaries in Malé, and these are not necessarily domestic products, so the ratio of imports to resort demand could be much higher.

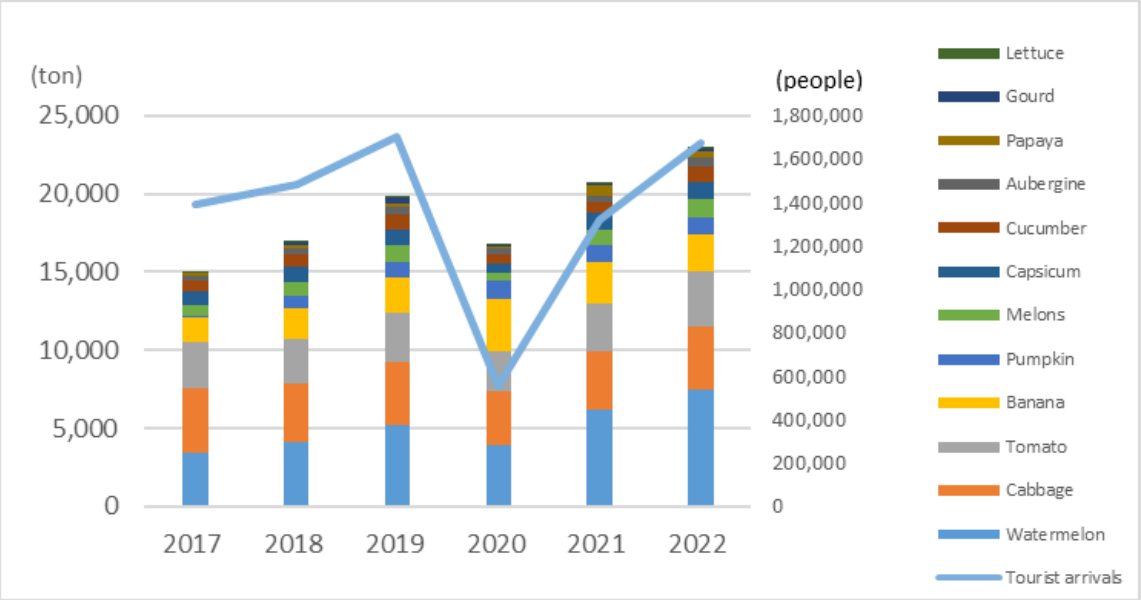
Table 5-3 Ration of Imports against Estimated Resort Demand

	Demand at Resorts (t/year)	Volume of imports to the resort (t/year)	Percentage of direct imports (%)
Watermelon	5,618.24	278.23	4.95%
Cucumber	3,473,97	653.94	18.82%

Lettuce	1,736.98	516.77	29.75%
Papaya	939.93	253.27	26.95%

Source: Prepared by the survey team

In addition, the figure below confirms that the number of foreign tourists and the volume of imports of major agricultural products increase and decrease in tandem. Import volumes of major crops have increased by about 50% since 2017 (an average annual increase of about 8.45%) while the domestic population has increased by only about 28% since 2014 (an average annual increase of about 3.13%), resulting in a rapid growth in imports relative to the growth of the domestic population (≈ the growth in demand for agricultural products in the country). Therefore, the increase in demand at resorts is likely to be met by imports.



Source: Prepared by the research team based on data from the Bureau of Statistics and the Ministry of Tourism.

Figure 5-2 Imports of Major Agricultural Products and Number of Foreign Visitors

Future Demand Projections for Resorts

As of April 13, 2023, the resort has a capacity of 42,137 beds in 174 resorts[89]. The number of resorts is expected to continue to grow, and according to the Ministry of Tourism, there are more than 100 resort development plans under consideration, of which 50 have already begun construction of infrastructure facilities. If the 50 resorts currently being built and the remaining 50 (or more) planned resorts were to be built with the same average number of beds as today, the number of beds would be as follows.

Table 5-4 Estimation of Number of Beds at Resorts

Number of Resorts	174	224	274
Number of Beds	42,137	54,245	66,354

Source: Prepared by the survey team

[89] Maldives Ministry of Tourism, Maldives Tourism Updates as of 13 April 2023

Assuming that the bed usage rate remains the same, the following demand (t/year) can be estimated from the demand per bed per week in Table 5-2, and an increase of 100 more resorts is expected to increase demand by about 1.6 times.1

Table 5-5 Estimation of Agricultural Products Demand (t/year)

Crops	Demand for 174 resorts	Demand for 224 resorts	Demand for 274 resorts
Watermelon	5,618	7,418	9,074
Cucumber	3,473	4,626	5,658
Lettuce	1,736	2,313	2,932
Potato	1,559	2,059	2,518
Papaya	939	1,241	1,518
Capsicum	106	141	172

Source: Prepared by the survey team

The number of annual tourists also experienced a significant drop in 2020 due to COVID-19, but by 2021 it had almost recovered to the pre-COVID-19 level and reached a record high in 2022. In 2023, the number of visitors entering the country from January to April has increased by 20% over the same period last year, and if the pace continues at this rate, the number of foreign visitors this year will exceed 2 million, achieving the record high following the previous year. New resort construction continues to increase lodging capacity for the growing number of tourists, as well as the expansion of air traffic and the infrastructure that serves as the main route of entry for foreign visitors. For example, Hanimadhoo Airport in the north has become an international airport, with international flights from India and other countries, and Malé Airport, the largest airport in the country, is undergoing expansion to further increase its capacity. Capacity to accommodate this growing number of foreign visitors is steadily being built, and this upward trend is expected to continue.

As the number of tourists increases, demand for food and beverage products at resorts, and thus for agricultural products, is expected to increase. If the trend in Figure 5-2 continues, it is likely that much of the increased demand for agricultural products resulting from the increase in the number of tourists will be met by imports. However, as discussed in 5.3.3, expectations of resorts for local procurement are high, and there is much room for domestic production to meet a portion of the increasing demand for agricultural products.

5.3.2 Preferences of Resorts in Purchasing Agricultural Products Obtained from Interviews

Through this survey, the survey team were able to interview purchasing managers at five resorts about their preferences in purchasing agricultural products. The survey team have attempted to analyze the preferences for purchasing agricultural products obtained from this survey in the form of the table below.

Table 5-6 Preferences for Purchasing Agricultural Products at Resorts

Item	Contents
Purchased Crops	• In common with all resorts, crops that are not grown in the Maldives, difficult to grow, or difficult to obtain are imported. Examples include asparagus, cauliflower, broccoli, and cheese. • On the other hand, for crops that can also be procured in the Maldives, it was observed both resorts that prioritize direct imports from importers (although they can be procured, due to cost) and resorts that procure from domestic suppliers (with a mix of imports). Some resorts also made sourcing from their own agricultural islands their first option.
Quality	• Chef determines the appropriate quality, which is not explicitly explained, and standards may vary from chef to chef. Specific items of quality include appearance, taste, and size. • Many resorts have a chef (and purchasing manager) review samples when sourcing from a new supplier.
Supply	• Several resorts had minimum transaction volumes. In addition, Resorts do not necessarily purchase all necessary quantities from a single supplier.
Security of Supply	• Resorts with annual or other regular contracts were not observed. • At almost all resorts, quotations are obtained from multiple suppliers for each procurement. (One resort was also identified, which is to determine the unit price for procurement in the same month at the beginning of the month.)
Packing Method	• Several resorts rejected plastic packaging materials in principle from a sustainability perspective. • In addition, some resorts far from Malé expressed a greater desire for Styrofoam containers and other packaging that could withstand long shipping times.
Safety (Pesticide use)	• Many resorts said that they received certificates from distributors for imported products. • Many resorts did not specifically request that domestic products be presented, as in many cases it was not possible to provide proof. Some resorts were fine with the use of organic products as long as the proper amount is used, but some resorts, especially those located in densely populated atolls (Baa, Kaafu, etc.), demanded organic products due to customer trends and competition from other resorts.

Source: Field interviews by research team

The following comments were obtained regarding the procurement of agricultural products from the Maldives, including expectations.

Areas with a high concentration of resorts (Kaafu Atoll, Baa Atoll, etc.)

Competition for customers among resorts is intensifying due to the increase in the number of resorts, and the need to improve services has arisen. Therefore, they would like to procure domestic crops in terms of freshness and uniqueness. At several resorts, purchasing managers commented that they would be willing to purchase crops from surrounding agricultural islands at higher prices than they are currently paying for them. In terms of uniqueness, Reethi Beach Resort offers Maldives Night once a week, where guests are served with Maldivian cuisine, using traditional Maldivian crops such as yams[90]. As such, there is a high demand for domestic crops, and some said they would be grateful if the surrounding agricultural islands could produce certain crops in accordance with the resort's requests. In fact, several resorts in Baa Atoll have established relationships with the island councils of B. Kamadhoo and B. Maalhos in the same atoll and have indicated an interest in purchasing agricultural products.

If the relationship with the surrounding agricultural islands can be deepened, the idea is to organize hands-on activities offered to resort guests, such as visits to the agricultural islands and harvesting experience. Regarding transportation, some resorts operate boats at their own expense to and from the surrounding inhabited islands, for example, Four Seasons Maldives operates boats multiple times a day for commuters from the island. A certain amount of luggage can be carried as passenger baggage, and in such cases, even small quantities can be sold to resorts.

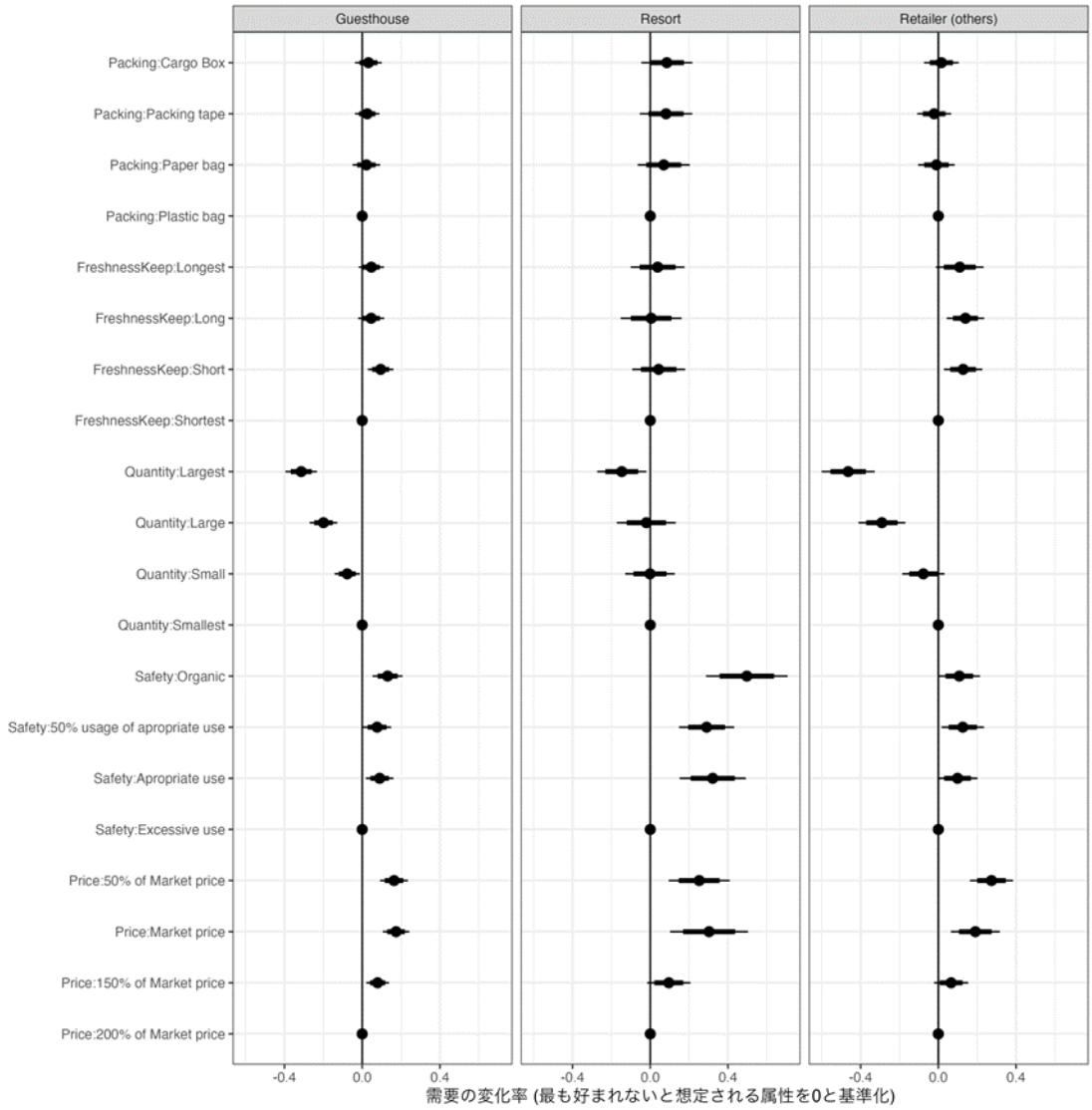
Areas far from Malé

Resorts located away from Malé currently procure almost entirely goods from Malé or imports through Malé. However, in the northern and southern regions, it takes more than 24 hours one way (2-3 days depending on sea conditions) for a transport vessel to travel between Malé and the resort, and round trips are made once a week or even less frequently when loading and other time is taken into account. Therefore, many resorts were willing to pursue sourcing from surrounding agricultural and resident islands if possible, in terms of crop freshness and transportation costs. Some resorts confirmed that they are actively engaged in procurement efforts, including discussions with surrounding island councils.

5.3.3 Resorts' Preferences in Purchasing Agricultural Produce from Conjoint Analysis

In the conjoint analysis, each respondent was analyzed by attribute (resort, guest house, and retail), and the results are shown in Figure 5-3. From this, it was confirmed that there are differences in preference for resorts compared to other attributes in the following two points of the table 5-7.

[90] The Maldives Ministry of Tourism "MALDIVES FIFTH TOURISM MASTER PLAN 2023-2027" includes "offering Maldivian local food and traditional cuisine" as part of Goal 3 of the plan.



Source: Analytical report by Dr. Kawata

Figure 5-3 AMCEs by Attribute of Respondents

Table 5-7 Characteristics of Preferences at Resorts

Effect of increased transaction volume on reduced demand	For all attributes, a "demand-decreasing effect of increased trading volume" was identified, where demand decreases as trading volume increases, but the extent of the decrease is more than 20% less for resort than for the other two attributes.
Safety Awareness	Compared to the other two attributes, a strong preference for Organic was estimated. Compared to Excessive use in Resort, demand for Organic has expanded by more than 40%. On the other hand, in guest houses and retail, the effect is only about 20%.

Source: Prepared by the survey team from analytical report by Prof. Kawata.

The preference for organic (and less than appropriate pesticide use) is consistent with the preferences that the survey team were able to confirm through the aforementioned interviews. Therefore, it is considered important to be Organic (and use less than appropriate pesticides) in

order to obtain business with the resort.

The aforementioned procurement style at resorts may have influenced the decrease in demand as transaction volume increases (small demand for trading on a large scale at one time). The resorts the survey team were able to interview for this survey had a procurement format in which they set a minimum quantity from one supplier per crop, but procured from multiple suppliers at the same time when demand was high. This may have resulted in demand not increasing relative to the expansion of transaction volume. On the flip side, however, it could be argued that even relatively small-scale producers could start doing business with resorts.

5.4 Demand in Guest houses, Preference for Crops Purchasing

5.4.1 Demand in Guest Houses

In the Maldives, guest houses have become the second largest capacity accommodation following resorts. Guest houses have become the second choice of accommodation for foreign tourists after resorts, with about 15% staying in guest houses, according to the Ministry of Tourism's Visitors Survey 2021. However, with only about one-twentieth the number of beds per facility, individual facilities are relatively small. Some guest houses have restaurants, but there are also a certain number of guest houses that are only B&Bs and rarely procure agricultural products. According to the Visitor Survey, 46% of guest house guests stay in B&B-style accommodations or on a first-come, first-served basis. As in the case of resorts, no statistical data is available on the demand for agricultural products in guest houses, but based on the above, it can be inferred that the demand for agricultural products in guest houses does not account for a large percentage of the total demand for agricultural products in the Maldives.

Table 5-8 Accommodation Capacity by Category

	Number of facilities	Number of Beds	Average number of beds per facility
Resort	174	42,137	242
Guest house	895	14,674	16
Other	166	4,599	27

Source: Maldives Ministry of Tourism, Maldives Tourism Updates as of 13 April 2023

5.4.2 Preferences in Guest houses Obtained from Interviews

From the interviews with guest houses on Hulhumalé, it is inferred that most of the B&B guest houses purchase what they need from nearby retailers on a daily basis, and that the products they purchase are almost fixed, especially in the smaller guest houses in Malé and Hulhumalé. In particular, it can be inferred that there is no strong preference for purchasing in the smaller guesthouses in Malé and Hulhumalé.

