

**People's Republic of Bangladesh
Ministry of Industries (MoInd)
Bangladesh Infrastructure Finance Fund Limited (BIFFL)**

**People's Republic of Bangladesh
Preparatory Survey for
Food Value Chain Improvement Project

Final Report**

January 2021

JAPAN INTERNATIONAL COOPERATION AGENCY

**JAPAN ECONOMIC RESEARCH INSTITUTE INC.
KAIHATSU MANAGEMENT CONSULTING, INC.**

4R
CR (3)
21-001

EXCHANGE RATE

USD 1 = JPY 109.56 = BDT 84.9

BDT 1 = JPY 1.29

As of the end of November, 2019

Executive Summary

1. Objective of the Survey

This Preparatory Survey (the Survey) aims to formulate detailed Yen Loan Project (the Project) plan for Improvement of food value chain through provision of concessional loan and technical assistance programs.

2. Outline of the Project

The proposed outline of the Project is described as follows.

Project Name

Food Value Chain Improvement Project in People's Republic of Bangladesh

Background and Rationale of the Project

In Bangladesh, processed food domestic market has been growing fast in accordance with recent GDP growth and the increase of middle income group. However, while Bangladeshi food processing industry has huge growth potential, it has also challenges such as high post-harvest losses, low added value, insufficient quality and food safety management system, which impede the country from fully take advantage of market opportunities.

In addition to the above challenges, financial issues should be also addressed. According to the interviews with food processing companies in the Survey, although almost all companies have capital investment plans, high loan interest rate tends to discourage their actual investment¹.

Objective of the Project

The objective of the Project is to improve credit access for agribusiness and food processing industries and to enhance their capacity in business development, food processing, and food safety by providing concessional financing through Two-Step Loan (TSL) and technical assistance, thereby contributing to the improvement of food value chain in Bangladesh.

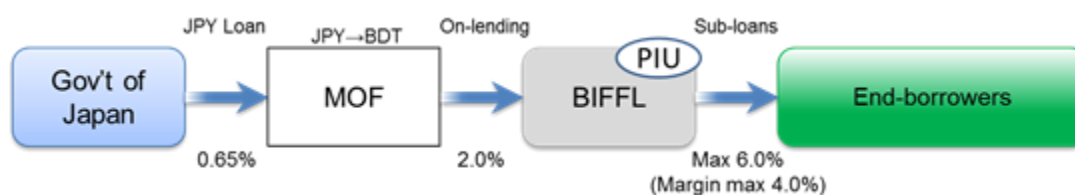
Project Components

(1) TSL for Agribusiness and Food Processing Industries

1) Proposed Fund Flow

¹ As of November 2019, loan interest ranges from 12 to 15% in private commercial bank. Regarding interest rate, please refer to Bangladesh Bank website (<https://www.bb.org.bd/finansys/interestlending.php>).

The proposed fund flow of the Project is illustrated in the following figure.



Source: The Survey Team

As illustrated in the figure above, after converted to Bangladesh Taka (BDT), the Project's TSL fund is on-lent with 2.0% interest rate to Bangladesh Infrastructure Finance Fund Limited (BIFFL) as Implementing Agency which provide On-Lending Loans to end-borrowers with interest rate up to 6.0% per annum².

2) Terms and Conditions of On-Lending Loan

The eligibility and conditions of On-Lending Loans are proposed as follows:

Legal eligibility of end-borrowers ³	Legal entity established in Bangladesh which belongs to one of the following categories: (i)Public limited company; (ii)Private limited company; (iii)Private proprietor; (iv)Partnership and (v)Cooperative
Eligible purpose	(i) Long term capital investment in agribusiness and food processing industries ⁴ (only for new equipment, machinery and production line) (ii) Technical know-how such as necessary expense for obtaining accreditation related to food safety and food processing including ISO, HACCP and halal certification
On-Lending currency	Bangladesh Taka (BDT)
Loan amount	Maximum loan amount is BDT 500 million for one end-borrower
Loan term	Two to ten years (including grace period up to two years)
Interest rate	Maximum interest rate is set at 6% per annum ⁵

² As a result of the consultation during the JICA's appraisal, the ceiling on the interest rate could be changed to 5.0% per annum as per the MoInd's request on condition of the MOF's written communication to MoInd explaining such a lower interest rate should function properly.