On the other hand, through interviews with guest houses located on islands other than Malé and Hulhumalé, it was frequently mentioned that tourists from abroad expect guest houses to provide

locally grown produce (local food). In some cases, the survey team were told that reservations could not be accepted because of the inability to provide local produce (local food). Therefore, there is a certain amount of demand for domestic agricultural products by guest houses, including purchases from surrounding islands. For example, yams as an ingredient for providing local food, lettuce, cucumbers, peppers, watermelons, bananas, and papayas in terms of freshness and procurement cost were identified as crops they would like to procure from the surrounding islands. On the other hand, guest houses do not have many guest rooms, so they do not order a large quantity at a time, often no more than 10 kg per week, depending on the crop.

5.5 General Consumer Demand

As mentioned earlier, statistics on demand (trading volume) are not maintained. In addition, as mentioned in Chapter 2, it is possible to ascertain the volume of domestic agricultural products distributed to Malé, but it is difficult to ascertain the overall volume of demand. Therefore, this survey attempted to estimate the quantity demanded in Malé and throughout the Maldives based on the type and quantity of purchased crops.

Thirty-three households were interviewed regarding the crops they purchased and the amount they purchased. The total number of persons in the households that could be interviewed was 156 (52 males, 58 females, and 46 children), for an average of 4.73 persons per household. This is in close agreement with the average number of persons per household in the entire Maldives in Census 2022, which is 4.7 persons per household and 4.5 persons per household in Malé.

Based on the monthly purchases obtained from the interviews, the annual purchases (≒demand) were estimated in the following way. The annual per capita purchases were obtained by dividing the number of purchases per crop by the number of purchases per person. This was multiplied by the Maldivian population in Census 2022 and the Maldivian population residing in Malé to calculate the amount of each annual purchase.

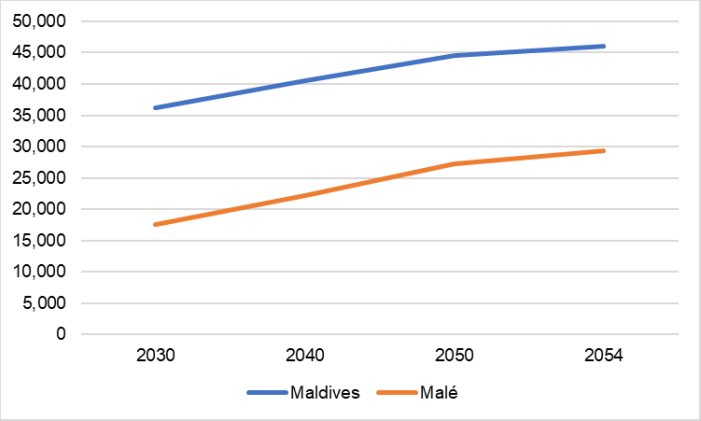
Table 5-9 Estimated Demand for Agricultural Products in the Maldives

Crops	Demand (kg/month)	Demand per person (kg/year)	Demand in Maldives (t/year)	Demand in Malé (t/year)
Young Coconut	49	10.56	4041.85	1701.3
Watermelon	125	9.96	3812.2	1604.64
Coconut	2.5	7.56	2893.6	1217.98
Cabbage	2.5	7.56	2893.6	1217.98
Cucumber	56.7	4.44	1699.41	715.32
Cassava	1	3.96	1515.69	637.99
Passion Fruit	15.3	3.72	1423.83	599.32
Butter Squash	21.4	3.6	1377.9	579.99
Mango	21.1	3.24	1240.11	521.99
Papaya	7.3	3.12	1194.18	502.66
Beans	30.35	2.52	964.53	405.99
Radish	1.7	2.52	964.53	405.99
Orange	0.5	2.04	780.81	328.66
Leeks	0.5	2.04	780.81	328.66
Banana	19.55	1.92	734.88	309.33
Spinach	5.5	1.8	688.95	289.99
Chinese Cabbage	4.8	1.8	688.95	289.99
Taro/Yam	4.75	1.68	643.02	270.66
Kale	10.68	1.56	597.09	251.33
Sweet Potato	8.38	1.56	597.09	251.33
Chili	18.09	1.44	551.16	232
Eggplant	9.45	1.44	551.16	232
Pumpkin	3.4	1.32	505.23	212.66
Water Spinach	1.9	1.2	459.3	193.33

Source: Prepared by the survey team

The demand for agricultural products by general consumers (Maldivian residents) in the population at 2030, 20240, 2050, and 2054, as calculated in the "Maldives Population Projections 2014-2054," which is a population projection through 2054, can be estimated as shown in the table below. The table below shows the estimated demand for agricultural products by the general consumers (Maldivian residents) at the population in 2030, 2040, 2050 and 2054. The population of the Maldives is expected to continue to grow until at least 2054, and with it, the demand for agricultural products by the general public will continue to increase.

Table 5-10 Estimated Demand for Agricultural Products by Maldivian Population (t/year)



Source: Prepared by the survey team

5.6 Current Status and Issues of Crop Distribution System

5.6.1 Current State of the Crop Distribution System

Chapter 4 categorized the producers and provided details on each of these categories. In this section, the agricultural products produced by these producers are classified by the starting point of distribution, and the current status of the supply chain revealed through this survey is summarized. The correspondence between each producer in Chapter 4 and the classification in this section is as follows.

Classification in Ch.4		Classification in Ch.5	
Inhabited island (individual)	4.2 and 4.3	Agriculture island	5.6.1
Inhabited island (company)	4.4		
Uninhabited agriculture island		leased agriculture island	
Resort		Resort	5.6.3

In the Maldives, the starting point for the distribution of agricultural products is divided into two types: 1) agricultural islands (where residents produce agricultural products), 2) leased agricultural islands (where companies lease uninhabited islands for their production) and 3) Resort (details described in 5.6.3). As for 1) and 2), there are similarities, with some products distributed directly from the producer to the final retailer/consumer and others distributed through intermediaries to the final retailer/consumer, as shown in the figure on the right. In addition, there

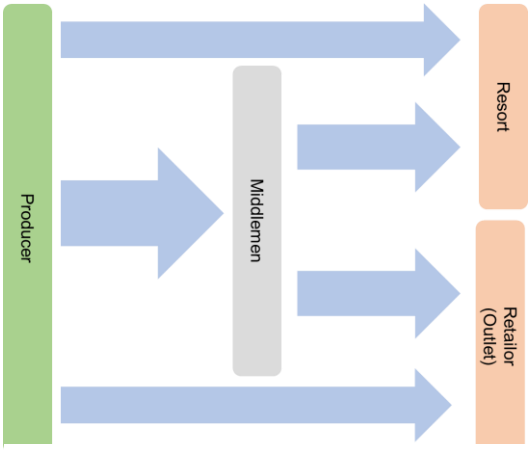


Figure 5-4 Outline of Agricultural Products Distribution in Maldives

is a certain amount of self-consumption by producers (mainly individual farmers on inhabited islands).

1) Agriculture Island

The destinations of agricultural products on agricultural islands can be divided into (1) sales on the island, (2) sales to neighboring islands, (3) sales to Malé, (4) sales to resorts, and (5) sales to AgroNat. (see the figure below for an overview)

(1) On-island sales

Sales to small retailers (small supermarkets) on the island and direct sales to islanders were observed. In the latter case, in addition to sales to acquaintances, there were confirmed cases of sales negotiations taking place on HDh. Nolhivaram and AA. Thoddoo, utilizing the group function of social networking services such as Viber.

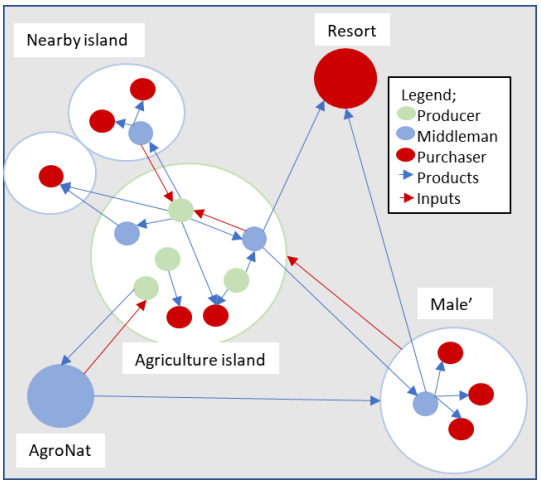


Figure 5-5 SC Structure from the view of Agriculture Island

(2) Sales to neighboring islands

Sales are made through cargo ships that operate regularly within the atoll and to other nearby islands. In addition to the operation of cargo vessels by the private sector, there are also water buses operated by MTCC to transport agricultural products between Addu City and Gn. Fuvahmula.

In addition, if a regular market is held on a neighboring island (for example, the Saturday market on the northern HDh. Kuldhuffushi), stalls and sales are also held there. In the former, they may sell wholesale to shipowners who also serve as intermediaries, or they may sell directly through friends or other connections.

Regularly scheduled cargo ships

Loading cargo onto a liner

Source: Survey team photo

Figure 5-6 Transportation of Agricultural Products within the Atoll

(3) Sales to Malé

Basically, they are sold through intermediary distributors to the market in Malé. The intermediary distributor is often the same as the owner of the vessel. In areas close to the Malé, cargo ships come and go daily, but in more remote areas, they operate less frequently, weekly or bi-weekly.

The wholesale and retail markets in Malé are as follows. The Malé market (central market) is located in the northern part of Malé, where about 60 wholesale and retail businesses are lined up. Wholesale and retail stores are also present around the market. There is also a market called as Chamber Market operated by the Chamber of Commerce and Industry in the southern part of Malé, which also has about 20 wholesale and retail stores.

The Malé Market

The Chamber Market

Source: Survey team photo

Figure 5-7 Wholesale and Retail Market in Malé

(4) Sales to resorts

On GA. Kondey, cases of sales directly to resorts were identified. In this case, an islander who worked at a resort in the atoll served as the point of contact for the sale to the resort. In addition, although not an inhabited island, a case that domestic agricultural products are sold to resorts in Malé through the Malé Market, Chamber Market and intermediary distributors was confirmed.

(5) Sales to AgroNat

As noted in 3.1, AgroNat purchases the entire production of contract farmers. The production is consolidated at each of AgroNat's bases, which are located at each atoll, and then transported and sold to Malé.

2) Leased Agricultural Island

The destination of agricultural products from leased agricultural islands can be divided into (1) sales to neighboring islands, (2) sales to resorts, and (3) sales to Malé.

(1) Sales to neighboring islands

Cases were identified in which the company's own boats were used to go to neighboring islands to sell the products, and cases in which sales to neighboring islands were conducted through intermediary distributors.

(2) Sales to resorts

Sales are being made to nearby resorts. There were also cases where the resorts themselves had leased agricultural islands.

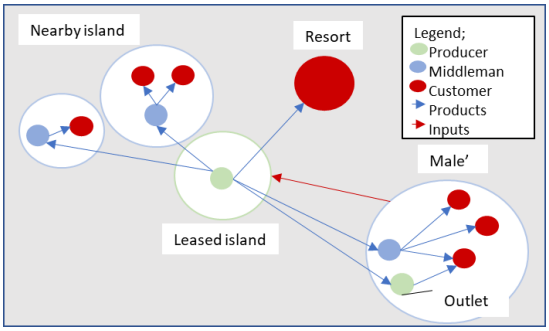


Figure 5-8 SC Structure from the view of Leased Island

(3) Sales to Malé

Sales to Malé may be through intermediary distributors or wholesale to retail outlets (called outlets) in Malé owned by leasing companies (and their affiliates) on Leased Agricultural Island.

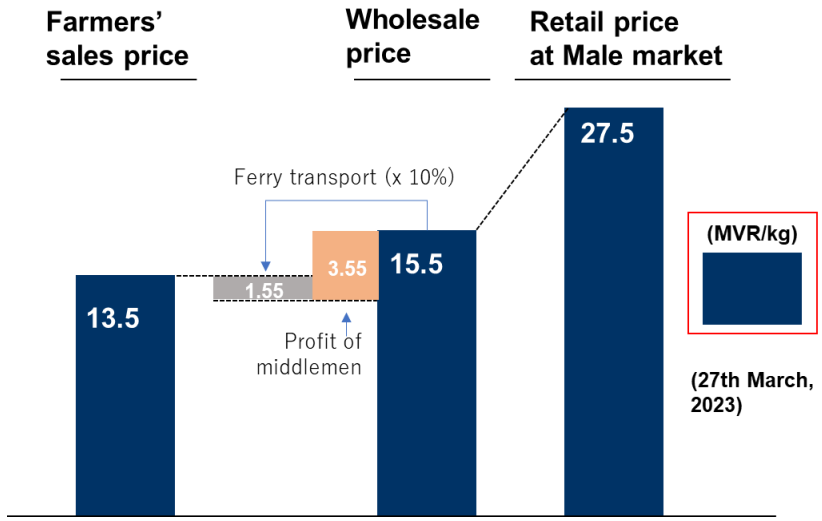
5.6.2 Current Status of Distribution Volume and Transportation Costs of Agricultural Products Distribution

As with production and demand, the survey team were unable to identify any national statistical data on the volume of agricultural products distributed within the Maldives. In this context, MoFMRA is collecting data on the volume of agricultural products flowing into the capital city of Malé, a logistics hub and major consumption center.

Regarding the form of fees related to the transportation of agricultural products, the survey team were able to identify two case study in AA. Thoddoo which is several hours away by cargo ship from Malé and Sh. Medhukuburudhoo (about 200km away from Malé). AA. Thoddoo showed a commission based on selling price, while Sh. Medhukuburudhoo showed a commission based on weight and a difference in the method used to calculate the commission. According to an intermediary distributor based on AA. Thoddoo, there is a rule that distributors can charge 10% of the total sales value as a transportation and handling fee (which can be added to the purchase price as a wholesale price).

The transportation cost at Sh. Medhukurubudhoo was MVR2/kg, confirming a fixed price system for weight. On the other hand, adding the information on production cost and final retail price in Malé, we can estimate the value chain of watermelon produced in AA. Thoddoo. In this case, intermediary distributors bought watermelons from farmers at MVR13.5/kg and sold them to retailers at MVR15.5/kg. The intermediate distributor could charge the farmer 10% (MVR 1.55/kg) of the wholesale price (MVR 15.5/kg) as a commission. Thus, the difference between the purchase price and the wholesale price (MVR2/kg) plus the said commission, MVR3.55/kg, is the profit of the middleman. In addition, retailers get the difference between the retail price (MVR27.5/kg) and the wholesale price as their profit. (The explanation on the left does not take

into account transportation costs, operating costs of retailers, etc.)

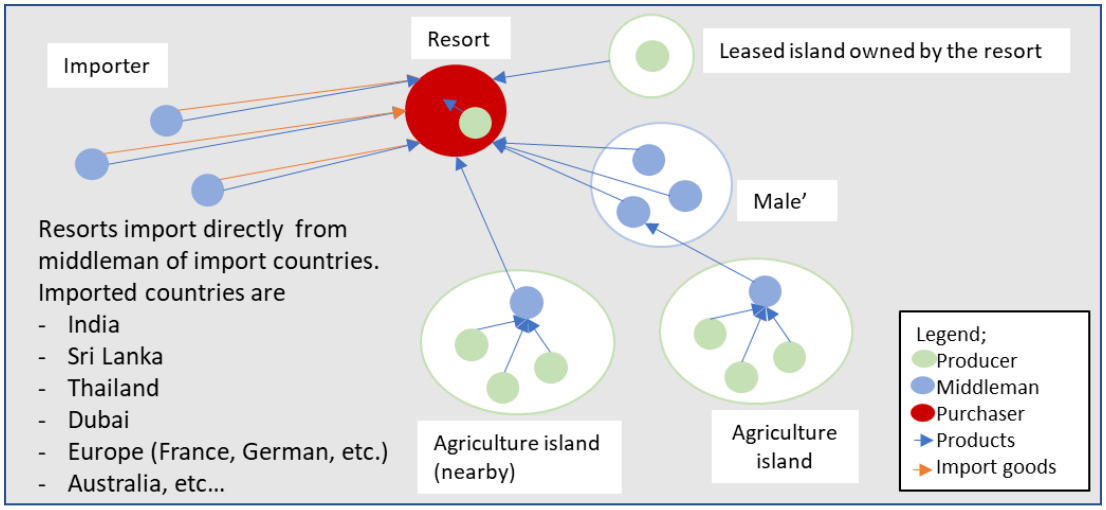


Source: Prepared by the survey team based on interviews conducted in the field.

Figure 5-9 Value Chain Diagram (Watermelon)

5.6.3 Current Status of Crop Distribution from the Resort's Perspective

The distribution of agricultural products from the resort's perspective can be organized as shown in the figure below, and can be classified into four categories based on the source of purchase: 1) original cultivation in the resort, 2) surrounding agricultural islands, 3) markets in Malé, and 4) direct purchase of imported products.



Source: Prepared by the research team based on interviews conducted in the field.

Figure 5-10 SC Structure Viewed from Resort

1) Proprietary cultivation within the resort

Through the visits to the resorts and interviews for the conjoint analysis, it became clear that there

are several resorts that grow some of the agricultural products served in their restaurants on their own islands. A small number of resorts also rented leased agricultural islands for cultivation. The area under cultivation and the types of crops grown varied widely from resort to resort, with some resorts growing only herbs and others growing more than 10 different crops in full-scale farms and greenhouses, mainly due to the limited size of the island on which the resorts are located. The resort with the largest cultivation among those the survey team interviewed reported that it produces approximately MVR 670,000 (approximately 5.87 million yen) per year in terms of market price.

The resort the survey team interviewed that have a leased agricultural island transports its crops to the resort via a port call at the leased agricultural island by the transport vessel from Malé (see below), which then loads the cargo and transports it to its own resort.

2) Agricultural islands around

A resort in Gaafu Alifu Atoll was found to be sourcing agricultural products from GA. Kondey. They are using an island resident who has worked at the resort in the past as a point of contact to buy and sell. In addition, three cases of direct sales to resorts were identified on AA. Thoddoo.

3) Market in Malé

The resorts usually own cargo carriers, which regularly ply between Malé and the resorts, transporting goods to the resorts. The resort also has a staff member stationed in Malé, who communicates with distributors in Malé and manages the loading of purchased goods onto cargo vessels. In the Maldives, none of the resorts the survey team interviewed had a fixed supplier, and they obtained quotes from multiple suppliers on a case-by-case basis to determine who to purchase from. For example, a resort that makes purchases in Malé on a weekly basis uses a procurement schedule similar to that shown in the table below.

Wed	Thu	Fri – Sat	Sun	Mon	Tue	Wed
Request for quotation for delivery on the next Wednesday	Obtain quotes from suppliers	Determination of where to purchase	Settle purchase orders to suppliers	Loading cargo	Loading of cargo and departure from Malé	Inspection and delivery

The procurement schedules presented above are for northern and southern resorts that are far from Malé (approximately one or more days by transport vessel to Malé), and some resorts were identified where the procurement frequency is about once every 10 days, depending on the distance from Malé. In the central part of the country, resorts in Baa Atoll were observed to have a procurement schedule of about once a week as described above. Some resorts in Kaafu Atoll, to which Malé belongs, were observed to conduct procurement as often as twice a week.

4) Direct purchase of imported products

According to interviews with customs officials, about 70% of the resorts buy directly from importers and clear customs themselves in Malé. Customs clearance is visually inspected by the

MFDA. After customs clearance, the cargo is transported with the purchases in Malé to a cargo ship owned by the aforementioned resorts.

The purchasing process involves direct communication with exporters in the country of supply, obtaining quotations from multiple suppliers on a case-by-case basis, making selections, and placing orders. The supplier country is determined to some extent by the type of product to be purchased, and the most common suppliers are Thailand, Sri Lanka (NIDRO SUPPLY), Germany, Australia, Dubai, etc. As for safety confirmation, international quality certifications, etc., are submitted at the start of transactions, and resorts therefore do not require them to be presented each time resorts place an order. Prices are also basically almost unchanged.

5.6.4 Issues in Crop Distribution

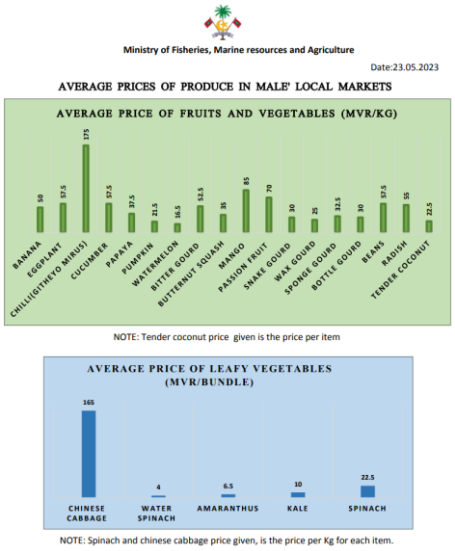
The following issues in the distribution of agricultural products were identified through interviews conducted through this survey.

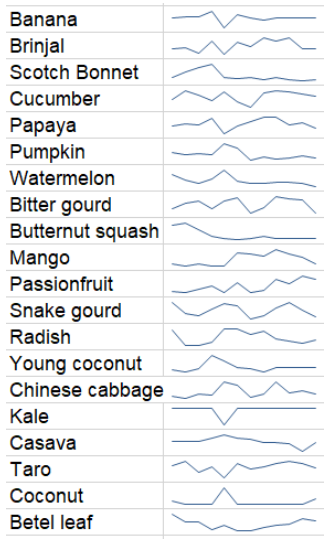
Table 5-11 Issues in Crop Distribution

Issue	Details and Factors of the issue
Damage to crops during transportation	In areas far from Malé, transportation by ship takes a quite long time (sometimes 2 or 3 days depending on sea conditions). For this reason, the more important the packing method is in resorts far from Malé, the more care must be taken to avoid damage to the goods during transportation. A guest house in the Kaafu Atoll, which is the same as Malé, also confirmed frequent cases of 50% of purchased agricultural products being painfully unusable during transportation.
Fragmentation of transportation networks	Particularly in areas far from Malé and in islands far from populated islands, the limited number of cargo vessels operating between the islands makes it difficult to transport goods at the right time. Also, in agricultural production, same difficulties happen.
High transportation costs	Sales to off-island destinations require transportation by ship, leading to higher transportation costs. Since most procurement at resorts is currently done from the capital city of Malé, the farther a resort is from Malé, the higher the transportation costs associated with procurement.
Inefficient supply chain	As the Maldivian agricultural supply chain is basically built around the capital city of Malé, the fact that there is only one logistics hub in the Maldives, which is long from north to south, is inefficient. Also, the unnecessary transportation costs make it impossible for domestic producers to be competitive against imported products.

5.7 Status of Information System for Crop Distribution

Information systems for agricultural commodity distribution that assume distributors as the main users could not be identified through this survey. On the other hand, the MoFMRA confirms the prices of agricultural commodities in the Malé market and publishes them on its website. As an example, market price information for May 23, 2023, is excerpted on the left side of the figure below. Market price information is gathered and compiled by MoFMRA staff members through direct confirmation of sales prices in the Malé market. Since market price information is essentially collected every MoFMRA business day, it is easy to see how prices are changing by organizing them in the form shown on the right-hand side of the figure below, which shows the change in market prices for each crop in 2022. The figure on the right-hand side below was organized by the survey team.





Examples of agricultural commodity distribution price listings[91]	Examples of price fluctuations that can be confirmed using the same data[92]

Figure 5-11 Market Price of Crops

It was also confirmed that in the information management system that mainly targets farmers, a system that also handles distribution and sales is being envisioned. In addition, although an extension of the informal network of connection, the survey team also observed cases of on-island sales communities being formed through the use of SNS. A summary of these is provided below.

1) Agriculture Information and Communication Technology (AICT)

Producers and operators	FAO funds will be utilized, produced by MAP, and operated by MoFMRA.
Outline	The main purpose of the system is to collect and manage production data

[91] Retrieved from https://www.gov.mv/en/files/23--9032.pdf (last visited May 26, 2023).
[92] Average monthly price changes for 2022 based on market price information published by MoFMRA.

	from farmers. It also has a platform function that allows producers, buyers, and agricultural material sellers to communicate with each other.
Status of maintenance and operation	System development conceptual stage.

2) Direct sales system on the island using SNS

Outline	Groups are created among islanders on social networking services (Viber, WhatsApp, etc.), and within these groups, sellers (producers) and buyers communicate directly with each other to make purchases.
Status of maintenance and operation	It was confirmed to be operated by volunteer islanders on HDh. Nolhivaram (northern Maldives) and AA. Thoddoo (near Malé).

The Maldives has a cell phone penetration rate (cell phone subscriptions per 100 people) of 135%, which is higher than in neighboring countries (India 82%, Sri Lanka 141%, Bangladesh 109%). In addition, fixed-line penetration is low (16.9%) but rising steadily. Therefore, cell phones in particular are considered to be an important communication tool in the Maldives, and their potential diffusion potential for information systems related to agricultural product distribution is high.[93]

[93] The respective penetration rates are taken from the World Bank database(https://data.worldbank.org/).

Chapter 6. Recommendations to JICA

The objective of this survey is to collect information and conduct analytical studies necessary to examine possible measures for agricultural development, focusing on mainly crop production, and cooperation measures by JICA, which would contribute to industrial diversification in the Maldives. This chapter first presents the appropriateness and rationality of supporting agriculture in the Maldives, using the results of statistics and surveys on consumer preferences, and then arguing the industry's potential in an objective manner.

Next, it summarizes the issues described through the parts up to Chapter 4 from the viewpoint of producers and institutional support. Then, considering the existing agricultural promotion programs introduced in Chapter 3 and the support provided to farmers by the government and the achievements made, the JICA survey team recommends measures to overcome the remaining challenges in production and distribution. Furthermore, the team recommends institutional support measures to sustain the implementation of these overcoming measures.

Finally, the JICA survey team examines a wide range of project schemes and make recommendations on what support JICA could provide to achieve these goals. Japanese knowledge, technology, and know-how that contribute to solving production and distribution issues will also be considered. The workflow is shown in the figure below.

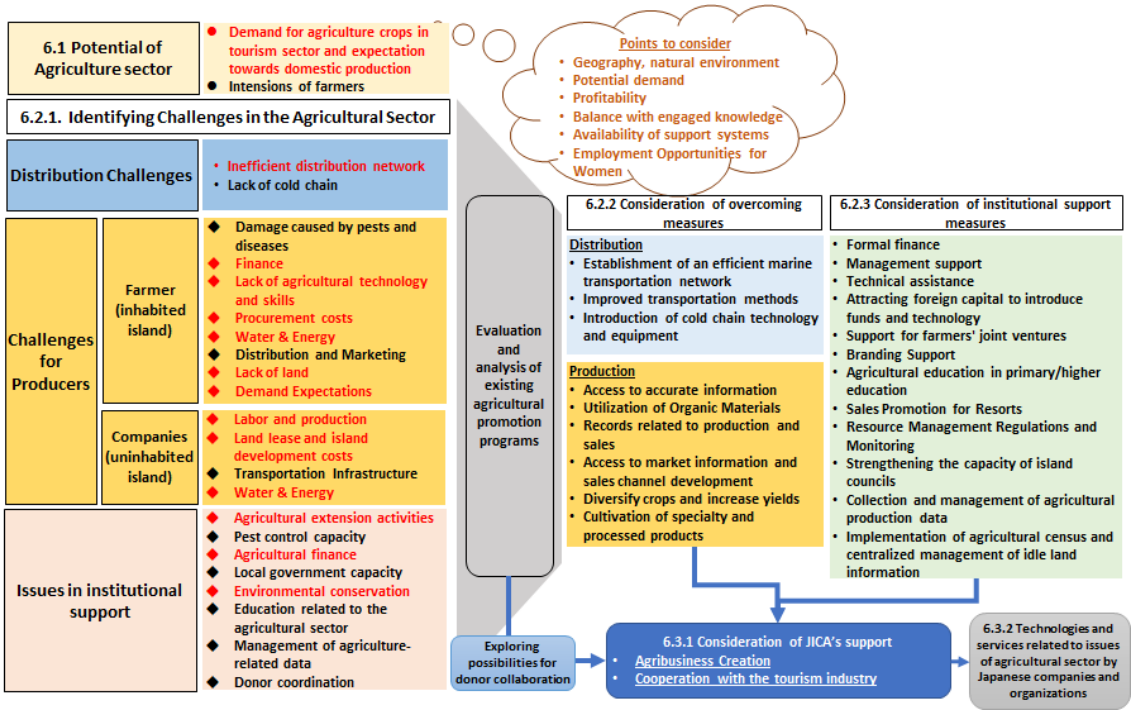


Figure 6-1 Process of considering JICA's support measures

The numbers attached to each step in the workflow correspond to the chapter numbers below. In addition, six key points to consider are set for identifying the potentials and challenges of the

agricultural sector. In that regard, the relevant items are indicated in red.

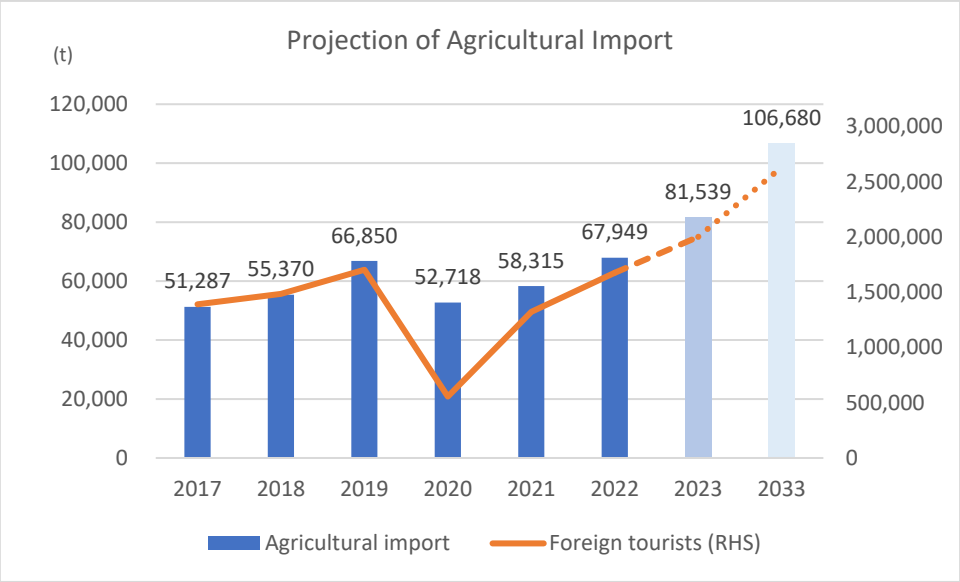
6.1 Potential of the Agricultural Sector in the Maldives

The tourism sector is symbolic for the Maldives, and resorts and guest houses are important consumers of agricultural products. The agricultural sector in the Maldives has great potential as an industry in a sense that the demand for agricultural products will continue to grow as the tourism sector develops further in the future. Although it was difficult to obtain quantitative data on demand in this survey, HDh. Kulhudhufushi, the largest island in the northern region, has a fruit and vegetable market and functions as a distribution hub for agricultural products, which has stimulated agricultural activities in the surrounding agricultural islands and has created a unique supply chain in the northern region. In light of the case of HDh. Kulhudhufushi, it can be assumed that there is great potential for the expansion of demand for agricultural products in the core islands of the regional atolls in the future, as they become more urbanized.

6.1.1 Growing demand for agricultural products in the tourism sector

As discussed in Chapter 2, agricultural import statistics and tourism sector statistics show that the volume of agricultural imports is linked to the number of foreign tourists flowing into the Maldives. The demand for agricultural products in the Maldives includes consumption by Maldivian nationals, and while national consumption was not supposed to be affected by the Covid-19 crisis in 2020, the import volume actually dropped significantly from the previous year. It is clear that the main reason for the decrease in import volume due to the crisis was the decrease in the number of foreign tourists, indicating the significant impact of the tourism sector on agricultural demand.

As explained in Chapter 5, the number of foreign tourists is expected to continue to increase. The foreign investment statistics presented in Chapter 2 illustrates that the number of FDI projects in the tourism sector has been increasing in recent years. According to the Ministry of Tourism, there are about 100 islands with resort development projects, including those that have not yet been started. When all completed, it will exceed the number of inhabited islands in the country, and infrastructure improvements, such as the opening of the Hanimadhoo international Airport and the expansion of Malé Airport, are expected to increase the capacity of receiving foreign tourists. The graph below shows the projected trends in the number of foreign tourists and the volume of agricultural imports. The volume of agricultural imports is estimated using the growth rate of the number of tourists in the future, which is estimated based on the resort development plan in Chapter 5.



Source: prepared by JICA survey team[94]

Figure 6-2 Agricultural import volume forecast

Assuming no change in domestic production from the current level, the volume of agricultural imports will exceed 100,000 tons/year in the future, as the above chart shows.

6.1.2 Expectations towards domestic agricultural products by consumers in the tourism sector

The conjoint analysis of preferences confirms the trend in favor of safe products, and this trend is even more pronounced among consumers at resorts, comparing to guest houses. There is a great opportunity for domestic agricultural products because purchasing from neighboring agricultural islands makes it easy to inspect farmland and ensure traceability without difficulty. It is also detected that even though consumers prefer cheaper price than current prices, the rise in demand would be extremely limited, making it difficult to envision a situation in which the tourism sector would face price competition from imports.

Interviews with resorts confirmed the same trend. The demand for organic produce from guests is increasing, and for this reason some resorts are growing their own produce on the islands, but there is not enough capacity to cover all consumption on the island, and many procurement managers prefer to purchase from neighboring agricultural islands if possible. Some resorts were willing to purchase produce from the surrounding agricultural islands even if the price is a little

[94] First, for the number of tourists in 2023, we assumed that the pace of 20% year-on-year growth, which is the actual figure for the first half of the year, would be maintained for the entire year. Furthermore, assuming that all new resorts currently under development will be in operation in 10 years, the number of tourists in 2033 was estimated using the same bed occupancy rate as today. On the other hand, since the Maldivian population is growing at an annual rate of 1.5% and the current birth rate is expected to slow down in the future, the population growth of the Maldivian nationals is not taken into account here. Next, we estimated the amount of agricultural imports at each point in time in line with the rate of increase in the number of tourists.

higher than the current procurement price. Some of the resorts have already communicated with the surrounding inhabited islands to inquire about the supply of agricultural products. It is one of the remarkable findings of this survey that consumers of tourism sectors are willing to purchase agricultural products produced in the Maldives.

6.1.3 Islanders' willingness to engage in agriculture and farmers' willingness to supply resorts

Many islanders wish to engage in agriculture as a way of life. In some cases, the number of applicants for plots of lands leased by island councils exceeded the number of plots available, and some farmers who already had plots are requesting additional plots to expand their production scale. There are also many farmers who want to introduce modern agricultural technology to improve productivity in order to supply crops to resorts, and many farmers who are considering diversifying their crops to meet the needs of resorts.

In the Maldives, there is a strong demand for domestic agricultural products from the tourism sector, and there are many potential farmers and producers who are interested in creating agribusinesses for the tourism sector. In this context, the appropriateness and rationality of the support to the Maldivian agricultural sector can be regarded quite high.

6.2 Challenges and Possible Responses in the Maldivian Agricultural Sector

Measures for agricultural development should be linked to the development of the tourism sector. However, despite the strong and growing demand in the tourism sector, the surrounding agricultural islands have not been able to capture this demand due to a number of challenges, and most of the benefits are being enjoyed by suppliers from outside the country. In order to maximize the benefits from the resort industry to the domestic market, it is desirable that the food consumed there are sourced domestically. Many Maldivians have a desire to stop the current situation that much of the revenue generated by the resorts, which are the main industry in the Maldives, is going out of the country.

The following section summarizes the challenges in the agricultural sector described up to Chapter 5, and describes measures to overcome them and government support.

6.2.1 Identifying Challenges in the Agricultural Sector

One of the most valuable findings identified in this survey is the high demand for agricultural products in the tourism sector, expectations for domestic agricultural products, and the willingness of producers to supply the tourism sector. Interviews with several resorts confirmed that they are directly communicating with nearby agricultural islands to inquire about the availability of agricultural products, and those customers are willing to purchase agricultural products produced in the Maldives. The conjoint analysis of customers' preferences confirms the trend in favor of safety among all customers, and this trend is even more pronounced for

resorts. Purchasing from surrounding agricultural islands makes it easy to inspect farmland and ensure traceability without difficulty.

On the other hand, the agricultural sector in the Maldives is facing various challenges and is not meeting the demands and expectations of such a tourism sector.

In analyzing the challenges faced by producers and other actors of the supply chains, several important aspects are considered; geography, natural environment, potential demand, profitability, balance with engaged knowledge, availability of support systems, and women's employment opportunities.

Table 6-1 Supply Chain (Production and Distribution) Issues

production (Inhabited island)	**Damage caused by pests and diseases**	The most serious problem that reduces productivity is damage caused by pests and diseases. The lack of management of imported materials, accurate diagnostic techniques, and countermeasures makes it difficult to control the damage.
	Finance	With unfamiliar agricultural finance and the limited financial capacity of individual farmers, who are the main producers, they are unable to make investments to improve productivity.
	Lack of agricultural technology and skills	Agricultural extension services are not reaching all farmers and farmers are exchanging unproven information with each other.
	Procurement costs	Material costs account for a large portion of the entire production costs. To increase profitability, it is essential to reduce the cost of materials, but the company's dependence on imports for most of its materials makes it susceptible to rising transportation costs.
	Water & Energy	Particularly with regard to water, since they are current farming is dependent on groundwater, there are concerns about the effects of saltwater inflow, depletion of water resources, and increased water costs due to the use of RO water in the future.
	Distribution and Marketing	While there are no problems with sales and transportation within the island through SNS transactions between individuals, it is difficult to secure sufficient margins for sales outside the island because they have to rely on monopolistic middlemen. Personal transactions to the resort are not possible due to small lots.
	Lack of land	Leased plots on inhabited islands are small and production per farmer is limited.
	Demand Expectations	In particular, the resort purchases hundreds of kilograms per crop (once a week), which cannot be handled by a single farm household on inhabited islands.

production (Uninhabited island)	**Labor and production**	Compared to farming on inhabited islands, cultivation takes place on large tracts of farmland, and labor costs account for a large portion of production costs for operators with low labor productivity, such as those with inadequate irrigation facilities.
	Land lease and Island development costs	Land lease fees vary from one uninhabited island to another, and in some cases, the amount paid is so large that it puts pressure on revenues. In addition, once the islands are acquired, all infrastructure development must be carried out at the expense of the operator, making it difficult to recoup investment costs through agricultural activities alone.
	Transportation Infrastructure	Uninhabited islands do not have intra-atoll ferries or regular vessels operated by private transport, and thus must develop their own means of shipping and transportation.
	Water & Energy	Since the use of groundwater is not permitted and the operator must maintain the facility, including the power supply, the initial costs as well as operating costs are enormous, putting pressure on profits.
distribution	**Inefficient distribution network**	The distribution of agricultural products is basically through Malé, and agricultural products and imports from local agricultural islands are consolidated in Malé and transported to local resident islands and some of them to resort islands. The long transportation distances have caused issues such as higher sales prices due to transportation costs and damage to cargo.
	Lack of cold chain	For domestic transportation to the islands, which are a distance from Malé, ships with refrigeration facilities are used, but because of the lack of refrigeration facilities at the shipping points, harvesting must be done according to the ship's schedule. Harvests that cannot be matched cannot be kept fresh and are discarded.

Source: Prepared by the survey team

6.2.2 Consideration of Measures to Overcome

Various efforts are currently being made to address the aforementioned challenges through agricultural promotion measures developed with the support of donor agencies, as described in Chapter 2, and farmer support programs by related agencies, as described in Chapter 4. However, these efforts will not solve all of the challenges in agricultural sector of the Maldivian identified in 6.2.1, and the table below continues to summarize the measures to be taken by the production and distribution actors in the supply chain to overcome them.

Table 6-2 Proposed measures to overcome in production and distribution

(data) item		measure to overcome an obstacle or difficulty
Production	Access to accurate information	Accurately access information on cultivation techniques adapted to the unique natural environment of the Maldives.
	Utilization of Organic matter	Produce compost and other agricultural materials from organic matter generated from daily life on the island, including agricultural activities, in an attempt to lower material costs and reduce waste.
	Records related to production and sales	Accurately identify and record procured materials and other production costs, as well as data related to production and sales, as information required when obtaining financing. Record them for each crop whenever possible.
	Access to market information and sales channel development	To find better sales partners, not rely on existing distribution channels such as monopoly middlemen, but obtain real-time market information from off-island markets to gain an advantage in sales.
	Financing and introduction of agricultural technology	From financing through loans to increasing productivity through the introduction of modern agricultural technology. Consider registering your company to apply for an SDFC loan
	Diversify crops and increase yields	Close communication with resorts will enable to accurately grasp the demands of customers, and to work on diversifying the types of crops grown and increasing production volume.
	Cultivation of specialty and processed products	Differentiate your products from others by developing region-specific products and processed products to take advantage of sales negotiations and transportation arrangements. It will also improve waste management on the island by developing processed products using waste.
Distribution	SC construction by region	far from Malé, the SCs will be construct the supply chained within atolls to enable completion of the entire process from production to consumption on a regional basis, such as within atolls. Establish regular vessel operations such as atoll ferries and establish collection and sales points within the atolls.
	Improved transportation	Packaging and loading methods need to be improved to prevent damage during transportation. For the

	methods	sustainability of the SC, enter into an equal sales contract with the producer (in some cases, any damage during transportation is the responsibility of the shipper).
	Introduction of cold chain technology and equipment	Encourage the introduction of technologies that fit the situation in the Maldives, such as cold chain technology that does not require electricity or encourage the entry of companies with such technologies.

Naturally, external support will be essential to take measures to overcome these obstacles. Next, the following table describes administrative support at the central government organization and local level, including the MoFMRA. For those that have already been implemented, describe their status of use and areas for improvement.

6.2.3 Government Support Measures

Table 6-3 Proposed Government Support Measures

Agenda	Support measures	Existing Initiatives and Issues
formal finance	Improve access to formal finance by individual farmers and provide accessible loan programs for small farmers.	Individual farmers are not eligible under the condition that they should be registered as SMEs with the Ministry of Economic Development.
Business support (start-up support for entrepreneurs)	Assist in recording data on production and sales and developing business plans based on this data.	BCC support is specific to SMEs and in principle does not include individual farmers.
Technical assistance (introduction and guidance)	Provide appropriate technical guidance to all farmers who wish to do so. It also provides support based on mutual communication in response to inquiries from farmers.	The agricultural extension tool being developed by MoFMRA has not yet established its operational system.
Attracting foreign investment to bring funds and technology	Establish measures to attract foreign investment specifically in agriculture to create an environment in which the demonstration of advanced technologies and services within the Maldives can take place quickly and smoothly.	N/A
Support for farmers' joint activities	Support the establishment of a system for joint procurement, production, and sales by farmers in local islands.	MAP is supporting IFFs in the three northern atolls but has yet to initiate concrete activities.

Sales promotion/branding support for resorts	Assess the demand and needs of the resort and support planned/contracted farming on the agricultural islands. The company also provides branding support for specialty and processed products in each region.	N/A
Agricultural education in primary/higher education	Agriculture should be included in integrated studies in primary education, and a curriculum in agriculture should be provided in higher education to prepare students for future employment in the agricultural sector.	The National University of Maldives has an agriculture course in its engineering department, but it does not provide the knowledge necessary to engage in commercial agriculture.
Resource Management Regulations and Monitoring	Develop environmental regulations that are in line with the realities of the situation and assist the Island Council in fostering understanding and implementing monitoring activities.	Related environmental regulations will be partially developed and enforced.
Strengthening the capacity of island councils	Capacity building that will lead to improved knowledge and skills, including environmental aspects, to enable proper enforcement of land development plans in relation to agricultural development on the island.	LGAs are providing training to island councils to improve their administrative capacity, but the agricultural sector is not included.
Collection and management of agricultural production data	Digitize the information collection system and provide capacity building to island council staff so that production data can be gathered on local agricultural islands.	N/A
Implementation of agricultural census and centralized management of idle land information	Investigate the operation status of farmland throughout the country, including leased uninhabited islands, and develop legislation to enable the utilization of idle land.	N/A

As mentioned above, for areas that are already being addressed by MoFMRA and other relevant institutions but where challenges remain, external support, including donor agencies, must be

injected if necessary, while working with existing players. On the other hand, external support is required for areas where no particular efforts are currently being made.

6.3 Recommendations for JICA's Cooperation in the Agricultural Sector of Maldives

6.3.1 Need for JICA's assistance

The need for JICA to provide assistance to the Maldivian agricultural sector is discussed below.

1) Relevance to the JICA Global Agenda

It is closely related to the market-oriented agricultural promotion and the establishment of regional food value chain (FVC), which are set as cluster project strategies in the JICA Global Agenda "Agriculture and Rural Development". As mentioned above, the demand and preference for agricultural products in resorts has been confirmed, and responding appropriately to this demand is one of the key strategies for producers.

FVC establishment is also highly relevant from this perspective. Instead of the existing inefficient FVC through Malé as a transit point, it is possible to establish regional FVCs in the northern and southern regions, connected with resorts as the end point. In addition, establishing fruit and vegetable markets in rural areas, such as one in Kulhudhuffushi in the north, would also be effective in building regional FVC.

2) Social Impact

Social impact through agricultural promotion is also expected. On local islands, employment opportunities outside of the public service are limited to peripheral resorts or fishing, which normally require leaving their family and the island to engage in these activities. Yet, if one can make a living from agriculture, one can live with one's family. Furthermore, while women do not have employment opportunities in those major industries, agriculture is a decent job opportunity for women and one of the most important industries from the perspective of gender equality.

In a situation where the population is increasingly concentrated in Malé and the cost of living is skyrocketing, more and more young people having families are considering moving to local islands. These young people, many of whom have higher education and experienced careers in the capital city of Malé, are excellent human resources, and are important actors in the economic revitalization of local islands. Such talented personnel could contribute to job creation on the island through commercial farming.

3) Utilization of ICT

In the Maldives, where an average of 1,000 people live on islands scattering across the country from north to south, the utilization of ICT is essential for agricultural extension activities to farmers and for sales and marketing by farmers. This is also an area where Japanese technology

and services are expected to make a great contribution. In relation to the digitization and DX of developing countries and regions that JICA is supporting, agriculture is one of the priority sectors and one of the sectors with the greatest number of cases where advanced technologies are being used. In the Maldivian agricultural sector, ICT is expected to be utilized in a wide range of fields, including the dissemination of agricultural technology, sales and marketing using smartphones, drone technology for monitoring business activities and environmental conservation on uninhabited islands, and the collection and management of agriculture-related data by the central government. While the Maldives is already considering the use of ICT in the agricultural sector, JICA can take an effective approach of co-creating with local partners and sharing technology and funds, rather than bringing Japan's existing technology.

4) Relevance to climate change issues

The Maldives is one of the countries most affected by climate change, and coastal erosion due to sea level rise and increased wave power associated with climate change will have serious impacts not only on housing, infrastructure, coastal ecosystems, and water resources, but also on the agricultural sector, which requires land itself. Damage to crops caused by natural disasters is generally reported, which threatens the income stability of farmers and the business continuity of agricultural enterprises, thereby hindering industrial development and posing a threat to the food security of the Maldives.

JICA has so far implemented a variety of cooperations in the field of climate change, making integrated use of various support schemes. For the Maldives, JICA is implementing a project approved by the Green Climate Fund (GCF) to protect and defend the coastline with the aim of creating a resilient society against climate change. The development of the agriculture sector in the Maldives is an important element in achieving the goal of creating a resilient society that the project is aiming to, and therefore, JICA's support for agriculture development is deeply meaningful.[95]

5) Achievements and future plans of other donors' support

In the Maldivian agricultural sector, which faces a variety of challenges, the agricultural promotion measures implemented to date are not sufficient, and expectations for JICA's assistance are quite high. The following part of this report will argue later how much other donor agencies cover the areas of JICA assistance proposed by this survey.

In particular, the need for human resource development is high, and while the facilities and equipment necessary for administrative services are being developed with the support of other donor agencies, the establishment of operational system to ensure their continuous and effective operation must also be implemented. In the Maldives, agriculture is not a subject of primary or higher education, and it is necessary to develop a system to foster and produce human resources

[95]Climate Resilient and Secure Islands Project: https://www.jica.go.jp/press/2021/20210702_31.html

who will be involved in agriculture as a business.

6.3.2 Consideration of support measures

In identifying areas in need of JICA assistance and in considering the specific support to be provided, the survey team considered the following points

- Feasible support: A feasible project proposal will be considered, taking into account the current resources of MoFMRA and related institutions, the nature of the Maldivian people, and the existence of successful island-level models that should be publicized nationally.
- Collaboration with other donor agencies: To understand existing agricultural promotion programs and other donors' support policies, to avoid omissions and duplication, and to consider support measures that will carry on existing achievements or have synergistic effects with ongoing support activities.
- Involvement of related organizations: In order to ensure consistency with the support activities for farmers implemented by SOEs under the Ministry of Economic Development and to develop a consistent agricultural promotion policy as MoFMRA, these related organizations will be involved as implementing agencies.
- Role of private sector: While the current resources of central and local government organizations are limited, there are some remarkable examples of private companies supporting farmers and building supply chains. Seek ways to collaborate with private organizations to complement administrative functions.
- Present as many options as possible, in order of priority, taking into consideration JICA's various support schemes and the mobilization of Japanese knowledge and technology.

6.3.3 Agricultural models and management strategies that should be supported

As indicated in the beginning of Chapter 4, agricultural models can be categorized by production entity. Based on the results of the SWOT analysis for each category and consumer preferences and mapping of supply chains described in Chapter 5, (1) individual farmers in inhabited islands and (2) agricultural companies in inhabited islands, as agricultural models that could drive agricultural development in the Maldives, are considered to be high priority for institutional support.

(1) Individual farmers in inhabited islands (model for sales to local consumers via local agricultural markets)
In inhabited islands, production is primarily performed by individual growers in backyard of houses and leased plots, with sales to middlemen and to wholesale and retail businesses that run own outlets in the market as the main sales channels. While for inhabited islands around Malé, Malé is the main destination, and for the more distant islands, direct sales through local agricultural markets and private channels are preferred for small-scale farmers, for large-scale

production, the Malé market is the only sales outlet.

HDh. Kulhudhuffushi in the north has a local market like the ones in Malé, which functions as a distribution hub for regional agricultural products as it attracts produce from the surrounding islands. In order to diversify the options for local consumers and individual farmers without relying on the Malé market, it is effective to establish a regional distribution hub for agricultural products, similar to a local wholesale market.

[Business strategy] Establishment of an agricultural distribution hub in the region

1) Establishment of a local wholesale market as a distribution hub for agricultural products

Currently, retailers and restaurants used by residents of Addu City import much of their produce from Malé due to the lack of access to local produce. On the other hand, producers are in a situation where sales to Malé are discarded when the cost of transportation is not worth it. The establishment of a local market in S.Hithadhoo is expected to solve these problems by enabling local consumers, including those at resorts, to purchase local produce in bulk quantities.

2) Digital agricultural market as a distribution hub for agricultural products

In cases where the scale of production is small and the construction of a physical marketplace is not feasible, a digital platform, in which the produce of individual farmers is introduced directly or indirectly to consumers through an online system, could be effective. Although attempts to share information through social networking services have occurred, a company that provides a point of contact is necessary for clients such as resorts that require stable shipments, and a digital market is expected to function with multiple middlemen competing with each other.

(2) Agricultural companies in inhabited islands (core agricultural enterprise model linking producers and consumers)

The main producers are companies that operate in inhabited islands, many of which play an important role in providing technical information to individual farmers and contributing to the industrialization of the island's agriculture through cooperative production. A specific example is Fresh Yield in S.Meedhoo, where the five co-investors include experts who have studied agricultural technology overseas including in Japan, and provide consulting services on water-saving technology in various regions, and agricultural leaders who have led AMCS. Fresh Yield is expected to play a role in revitalizing agricultural production in Addu through partnerships with farmers, while strengthening its own production function as the core.

In addition to the private sector, the LAC under the AA.Thoddoo island council is expected to perform similar functions: the LAC can conduct businesses that support agricultural production

on inhabited islands, such as seedling production and implementation of model agricultural projects, and build a stable supply system by partnering with individual farmers to serve as a liaison with resorts and other consumers.
[management strategy] Production and sales with resorts as the main customers Fresh Yield aims to establish an advanced agricultural production model that AMCS has achieved as a cooperative. Field Yield explains that its business strategy consists of two steps: i) stable supply and expansion of sales channels through its own production, and ii) expansion of scale by collaborating with partner farmers. The council of AA. Thoddoo also takes the same strategy to supply to resorts. Council members explain that LAC's role as a sales contact enables it to take responsibility for quality improvement for producers and to help disseminate technical information to farmers. Quality improvement here is primarily about transparency in the use of chemicals, with the goal of gaining the trust of the resorts. While organic certification is being considered as a concrete method, mutual management methods such as the Participatory Guarantee System (PGS) are considered effective in the case that production sites can be reached from the resort islands

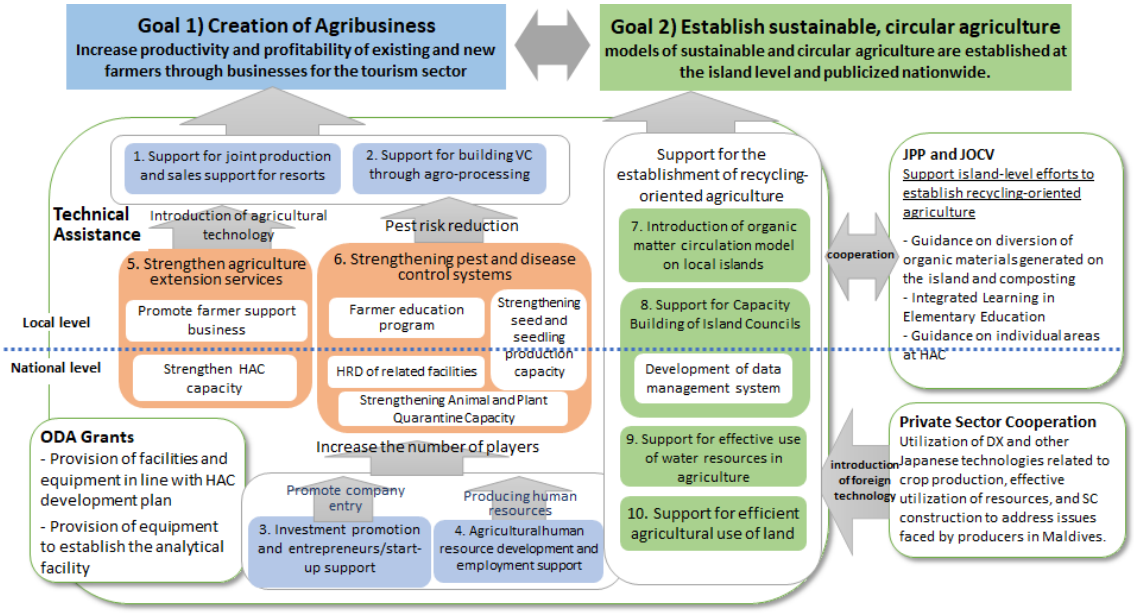
Both of the agricultural models shown in (1) and (2) could be eligible for public support, but (2) in particular is considered more important from the perspective of the industrialization of agriculture. As typical reasons for engagement in agriculture described in Chapter 4, many of the agricultural entrepreneurs are U-turners with experience in urban areas, and they are highly interested in solving social issues in the island. In other words, by supporting the agricultural model shown in (2) above with public programs, they are expected to play an active role beyond management of agricultural companies.

6.3.4 Target Areas of JICA Assistance and Scheme of Assistance

In order for the Maldives to diversify its economy and for the agricultural sector to expand its economic scale as an industry, the development of the agriculture sector based on the creation of agribusinesses is considered effective. Agricultural production in the Maldives is mainly carried out by individual farmers, and since there are few companies participating in the sector, it is currently an informal sector. Businesses should be encouraged to enter the market and farmers to start their own businesses, and all phases of agricultural SC, not just production, should be commercialized. In addition, as mentioned above, in order to expand and continue agricultural production in the Maldives' unique natural environment and limited resources, environmentally friendly and recycling-oriented agriculture is required.

In examining JICA's support measures, JICA sets "creation of agribusiness" as the main goal which leads to the development of agriculture sector. Besides, the survey team sets "establishment of sustainable, circular agriculture" as the second goal, which should be achieved at the same time, and examined support measures to realize these goals for each JICA scheme. The overall picture

is organized as shown in the figure below.



Source: Prepared by the survey team

Figure 6-3 JICA Assistance Measures

Based on technical cooperation projects, the project will also provide the equipment necessary for its implementation, as well as support for activities at the island level through grassroots and JOCV, and promote the introduction of Japanese technology and services that contribute to solving problems faced by the SCs, mainly in crop production, through a private-sector partnership scheme. A total of 10 component proposed have been considered for technical cooperation projects as shown above, and those arranged in the same color as goals 1 and 2 are component directly linked to the realization for each. project proposals in orange are related to both of these two goals. Each of the 10 projects is both independent and complementary to the others. For example, the support directly related to agribusiness in No.1 and No.2 requires productivity improvement through No.6, and without the efforts of No.4, the human resources that will lead the business will not appear at all.

As mentioned above, it is believed that JICA's support is indispensable in the Maldivian agricultural sector. For proposed component from No. 1 to No. 10, the following part discuss why each of JICA's project proposal is necessary (appropriateness) and whether it is feasible (feasibility) from the perspective described in "Necessity of Support" above.

1. Support for joint production and sales support for resorts

Appropriateness: This initiative is connected to "market-oriented agriculture", which is also addressed in the cluster of the JICA Global Agenda, and will lead small farmers in the Maldives to view agriculture as a business and to produce and sell agricultural products based on market needs. In order to meet the needs of the tourism sector, it is first necessary to establish a supply system that meets the minimum procurement volume for resorts and other facilities, which could

be achieved through joint production and sales at the island level. The demand for resorts is expected not only to increase sales and revenues for agricultural islands, but also to enable the surrounding communities to enjoy the economic benefits of the resort industry.

It can also be used as an exit strategy for AgroNat contract farmers. If the knowledge and experience gained through two years of contract farming can be utilized to participate in joint sales to neighboring resorts and develop their own sales channels, the achievements of the contract farming system will be taken over.

Feasibility: There have been efforts to support the formation of agricultural cooperative organizations in the Maldives in the past, but with the exception of AMCS, no successful examples have emerged. One of the lessons learned to date has been that some projects have not been sustainable after the completion of the project because of the financial support provided, and that some farmers have not started to take concrete actions although the project encourages farmers to form and manage their own groups on their own initiative. Taking advantage of those lessons learned, it is necessary to promote entrepreneurship and support a private company that will serve as the core of the project rather than leaving it to the islanders. Then, the key private entity is required to connect with farmers on the island and collect their produce as the company promotes contracts and transactions with resorts. As a success case, the entrepreneurs from S.Meedhoo, utilizing their experience at AMCS, established a start-up to produce crops in a total of 120,000 sqft of fields (corporate-owned green houses and investor's fields), and then will start contracts and sales with nearby resorts. After achieving sales from a total of 120,000 sqft plots (corporate-owned greenhouses and investors' plots), the company is considering involving farmers in the region to strengthen the joint sales system.

2. Support for building VC through agro-processing

Appropriateness: This is a support for initiatives related to the Southeast Asia Regional FVC Initiative, which is one of the cluster business strategies in the JICA's Global Agenda. In the Maldives, agricultural products are only sold as they are, if value can be added through processing and access to high-end markets, especially resorts, a compact and robust value chain can be established within the atoll. Furthermore, although it will take time, these efforts may lead to export promotion in the future. The increase in value added in the agricultural sector will lead to an increase in GDP in the sector.

Feasibility: There are several examples of agro-processing in the Maldives, such as coconut oil and breadfruit chips. JICA has been providing support for agro-processing in various countries and regions, and it is believed that their accumulated resources can be used to provide support in the Maldives as well. A possible way to provide assistance is through BCC, which has regional offices and already provides business support for SMEs.

3. Investment promotion and entrepreneurs / start-ups support

Appropriateness: agriculture in developing countries is generally an informal sector, but in the

Maldives, the participation of enterprises, including SMEs, is rare, and there is little participation of enterprises not only in crop production, but also in other phases of SC, such as input production and processing. Since most of the producers are individual farmers, the industry has not yet been established. JICA's support for entrepreneurs and startups and investment promotion, which JICA has proven in other countries, is required, and it is expected that this will increase the number of new entrants engaged in agribusiness.

It is also desirable to work on issues related to leased uninhabited island from the perspective of investment promotion. In order to ensure that the rights to develop uninhabited agricultural islands are distributed to more suitable operators, it would be effective to improve the bidding process, strengthen monitoring functions, and actively promote investment by approaching promising domestic and foreign operators who are in line with the Maldivian government's strategy and encouraging their participation in the development of agricultural islands.

Feasibility: In terms of investment promotion and business attraction at the island level, there are cases where councils and companies are developing demonstration farms on each island to introduce advanced agricultural technology, which can be expected to serve as a receptacle for business attraction. For example, on the uninhabited island, where AgroNat is promoting Community Farming, and on AA. Thoddoo, the island council is taking the initiative to develop a demonstration farm on the island and introduce modern agricultural technology. Regarding support for entrepreneurs and start-ups, it would be possible to provide intensive entrepreneurial support in cooperation with BCC and SDFC, targeting local islands where there is an abundance of young human resources and agriculture is the main industry, and there are also resorts in the neighboring area that have potential SCs.

4. Agricultural human resource development and employment support

Appropriateness: Agriculture has never been treated as an educational subject from primary to higher education, and there are very few agribusiness leaders or government personnel who would be candidates for agricultural extension agents. As a mid- to long-term initiative, it is necessary to incorporate agriculture into education in order to increase the number of such agricultural human resources. Furthermore, in order to ensure that people who have learned about agriculture can smoothly start their careers, appropriate information should be provided to companies and organizations in the public and private sectors that need human resources, and efforts should also be made to support job placement so that matching can take place.

The National University of Maldives plans to introduce an agriculture course in September 2024, but it will not create a new faculty for Agriculture, but rather an agriculture course under the existing Faculty of Engineering, which will allow students to learn agricultural expertise, but will make it difficult to instill a business mindset, making it difficult to connect to specific jobs after graduation.

Feasibility: Although preparations are still underway for implementation, the timing is right for a national university to specialize in agriculture at this time for JICA to develop agricultural support

from the education sector. The university has been collaborating with a Pakistani university in developing the curriculum, which is expected to continue to be improved, and it is possible for JICA to strengthen agricultural education in higher education on the basis of its agricultural courses. In fact, when the survey team met with the National University of Maldives, it was agreed that a continuous communication and exchange of ideas will be in place, including MoFMRA.

In addition, JOCV is expected to play an active role in primary education. In the Maldives, JOCV has so far been sent to schools on the island in the past. Since environmental education is already provided in primary education in the Maldives, it would be feasible to provide support to deepen the basic understanding of agriculture among children in the islands, by dealing with themes such as agriculture and environmental conservation in connection with such education.

5. Strengthen agriculture extension services

Appropriateness: It is difficult for government agricultural extension services to reach all the agricultural islands that request them. Even after providing one-off technical guidance, it is important for farmers to seek consultation on the actual issues faced in the farming process. HAC is located in the northern region and is not easily accessible to farmers throughout the Maldives. The use of ICT with Japanese technology and services should be able to overcome geographical handicaps, enabling low-cost information dissemination and mutual communication to a larger number of farmers.

In addition, capacity building for the HAC that plays a central role, has not been covered by other donors' support to date. The HAC development plan, which describes the equipment to be introduced, has been completed with the support of MAP, but there is no prospect for support to implement it.

Figure 6-4 Consultation service by Agro Service

Feasibility: For agricultural extension, MoFMRA is already preparing digital tools with the support of FAO. Although a question is whether or not it will be used by farmers nationwide, there is a good example of a private company using ICT to implement agricultural extension services. Agro Service, which also does agricultural production, connects with farmers all over the country through the Viber group and responds to inquiries from farmers about cultivation techniques on a daily basis. Considering the fact that the number of members has grown to more than 1,000 through word of mouth only in the few years since the service started, it is thought that remote agricultural extension activities using digital tools will spread among farmers if potential users understand the benefits. However, this is conditional on the quality of service, and in particular, it is essential to establish a system for MoFMRA to respond quickly and politely to inquiries from

farmers one by one.

6. Strengthen pest and disease control systems

Appropriateness: The main cause of productivity loss is damage caused by pests and diseases. Although this is an area covered by other donors' support, much of the support is related to infrastructure development, such as facility construction and equipment installation, and there is not enough human resource development for appropriate and effective operation of these facilities. Technical cooperation focused on human resource development, a hallmark of JICA's assistance, is required.

As mentioned earlier, pests are the most serious problem in crop production. Not only does it reduce productivity, but it also causes pollution of the soil and other natural environments by leading to the massive use of insecticides and other chemicals. On the other hand, the results of the consumer preference survey show that resorts are greatly concerned about "safety". Addressing this issue will lay the groundwork for the "creation of agribusiness" and, in addition, promote the "establishment of recycling-oriented agriculture" based on the utilization of domestic resources.

Feasibility: the facility and equipment necessary for this service will be ready with the support of other donors. On the other hand, there is a lack of manpower to promote human resource development. There is a lack of domestic targets for capacity building. It is worth considering the active use of AI technology in compensating for the shortage of manpower. AI tools for diagnosing pests and AI chatbots for responding to inquiries from farmers are also effective in saving labor.

7. Support for the introduction of organic matter circulation model on local islands

Appropriateness: "Improving waste management and creating a circular society" is a top priority in the Maldives. With the cost of transporting waste and the difficulty of constructing waste treatment facilities in all inhabited islands, it is necessary to make agriculture on the islands more cyclical and sustainable. To establish a model of organic circulation in agriculture, several technologies and initiatives will be introduced and demonstrated on selected islands.

Feasibility: The Maldives has unutilized organic matter, and efficient recovery and processing technologies will enable the production of high value-added insect protein feed, liquid fertilizer for hydroponics, and biochar, which is expected to be highly effective on sandy soil. As an example of successful compost production introduction, food waste compost production has taken root from the individual to the council level, with the island council leading the way in R. Vaadhoo. Individuals are making high-quality compost by adding household food scraps to additional materials and using it for their vegetable gardens. The raw material is a well-balanced fertilizer composition of garbage, grass ash, seaweed, and fish meal, which is based on the experience of traditional fertilizer production. In order to generate economic efficiency from the production of these materials, it is necessary to combine inexpensive raw material procurement with advanced

resource conversion technology, and the introduction of such technology in collaboration with the private sector is expected.

			
Ash and charcoal: traditional fertilizers, containing phosphoric acid and potassium	Seaweed: contains minerals needed by plants	Fish Tailings: From a nearby fish processing plant. Contains nitrogen and amino acids	Agitator

Source: Survey team photo

Figure 6-5 Good practices in compost production

JOCV is expected to play an important role in implementation of this component. It is believed that it would be effective to support individual initiatives such as the introduction of compost production, including raising awareness of waste management among islanders, in a way that is close to the islanders.

8. Support for Capacity Building of Island Councils by LGA

Appropriateness: In order to establish circular agriculture, not only producers but also government organizations that regulate and monitor agricultural activities from the perspective of environmental conservation play a significant role. Regulations will be developed and enforced at the initiative of the central government, but actual enforcement will need to be done at the island level. In order to establish circular agriculture, such as pesticide use, water resource use, and waste management, it is necessary to faithfully cover all relevant monitoring items and properly manage agricultural activities on the island.

This includes the establishment of a digital data collection system for collecting and managing agriculture-related data, as requested by MoFMRA. In particular, the collection of production data and other analytical work at the central level, such as production data on regional islands, requires improved administrative capacity at the central and regional levels. The data obtained can be used for MoFMRA's policy considerations.

Feasibility: LGA already provides training to island councils across the country to improve their administrative capacity. In the wake of the Covid-19 crisis, there are also regular online meetings with island councils, and a platform already exists to connect with such island councils. By using its existing platform, it may be possible to improve the administrative capacity of the island council regarding agricultural promotion. One idea is to develop educational materials for island councils through the use of ICT.

9. Support for effective use of water resources in agriculture

Appropriateness: Water resources are the most important issue in agricultural production in the Maldives. The cost of water for crop production is currently free because of the use of groundwater, but if the use of RO water is mandated in the future as in the case of leased agricultural islands, it will increase production costs and put pressure on farmers' profits. In terms of environmental considerations, groundwater will continue to be used until RO water is used, but the Ministry of the Environment has no way to regularly monitor groundwater conditions amid concerns about groundwater contamination and salt damage, nor has it confirmed the status of agricultural water use. Supporting the formulation and implementation of rules for the conservation of limited groundwater is important for both agricultural development and environmental conservation.

It is also important to note that this is an area where Japanese technology can contribute, such as water-saving cultivation technology in agriculture and domestic wastewater treatment technology for agricultural use.

Feasibility: As mentioned above, support would include a nationwide survey on agricultural groundwater use and a groundwater quality survey in cooperation with the Ministry of the Environment. The Ministry of the Environment, in cooperation with the Green Climate Fund, has already conducted groundwater surveys on a total of 37 islands, and can efficiently cover the remaining islands by utilizing this experience.

10. Support for efficient agricultural use of land

Appropriateness: Lack of sufficient land is one of the challenges, but there are many vacant houses observed in inhabited islands and lands that are unused even if they have owners. First of all, it is essential to establish a law to allow such idle land to be utilized. There are also still many uninhabited islands that remain untouched. Through not all uninhabited islands are suitable for agriculture, it is expected that new uninhabited islands will be leased as an important agricultural promotion measure. Unfortunately, however, the reality is that many of the 52 leased agricultural islands in the country are not in operation for agricultural production. There is room for support for legal and institutional reforms promoted by the central government and island councils to ensure that limited resources are used effectively.

Feasibility: The bidding process and review criteria for leasing uninhabited islands can be amended under the authority of MoFMRA. In the development of uninhabited islands, there are cases where development cannot be carried out as planned due to unforeseen problems, and not all of them can be said to be the responsibility of the operator. If there is no room for improvement in the bidding system itself, it is worth considering of strengthening the post-lease monitoring function to understand the reasons for the delay in development and provide administrative support if possible.

Although island councils have authority over the use of idle land on inhabited islands, they have a culture of respecting harmony with islanders, and it is difficult to revise systems that may cause disadvantages even for a minority of islanders.

Status of support from other donor agencies and MoFMRA's intentions

The preceding part listed 10 areas that require JICA support and discussed their appropriateness and feasibility. The table below provides additional information for JICA's consideration, including (1) other donors' support achievements and policies, and (2) interests of MoFMRA.

Table 6-4 Trends in other aid agencies and MoFMRA's intentions

No.	Proposed Component	JICA assistance by scheme				○ on-going, ● completed, △ pipeline				Remark	MoFMRA's priority
		Grant	TA	Private Sector	JOCV	IFAD	FAO	UNDP	WB		
1	Support for joint production and sales support for resorts		○		○	○	△	●		The FAO project is being proposed to the WB fund program.	It is difficult to achieve this by relying solely on the initiative of farmers.
2	Support for building VC through agro-processing		○	○	○						There is also potential for other crops than coconuts.
3	Investment promotion and entrepreneurs/start-ups support		○								High priority. It should be implemented together with No.1.
4	Agricultural human resource development and employment support		○		○						High priority. It also serves as the training of No. 5 extension worker candidates.
5	Strengthen agricultural technology extension services	○	○		○	○	○ till end-June 2023			FAO develops digital tools for dissemination.	High priority. There is a HAC development plan but no plan for implementation.
6	Strengthen pest and disease control systems	○	○			○	○	○		IFAD/UNDP support for facilities only. FAO introduces testing facilities.	High priority.
7	Support for the introduction of organic matter circulation model on local islands		○	○	○						
8	Support for Capacity Building of Island Councils		○								High priority. Need to develop the digital data collection and management system.
9	Support for effective use of water resources in agriculture		○	○							
10	Support for efficient agricultural use of land		○								

Source: Prepared by the survey team

Regarding the MoFMRA's requests, the first priority is to strengthen the agricultural technology extension services centered on the HAC, and also to use the HAC as a place for vocational training. Related to this, the lack of opportunities to learn about agriculture in the Maldives has led to a shortage of human resources in various areas of the agricultural sector, and strong interest was expressed in No. 4 above. In addition, since there is no mechanism for the central government to collect, manage, and analyze agriculture-related data such as national crop production, it was suggested that support is needed for digitization of data collection methods and improvement of analytical capacity.

Furthermore, in order to confirm whether the support components proposed by the study team are consistent with the national policy of the Maldives, we compared them as shown in the table below, based on the strategic activities of the national policy NFAP 2019-2029, as organized in Chapter 2. The results confirm that No. 1 to No. 5 and No. 7 and No. 8 of the above proposed components correspond to each other.

Table 6-5 Comparison to NFAP

NFAP		Proposed Component
Climate change measures	Promote and facilitate the implementation of ecologically friendly and resilient production systems for farmers, such as on-site compost and biofertilizers production	No.7
Value Chain Building	Facilitate the sustainable use of local agricultural resources for the production of fertilizers, pesticides, animal feeds and other inputs	No.7
	Strengthen the role of state-owned agencies mandated to effectively link-up farmers to other value-chain stakeholders,	No.1, 2
	Facilitate the implementation of medium-scale processing facilities	
Food security	Foster the production and marketing of selected field crops in which the country has the potential to attain self-sufficiency	
Community Development	Facilitate the implementation of a platform to attract and retain youth engagement in agriculture	No.3, 4
	Facilitate the implementation of entrepreneurship programs, internships, subsidized job placements, and other employment schemes	No.1, 2, 3, 4
Institutional Support	Facilitate the implementation of a development plan aimed at building the technical, managerial and technological capacities of human resources	
	Identify, promote and support opportunities aimed at strengthening the managerial, technical and technological capacities of affiliated centers	No.5
	Enhance the presence of extension service at the grassroot level	No.5
	Support the development of a legal framework and certification system that will lead to the establishment of national standards for product quality and sustainable use of natural resources	
Partnership	Facilitate proper collection, aggregation, analysis and dissemination of reliable data	NO.8

6.3.5 Proposals for Support Project

Considering JICA's support policy for the Maldives, it is unlikely that multiple projects in the agricultural sector will be prepared in a short period of time. The survey team therefore select several components from the above list that meet both the Maldivian government's needs and JICA's policies, and integrate them into a single project. Furthermore, a conventional approach might not be sufficient for agricultural development under the special conditions of island countries, and it would be effective to involve several sectors, including the environmental sector, as described below.

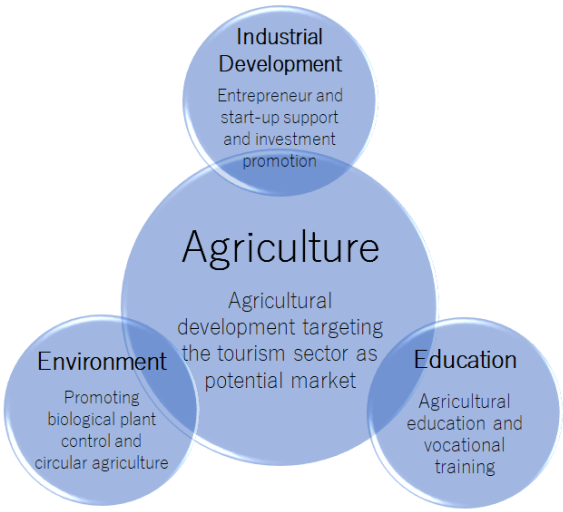


Figure 6-6 Concept of effective agricultural support projects

The following is a summary of the project proposed in this survey.

- Project Title (tentative): Creation of agribusiness for building VC based on circular agriculture
- Scheme of assistance: Technical cooperation projects and grant (if necessary)
- Implementing agency: MoFMRA

Components and Results		Partner Institutions	Target Area
1	Creation of agribusiness for building VC	BCC, Island Council	Baa Atoll, Gaafu Alifu Atoll
2	Establishment of a support system to promote biological plant control and circulation of local resource that contributes to sustainable agricultural production	HAC, Island Council, Ministry of the Environment	Fuvahmulah, Nationwide
3	Developing agricultural human resources through agricultural education	HAC, MNU	Hanimaadhoo, Nationwide

The following are proposed activities for each component.

Component 1: Creation of agribusiness for building VC

Objective: To identify and support key entrepreneurs at the island level to create agribusinesses for resorts. In the initial phase, promising candidates will be selected through agricultural extension activities to farmers on the island. In the latter phase, it aims to create a production and sales system involving farmers on the island with the aim of creating a business of agricultural products and processed products for resorts. This component also aims to establish a system in MoFMRA to support agribusiness creation through matching with the tourism sector and provide indirect support.

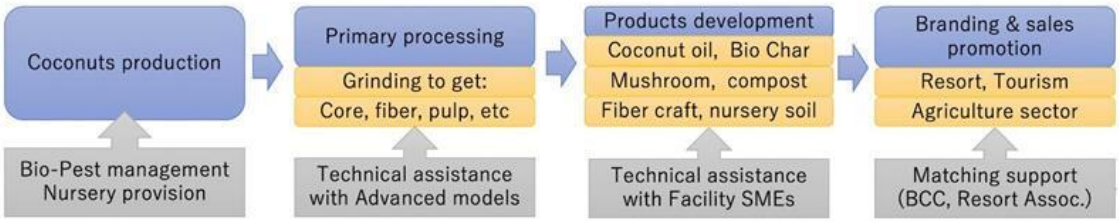
1) Selection of target areas and discussions with stakeholders
   - Conduct needs assessment for the resort (confirm demand and requirements for agricultural products and processed products, confirm expectations for domestic products)

- Conduct a survey on the surrounding agricultural islands (confirm current status of crop production and raw material production potential)
- Selection of target atolls/islands
- Needs assessment for farmers (regarding challenges and expected support)

2) Support for private sector entities that play a central role (including LAC)
- Conduct technical extension activities to target island farmers: As part of HAC's agricultural extension activities, provide technical guidance while utilizing AgZone (in collaboration with Component 2)
- Selection of potential entrepreneurs/public call for applicants (in coordination with support for providing employment opportunities under Component 3), or selected from existing private companies
- Support for target entrepreneurs or business entities with agricultural production or farmer support services as their business (service content will be reviewed based on the results of the farmer needs survey, (e.g., packing service, farm equipment rental),
- Assistance in financing the establishment of companies (BCC, SDFC)

3) Contract farming with resorts
- Conduct workshops among nearby resorts (including tourists), island councils, and businesses
- Develop a cultivation plan in line with the purchasing plan of the target resort by the company/island farmers
- Installation of refrigeration equipment
- Support and monitoring of planned production for resorts

4) Promote agribusiness by strengthening the agricultural value chain through agro-processing of major crops
- Support for production business and collection of raw materials
- Support for introduction of processing technology and equipment (BCC)
- Sales and branding support (through BCC, resort associations, etc.)
- Development of digital tools for marketing



Source: Prepared by the survey team

Figure 6-7 Examples of support processes for agro-processing

Component 2: Establishment of a support system to promote biological plant control and circulation of local resource that contributes to sustainable agricultural production

(Objective) To improve the knowledge and capacity of administrative organizations with regard

to pest control and to strengthen the system for disseminating information on effective measures to farmers throughout the country. This will lead to increased productivity and reduced pesticide use on the target islands, especially under Component 1, to promote the safety of crops to the resort. In addition, relevant government agencies will serve as hubs to support individual and corporate efforts to promote "biological plant control" and "circulation of regional resource," which are believed to be effective in the transition to sustainable agricultural production.

1) Establishment of an operational structure for the Fuvahmulah Research and Analysis Facility

*Note: The schedule of activities will be determined in accordance with the construction progress of this facility.

- Enhancement of pest monitoring function: identification of pests and biological control materials to be surveyed, development of inspection procedures and guidelines, and development and implementation of training plans
- Develop a plan to introduce tissue culture and grafting techniques to address identified critical diseases
- Dissemination of technology for pest control: Overseas training programs (training in Japan and third countries, for HAC staff as well), collaboration with overseas public research institutions and private companies, and programs to promote the introduction of natural enemy organisms, antagonistic microorganisms, etc.

2) Establish an operational system for AgZone, a digital tool for agricultural extension

- Review and expansion of contents: updating information to be distributed, collecting good practices from across the country on sustainable agricultural production, and preparing materials on pest control techniques.
- Establish MoFMRA management system: strengthen the capacity of staff in charge, especially HAC (indirect support by JOCV), and confirm how to collaborate with related organizations.

3) Establishment of a support system for the introduction of biological plant control and organic material recycling

- Selection of target islands and technologies to be introduced: Selection of candidate islands and interviews with island councils, examination of technologies to be introduced (examples: production of fungi and culture medium using plant residues, conversion of food waste by insects into resources (feed, compost), development of carbon agricultural materials and introduction of carbon credits through carbonization of residues)
- Support for introduction of initiatives related to circulation of organic matter: provision of equipment, collaboration with the private sector including island councils and LAC, support by JOCV and other experts
- Strengthening seedling conservation and seedling production functions of indigenous crops: provision of equipment, technical guidance by HAC, and establishment of production system (LAC)
- Public awareness activities regarding successful models utilizing 1) and 2) above

Component 3: Development of agricultural human resources through agricultural education

Objective: To expand and offer a more agribusiness-oriented curriculum at HAC and the National University of Maldives, and to provide employment opportunities for public and private sector workers in the local islands.

1) Support for Improvement of Agricultural Courses at National Universities
   - Needs assessment for agriculture-related companies
   - Conducting internships in agriculture-related companies

2) Introduction of vocational training courses
   - Development of related lectures implementation of online courses (possible use of AgZone)
   - Development of practical training curriculum (case study: on-the-job training at Hulhumalé)

3) Support for providing job opportunities for personnel and university graduates
   - Compilation and dissemination of information on job opportunities in the agricultural sector
   - Matching events with local island agribusinesses (including LACs)

The figure below shows an image of the complementary and synergistic effects of each component that the proposed project aims to achieve. For Component 1, which is directly linked to the creation of agribusiness, a series of activities can be set up in support of Components 2 and 3.

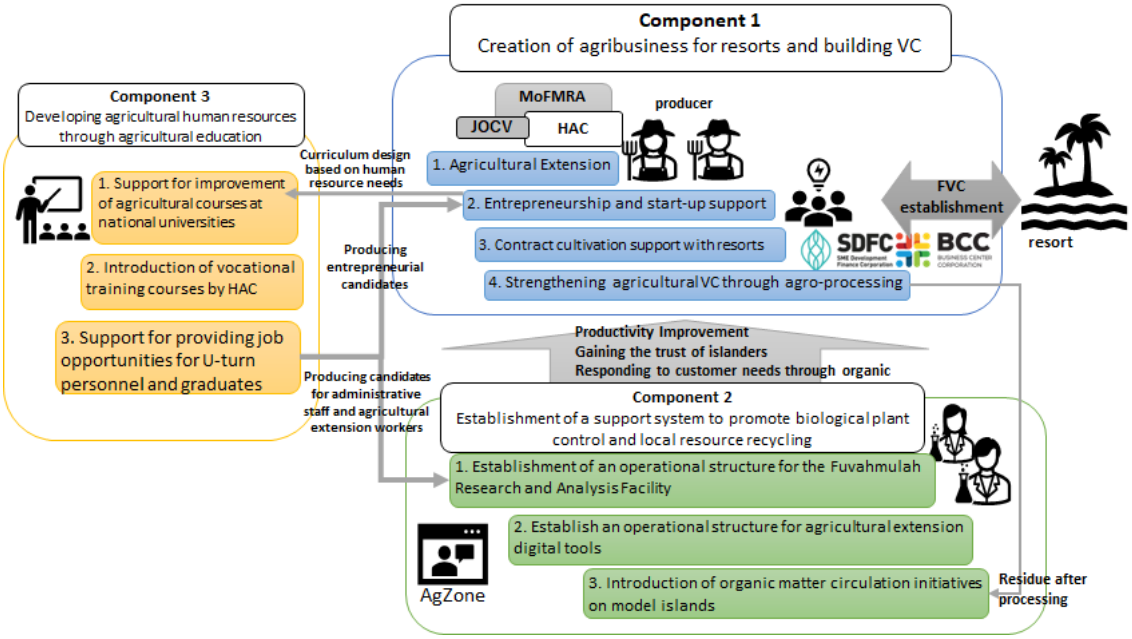


Figure 6-8 Proposed Support Projects

The components is arranged in order of priority considered by the study team, and if it is necessary to design a smaller-scale project, it may be possible to formulate the case in a way that excludes component 3, which is a medium- to long-term initiative.

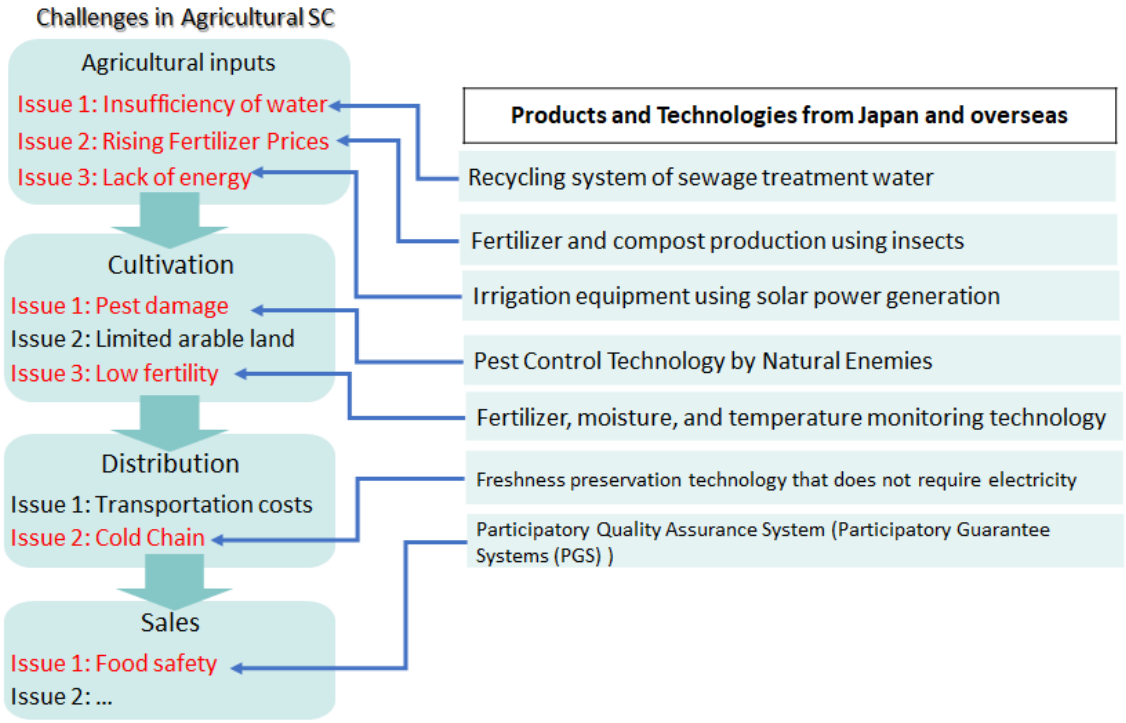
6.4 Contributions by Japanese Companies and Public Organizations

By utilizing agricultural technologies, products, and services owned by the Japanese private sector and public organizations, it is possible to contribute to solving supply chain issues, mainly in crop

production in the Maldives, establishing a circular agriculture, and developing crops that will be preferred and selected by consumers. It is expected that Japanese companies with such promising technologies, products, and services will be interested in developing their business in the Maldives through JICA's private sector partnership scheme in the future.

Interest in Japanese products, technologies, and services from the Maldivian private sector and institutions related to agricultural promotion is also intense. As mentioned above, the private sector, island councils, SOEs, and others have been active in demonstrating agricultural technologies that could address the challenges in the Maldives, including the development of dedicated plots on leased and inhabited agricultural islands. In addition, Maldivians tend to trust success stories they see in their neighborhoods more than information they receive from the government, and it is therefore possible to establish a successful model, even on a small scale, and quickly expand it nationwide by publicizing it through appropriate channels.

The challenges at each stage of the supply chain for agricultural products and the technologies, products, and services from Japan and other countries that can contribute to solving them are summarized in the figure below. Regarding solar-powered irrigation systems, AgroNat is eager to to adopt them in Community Farming, which is being developed on a leased uninhabited island.



Source: Prepared by the survey team

Figure 6-9 Challenges in Agricultural SC and Technologies that Could Address Them

Some of the products and technologies proposed in the above diagram are outlined below.

Table 6-6 Technology Contributing to Solving Issues in the Maldivian Agricultural Sector

Technology	Outline	Remarks
Recycling system of sewage treatment	UF membranes can remove bacteria and thus provide a stable supply of safe agricultural water; UV irradiation can inactivate viruses.	A certain size is required for economical operation.
Fertilizer and compost production by insects	Production of feed and compost from food waste using Black Soldier Fly (BSF)	Cooperation of island residents is needed for sorted collection.
Pest control by natural enemies	Technology for the control of diseases and pests, including coconut pests, by parasitic organisms and entomopathogenic viruses	Cultivation in biological testing facilities in Fuvahmulah and strengthening the production system of biological control agents by private companies are important.
Soil Monitoring	Analysis of environmental pollution and soil components such as salinity and nitrogen using simple analyzers, and analysis of disease using antigen test kits	HAC researchers can use for research and training on each island.
Participatory Guarantee Systems (PGS)	A system in which producers and consumers take the initiative at the local level to mutually confirm production methods and receive certification as an organic farming group.	It is a low-cost certification process that differs from regular international organic certification and has been implemented in neighboring Sri Lanka.

As the Maldives is not an attractive market in terms of size, it is unrealistic for Japanese companies, especially large ones, to develop a domestic market and business operations with the expectation of profitability. However, as a business that solves social issues, its impact is significant, and if it can achieve results in the Maldives, which is attracting attention globally from the perspective of climate change. Furthermore, it is expected to enhance the company’s brand value. In order to encourage these promising companies to consider entering the Maldives by taking advantage of JICA's private-sector partnership scheme, etc., it would be effective to disseminate information in Japan on the issues in the Maldivian agricultural sector with specific local information.

Apart from the private sector, support by Japanese academic institutions, can also be expected. In particular, Faculty of Agriculture, Tokyo University of Agriculture and Technology (TUAT) has a long track record of research and education in biological plant pest control, as well as technical assistance overseas. Nagaoka University of Technology and National Institute of Technology, Nagaoka College have also conducted research on the conversion of waste agricultural products into resources, including the production of animal feed, and have supported overseas projects through JICA projects.

Can Tho University, Faculty of Agriculture, TUAT's sister school, has a strong affinity with Japanese academic and research institutions, as it has conducted the development of research

human resource through the JICA’s project for Strengthening Can Tho University.

International Cooperation between municipalities could also be considered. Okinawa Prefecture in Japan, which has a natural environment similar to that of the Maldives and is also an island region, has many years of experience in pest control in agricultural production. An institution about pest control in Okinawa has a proven track record in pest eradication projects using sterile insect technique, some of which are pioneering in the world. In addition to pest control, Okinawa's contribution to agricultural development in the Maldives through its technology and know-how as an island nation and region is likely to continue.

Although the Maldives has many unfavorable conditions for agriculture, its unique FVC feature with tourism sector which can be a catalyst for local economic revitalization, which is unparalleled in other countries, provide a strong tailwind for the Maldives to promote agricultural development. Through this survey, it was found that the resorts have intentions to purchase local products and have high expectations for the agricultural islands, and meanwhile, the agricultural islands also have intentions to develop new sales channels, including resorts. What should be considered is how to link these actors and whether or not external support will make their businesses sustainable.

The nature of the support projects proposed by the survey team is highly compatible with JICA's global agenda, and is also expected to have a social impact in terms of job creation and correction of gender disparities in the Maldives. Since agriculture is closely related to the environmental sector, it is possible to approach climate change and environmental conservation, which are priority issues in the Maldives, through agricultural promotion. If a model of circular agriculture can be established, it can be considered for application to other island countries, such as the Pacific Islands, and it can be expected to spread internationally from the Maldives.

The Maldives is clearly an important partner country for Japan, given its geopolitical importance due to its location at a strategic point on Japan's sea lanes. It is desirable that the two countries will build a stronger bilateral relationship by developing a more multifaceted approach to support, moving away from the conventional approach of focusing on disaster prevention and the environment to include the field of industrial development.

List of Attachment

No.	Name of Document
1	List of Islands Targeted by MAP
2	List of Leased Agricultural Islands
3	List of Tax-exempted Import Agricultural Inputs
4	Questionnaire for Customer Preference Survey (Conjoint Analysis)

List of islands targeted by MAP

Atoll	Island
Haa Alif	Hoarafushi*
Haa Alif	Uligamu
Haa Alif	Baarah
Haa Alif	Filladhoo
Haa Alif	Kelaa
Haa Alif	Molhadhoo
Haa Alif	Muraidhoo
Haa Alif	Vashafaru
Haa Dhaalu	Kumundhoo
Haa Dhaalu	Nolhivaranfaru
Haa Dhaalu	Vaikaradhoo*
Haa Dhaalu	Finey
Haa Dhaalu	Hanimaadhoo
Haa Dhaalu	Hirimaradhoo
Haa Dhaalu	Makunudhoo
Haa Dhaalu	Neykurendhoo
Haa Dhaalu	Nolhivaram
Shaviyani	Kanditheemu
Shaviyani	Narudhoo
Shaviyani	Goidhoo
Shaviyani	Bilehfahi
Shaviyani	Foakaidhoo
Shaviyani	Milandhoo*
Shaviyani	Feevah
Shaviyani	Feydhoo

Attachment 2 List of Leased Agricultural Islands

#	Island	Lease holder
1	Sh. Madikurehdhoo	F.W Construction Company Pvt Ltd
2	Dh. Uhdhoo	Sun Investment Pvt. Ltd
3	M. Thuvaru	Aminath Aroosha Ibrahim
4	K. Thunbafushi	Mohamed Moosa
5	L. Maandhoo	Horizon Fisheries Pvt Ltd
6	N. Thanburudhoo	R.M.C.I Pvt Ltd
7	L. Kan'daru	Mr. Abdul Majeed
8	SH. Medhukunburudhoo	Seenu Maldives Pvt Ltd
9	N. Felivaru	Mr. Ibrahim Rasheed
10	N. Karinmavahtaru	Black Gold Investment Pvt Ltd
11	N. Minaavaru	Impex Fisheries Maldives Pvt Ltd
12	Lh. Maduvvari	Ocean Ridge Investment Pvt Ltd
13	R. Lhohi	Island Lhohi Investment Pvt Ltd
14	M. Fenfuraaveli	Bion Pvt Ltd
15	Dh. Lhohi	Emarald Travel Service Pvt Ltd
16	L. Mendhoo	Mr. Hassan Aadhil
17	B. Kashidhoo	Mr. Mohamed Shafeeq
18	B. Anhenunfushi	Mr. Hassan Haleem
19	N. Bandaidhihdhoo 21.1 Ha	Thanburumaa Pvt Ltd
20	GA. Kooddoo 5 Ha	Mr. Mohamed Ali Janaah
21	N. Maakurehdhoo	I &T Management Pvt Ltd
22	Sh. Ekasdhoo	SIMDI Company Pvt Ltd
23	Sh. Firun'baidhoo	Mr. Moosa Fathuhee
24	B. Maarikilu	The Wiz Company Pvt Ltd
25	R. Lin'boakandhoo	Lin'boKandhoo Investment Pvt Ltd
26	HA. Maafahi	Mr. Salah Shihaab
27	Sh. Madidhoo	Mr. Mohamed Waheed
28	HDh. Theefaridhoo	Fari Maldives Pvt Ltd
29	R. Ungulu	Sun Hiyaa International Pvt Ltd
30	Adh. Hukurudhoo	Hukurudhoo Investment Pvt Ltd
31	HDh. Vaikaramuraidhoo (43.98 Ha)	V.K.M Investment Pvt Ltd
32	R. Dheburidheythereyvaadhoo	Mr. Amir Mansoor
33	Lh. Aligaa	Crystalline.M.V Pvt Ltd
34	Lh. Lhohi	Frozen Lemons Pvt Ltd
35	B. Un'doodhoo	Un'doodhoo Investment Pvt Ltd
36	M. Gaakurali	Ms. Aishath Arsha
37	B. Aidhoo	Mr. Mohamed Saeed
38	V. Hulhidhoo	Aarah Investment Pvt Ltd
39	Th. Dhururehaa	Mr. Mohamed Latheef
40	GA. Funadhoo	Meritech Management Pvt Ltd
41	Lh. Faadhoo	Open Blue Private Limited
42	N. Maafunafaru	Ibrahim Rasheed
43	N. Bomasdhoo	Siyaahaa Maldives Pvt Ltd
44	N. Vavathi	Sandy Crystal Private Limited
45	L. Kudafushi	Successors of the late Uz. Mujthaz Fahmy
46	R. Gaaun'doodhoo	Sea Partners Maldives Pvt Ltd
47	HA. Madulu	Mafhaa Pvt Ltd
48	Sh. Kakaaeriyadhoo	Zero Pvt Ltd
49	L. Gaadhoo	Agro National Coporation Pvt Ltd
50	HA. Mulidhoo	Agro National Coporation Pvt Ltd
51	Sh. Neyo	AIMA Construction Company Pvt Ltd
52	L. Thun'buri	The Hawks Pvt Ltd

بسم الله الرحمن الرحيم

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No.	Description
1	Mushroom Spawn
2	Vitamins And Food Supplements For Poultry And Other Agricultural Animals
3	Foods For Poultry And Other Agricultural Animals
4	Sulphates Of Magnesium
5	Sulphates Of Aluminium
6	Sulphates Of Copper
7	Other Sulphates for Agriculture Purpose
8	Insecticides And Pesticides Used For Agricultural Purpose
9	Fungicides (Used For Agricultural Purpose)
10	Plant Growth Regulator
11	Diagnostic / Lab Reagents (Used For Agricultural Purpose)
12	Mixtures Used As Plant Growing Media And Other Similar Mixtures Used For Agricultural Purpose
13	Hydroponics System (Plastic)
14	Tools Used For Agriculture With Working Surface Of Plastic

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15	Poultry Feeders / Drinkers Of Plastic Used For Agricultural Purpose
16	Planting Pots And The Like, Including Seedling Trays (Plastic)
17	New Pneumatic Tyres For Wheel Barrow, Of Rubber Not Elsewhere Specified
18	Tyre (For Wheel Barrow) Used
19	Tube (Wheel Barrow)
20	Beehives, Frames And Other Wooden Articles For Bee Keeping
21	Planting Pots And The Like, Including Seedling Trays (Of Porcelain Or China)
22	Planting Pots And The Like, Including Seedling Trays (Of Ceramic)
23	Shovel (Hand Tool)
24	Spade (Hand Tool)
25	Hoe (Hand Tool)
26	Mattocks (Hand Tool)
27	Picks (Hand Tool)
28	Rake (Hand Tool)
29	Secateurs (One -Handed Tool)
30	Shears, Poultry (One - Handed Tool)
31	Hedge Shears, Two-Handed Pruning Shears And Similar Two-Handed Shears
32	Fork (Hand Tool)
33	Other Hand Tools Of A Kind Use In Agriculture, Horticulture Or Forestry
34	Tools; Knives And Cutting Blades, For Agricultural, Horticultural Or Forestry Machines Or Mechanical Appliances
35	Engines For Agricultural Machines
36	Dyers For Agricultural Products
37	Portable Sprayers For Agricultural Or Horticultural
38	Sprayers For Agricultural Or Horticultural Other Than Portable
39	Other Appliances For Spraying, Dispersing Or Projecting Liquids Or Powers For Agricultural Or Horticultural
40	Ploughs
41	Disc Harrows

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42	Harrows (Excl. Disc Harrows), Scarifiers, Cultivators, Weeders And Hoes
43	No-Till Direct Seeders, Planters And Transplanters
44	Other Seeders, Planters And Transplanters
45	Manure Spreaders
46	Fertilizer Distributors
47	Stone-Removing Machines For Soil Preparation Or Cultivation
48	Gardening Shredder
49	Parts Of Agricultural, Horticultural Or Forestry Machinery For Soil Preparation Or Cultivation
50	Other Mowers, Including Cutter Bars For Tractor Mounting (Excluding Mowers For Lawns, Parks Or Sports-Grounds)
51	Combine Harvester-Threshers
52	Other Threshing Machinery
53	Root Or Tuber Harvesting Machines
54	Other Harvesting Machinery
55	Machines For Cleaning, Sorting Or Grading Eggs, Fruit Or Other Agricultural Produce
56	Parts For Harvesting Machinery
57	Presses, Crushers, Etc, For Making Fruit Juices, Etc
58	Parts Of Machinery For Making Fruit Juices, Etc
59	Machinery For Preparing Animal Feeding Stuffs
60	Poultry Incubators And Brooders
61	Poultry-Keeping Machinery
62	Debeaker Machine
63	Machinery; For Agricultural, Horticultural Or Forestry Use (Excluding Debeaker Machine)
64	Parts Of Poultry-Keeping Machinery Or Poultry Incubators And Brooders
65	Parts Of That Machinery For Agricultural, Horticultural Or Forestry Use
66	Machines For Cleaning/Sorting/Grading Seed, Grain Or Dried Vegetables
67	Machinery For Milling Or Working Cereals Or Dried Vegetables
68	Parts Of Milling, Etc, Machinery

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69	Wheel Barrow
70	Wheel Barrow Parts
71	Wooden Pre-Fabricated Buildings For Poultry/Animal Husbandry Or Similar Agricultural Purpose
72	Wooden Pre-Fabricated Buildings For Poultry/Animal Husbandry Or Similar Agricultural Purpose (Other than wooden)
73	Instruments And Apparatus For Physical Or Chemical Analysis (Used For Agricultural Purpose)
74	Greenhouse Net for Agriculture and Forestry Purposes
75	Plant Growing Mediums
76	Live Bees
77	Greenhouse Polythene
78	Weed mat for Agriculture Purpose
79	Electric/Battery Operated Repellant Devices
80	Organic Herbicides, Fungicides and Weedicides
81	Pheromone Traps
82	Sublime for Protected Agriculture
83	Net Cup
84	Biostrate
85	Hemp Felt
86	Flexi Plug
87	Horticulture LED Light
88	Heavy Vehicles used for Agriculture Purpose
89	Tissue Cultured Banana Plants
90	Planting Bags
91	Pesticide Residue Test Kits
92	Machinery and Chemicals used for Pesticide Residue Testing

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93	Basket and Sacks used to Transport Agriculture Crops
94	Drip Irrigation Systems
95	Water Filter for Irrigation System
96	Water Meter / Metering Valve for Irrigation System
97	Drippers and Drip Lines
98	Micro Sprinkler
99	Fertilizer Injector
100	Dripper Stabilizer
101	Irrigation Controllers
102	Pressure Reducers for Irrigation Systems
103	Pressure Regulation Valves for Irrigation Systems
104	Fittings for Drip Irrigation Systems
105	Solar Powered Irrigation Pumps
106	Greenhouse Cooling Systems
107	Inflatable Roofing Systems for Green House
108	Fog or Misting System
109	Live Chicks And Broilers, Weighing =< 185G (Chicks)
110	Live Turkeys Weighing Not More Than 185G
111	Live Ducks Weighing Not More Than 185G
112	Live Broiler And Chickens Weighing More Than 185G
113	Live Turkeys Weighing More Than 185G
114	Live Ducks Weighing More Than 185G
115	Quail
116	Fertilized Eggs (Gallus Domestic) For Incubation
117	Fertilized Eggs (Other Than Gallus Domestic) For Incubation
118	Sunflower Seeds

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119	Sugar Beet Seed, Of A Kind Used For Sowing
120	Lucerne (Alfalfa) Seeds, Of A Kind Used For Sowing
121	Clover Seed, Of A Kind Used For Sowing
122	Fescue Seeds, Of A Kind Used For Sowing
123	Kentucky Blue Grass Seeds, Of A Kind Used For Sowing
124	Rye Grass Seeds, Of A Kind Used For Sowing
125	Seeds Of Forage Plants, Of A Kind Used For Sowing
126	Seeds Of Herbaceous Plants, Of A Kind Used For Sowing
127	Vegetable Seeds (Sowing)
128	Casacas (Isbagulu)
129	Other Seeds, Fruits And Spores Of A Kind Used For Sowing
130	Sea Weed (Fresh/Dried/Frozen)
131	Black Moss (Fresh, Dried, Frozen)
132	Other Algae Fit For Human Consumption Not Elsewhere Specified
133	Algae (Fresh/Dried/Frozen) Inedible
134	Sea Weed (Fresh/Dried/Frozen) Inedible
135	Lucerne (Alfalfa) Meal And Pellets
136	Other Forage Products
137	Coir Dust & Coco peat
138	Chicken Food
139	Ash And Residues From The Incineration Of Municipal Waste
140	Other Slag And Ash, Including Seaweed Ash (Kelp)
141	Peat (Incl. Peat Litter)
142	Vaccines For Veterinary Medicine
143	Vaccines For Veterinary Medicine
144	Vaccines For Veterinary Medicine
145	Poultry Medicine
146	Veterinary Medicine
147	Veterinary Medicine

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148	Veterinary Medicine
149	Cow Dung
150	Organic Fertilizers
151	Urea
152	Ammonium Sulphate
153	Double Salts And Mixtures Of Ammonium Sulphate And Ammonium Nitrate
154	Ammonium Nitrate
155	Mixtures Of Ammonium Nitrate With Inorganic Non-Fertilizing Substances
156	Sodium Nitrate
157	Double Salts And Mixtures Of Calcium Nitrate And Ammonium Nitrate
158	Mixtures Of Urea And Ammonium Nitrate In Aqueous Or Ammoniacal Solution
159	Mineral Or Chemical Fertilizers, Nitrogenous
160	Containing by weight 35% or more of Diphosphorus Pentaoxide (P2O5)
161	Other Superphosphates
162	Mineral Or Chemical Fertilizers, Phosphatic
163	Potassium Chloride
164	Potassium Sulphate
165	Mineral Or Chemical Fertilizers, Potassic
166	Fertilizers, Mineral Or Chemical; In Tablets Or Similar Forms Or In Packages Of A Gross Weight Not Exceeding 10Kg
167	Mineral Or Chemical Fertilizers With Nitrogen, Phosphorus And Potassium
168	Diammonium Hydrogenorthophosphate (Diammonium Phosphate)
169	Ammonium Dihydrogenorthophosphate (Monoammonium Phosphate)
170	Mineral Or Chemical Fertilizers Containing Nitrates And Phosphates
171	Other Mineral Or Chemical Fertilizers Containing The Two Fertilizing Elements Nitrogen And Phosphorus
172	Mineral Or Chemical Fertilizers With Phosphorus And Potassium

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173	Other Fertilizers
174	Pipe (Hdpe,Insulated With Polyurethane),Rigid
175	Other Rigid Tubes, Pipes And Hoses Of Ethylene
176	Pipe,Tube & Hose Of Polypropylene (Rigid)
177	Pvc Pipes,Tubes & Hose (Rigid)
178	Pvc Conduit Pipe (Rigid)
179	Tubes, Pipes And Hoses, Rigid Of Other Plastics
180	Hose (Flexible) Of Pvc
181	Pipes & Tubes (Flexible) Of Pvc
182	Pvc Conduit Pipe (Flexible)
183	Other Tubes, Pipes And Hoses Other, Not Reinforced Or Otherwise Combined With Other Materials, Without Fittings
184	Other Tubes, Pipes And Hoses Other, Not Reinforced Or Otherwise Combined With Other Materials, With Fittings
185	Other Tubes, Pipes And Hoses
186	Pipe Fittings (Pvc)
187	Flower Pot Of Artificial Stone
188	Planting Pot Of Cement
189	Syringes, Used In Medical, Surgical, Dental Or Veterinary Sciences
190	Machineries & Instruments and Appliances For Medical, Surgical, Dental Or Veterinary Uses
191	Apparatus Based On The Use Of Alpha, Beta Or Gamma Radiations, For Medical, Surgical, Dental Or Veterinary Uses, Including Radiography Or Radiotherapy Apparatus

16 ڊسمبر 2019

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Background

Q1. Type of business

1. Resort

2. Guesthouse

3. Retailer (others)

Q2. In-house production of crops (in its premises and/or in the leased agricultural island)

1. Yes

2. No

Q3. How do you keep crops in transportation?

1. Use refrigerating or cooling facilities

2. Does not use refrigerating or cooling facilities

3. Does not know

- About daily food stocking

Q4. Frequency of purchase of crop

1. within 3 days

2. Between 4 - 7 days

3. Between 8 - 14 days

4. More than 15 days

Q5. Require agrochemical application records and/or the equivalent

1. Yes

2. No

As a example, ID = 1 is shown.
In the survey, 50 sets of ID is prepared and used.

Conjoint ID = 1

Senario

You are considering procurement of a certain crop from new supplier. The [imaginary] crop is characterized by Price, Packing, Freshness, Quantity, and Safety. Please choose one you would like to purchase among the two alternative crops.

Note: The crop will be delivered directly from a farm land and crop price includes delivery cost. Characteristics of the crops, other than specified in the questionnaires, meet your expectations. Starting date of "freshness" in the alternatives means is the day loading into cargo ship. "Market price" in the alternatives means a common market price assumed at the time of procurement.

Round 1 Yam

Goods	Attributes	Alternatives1	Alternative2
Yam	Quantity (per week)	120kg	24kg
Yam	Market Price	150% of Market price	Market price
Yam	Safety	Apropriate use	50% usage of apropriate use
Yam	Freshness	Keep 3days served quality	Keep 7days served quality
Yam	Packing	Plastic bag	Paper bag

Round 2 Yam

Goods	Attributes	Alternatives1	Alternative2
Yam	Quantity (per week)	960kg	24kg
Yam	Market Price	50% of Market price	50% of Market price
Yam	Safety	Apropriate use	50% usage of apropriate use
Yam	Freshness	Keep 3days served quality	Keep 3days served quality
Yam	Packing	Plastic bag	Plastic bag

Round 3 Yam

Goods	Attributes	Alternatives1	Alternative2
Yam	Quantity (per week)	120kg	960kg
Yam	Market Price	Market price	50% of Market price
Yam	Safety	50% usage of apropriate use	Excessive use
Yam	Freshness	Keep 3days served quality	Keep 14days served quality
Yam	Packing	Cargo Box	Paper bag

Round 4 Yam

Goods	Attributes	Alternatives1	Alternative2
Yam	Quantity (per week)	120kg	2400kg
Yam	Market Price	Market price	200% of Market price
Yam	Safety	50% usage of apropriate use	50% usage of apropriate use
Yam	Freshness	Keep 14days served quality	Keep 21days served quality
Yam	Packing	Cargo Box	Plastic bag

Round 5 Yam

Goods	Attributes	Alternatives1	Alternative2
Yam	Quantity (per week)	960kg	24kg
Yam	Market Price	Market price	150% of Market price
Yam	Safety	Organic	Excessive use
Yam	Freshness	Keep 21days served quality	Keep 7days served quality
Yam	Packing	Cargo Box	Paper bag

Round 6 Banana

Goods	Attributes	Alternatives1	Alternative2
Banana	Quantity (per week)	820kg	2050kg
Banana	Market Price	150% of Market price	Market price
Banana	Safety	50% usage of apropriate use	50% usage of apropriate use
Banana	Freshness	Keep 5days served quality	Keep 3days served quality
Banana	Packing	Cargo Box	Paper bag

Round 7 Banana

Goods	Attributes	Alternatives1	Alternative2
Banana	Quantity (per week)	102.5kg	820kg
Banana	Market Price	Market price	200% of Market price
Banana	Safety	50% usage of apropriate use	50% usage of apropriate use
Banana	Freshness	Keep 3days served quality	Keep 7days served quality
Banana	Packing	Packing tape	Packing tape

Round 8 Banana

Goods	Attributes	Alternatives1	Alternative2
Banana	Quantity (per week)	2050kg	20.5kg
Banana	Market Price	Market price	200% of Market price
Banana	Safety	Excessive use	Organic
Banana	Freshness	Keep 7days served quality	Keep 10days served quality
Banana	Packing	Packing tape	Plastic bag

Round 9 Banana

Goods	Attributes	Alternatives1	Alternative2
Banana	Quantity (per week)	2050kg	820kg
Banana	Market Price	50% of Market price	50% of Market price
Banana	Safety	Apropriate use	Organic
Banana	Freshness	Keep 5days served quality	Keep 10days served quality
Banana	Packing	Cargo Box	Paper bag

Round 10 Banana

Goods	Attributes	Alternatives1	Alternative2
Banana	Quantity (per week)	20.5kg	20.5kg
Banana	Market Price	200% of Market price	50% of Market price
Banana	Safety	Excessive use	Apropriate use
Banana	Freshness	Keep 10days served quality	Keep 5days served quality
Banana	Packing	Plastic bag	Plastic bag

Round 11 Cucumber

Goods	Attributes	Alternatives1	Alternative2
Cucumber	Quantity (per week)	15.5kg	77.5kg
Cucumber	Market Price	150% of Market price	Market price
Cucumber	Safety	Apropriate use	Excessive use
Cucumber	Freshness	Keep 7days served quality	Keep 7days served quality
Cucumber	Packing	Paper bag	Cargo Box

Round 12 Cucumber

Goods	Attributes	Alternatives1	Alternative2
Cucumber	Quantity (per week)	77.5kg	1550kg
Cucumber	Market Price	Market price	150% of Market price
Cucumber	Safety	Excessive use	Organic
Cucumber	Freshness	Keep 7days served quality	Keep 5days served quality
Cucumber	Packing	Packing tape	Paper bag

Round 13 Cucumber

Goods	Attributes	Alternatives1	Alternative2
Cucumber	Quantity (per week)	15.5kg	77.5kg
Cucumber	Market Price	150% of Market price	50% of Market price
Cucumber	Safety	Apropriate use	Excessive use
Cucumber	Freshness	Keep 5days served quality	Keep 5days served quality
Cucumber	Packing	Packing tape	Cargo Box

Round 14 Cucumber

Goods	Attributes	Alternatives1	Alternative2
Cucumber	Quantity (per week)	15.5kg	15.5kg
Cucumber	Market Price	200% of Market price	200% of Market price
Cucumber	Safety	Apropriate use	50% usage of apropriate use
Cucumber	Freshness	Keep 7days served quality	Keep 10days served quality
Cucumber	Packing	Cargo Box	Plastic bag

Round 15 Cucumber

Goods	Attributes	Alternatives1	Alternative2
Cucumber	Quantity (per week)	620kg	15.5kg
Cucumber	Market Price	Market price	Market price
Cucumber	Safety	Apropriate use	50% usage of apropriate use
Cucumber	Freshness	Keep 7days served quality	Keep 5days served quality
Cucumber	Packing	Plastic bag	Cargo Box