³ Please refer to 5.2.2 for the definitions of the legal eligibilities.

⁴ The eligible sub-sectors are: food processing industries (including fruit, vegetable, spice, rice, wheat, bean, and edible oil); seed manufacturing; organic fertilizer manufacturing; warehouse/ logistics; wholesale; transportation and retail industries.

⁵ As previously stated, the ceiling on the interest rate could be set at 5.0% per annum.

Maturity and collateral	The maturity and collateral will be determined by BIFFL in compliance with the rules and regulations prevailing in Bangladesh.
-------------------------	--

Source: The Survey Team

(2) Technical Support and Capacity Building (Consulting Service)

1) Consulting Service for Implementing Agency (BIFFL)

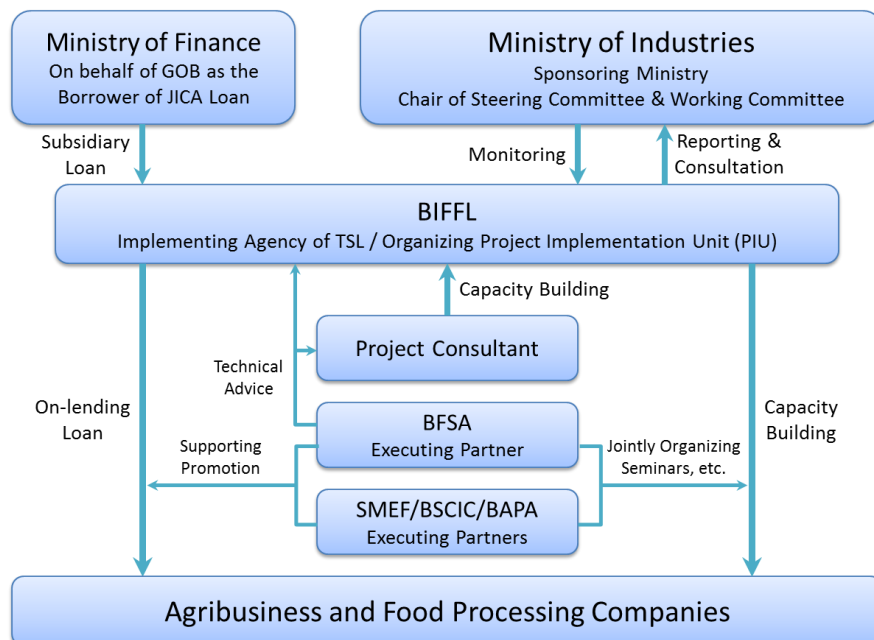
- TSL project management
- Sector analysis for agribusiness and food processing industries
- TSL project monitoring

2) Consulting Service for Agribusiness and Food Processing Industries

- Strengthening of management and financial capacity
- Improvement of food processing technology
- Improvement of food safety
- Study trip to other country and marketing support such as exhibition in overseas

Organization for Project Implementation

The project implementation structure is proposed as follows:



Source: The Survey Team

Project Cost Estimation

(1) Funding Needs by Agribusiness and Food Processing Industries

The investment needs and funding needs by the targeted agribusiness and food processing industries are shown in the following table.

(Unit: million USD)

	Investment needs			Funding needs			
	Business Expansion	Replacement	Total	Large	Medium	Small / micro	Total
Mango processing	27.3	40.6	67.8	43.2	18.3	0.3	61.8
Tomato processing	0.9	1.8	2.7	1.7	0.7	0.0	2.4
Potato processing	28.9	25.2	54.1	34.5	14.6	0.3	49.3
Spice processing	22.1	45.3	67.4	42.9	18.2	0.3	61.4
Wheat processing	8.1	5.8	14.0	1.4	0.7	2.5	4.6
Edible oil production	9.9	15.7	25.6	3.7	0.3	4.0	8.0
Organic fertilizer production	5.9	2.4	8.3	0.0	4.7	0.5	5.2
Cold storage facilities	95.6	554.3	649.9	0	16.5	0.0	16.5
Freezing, refrigerated and insulated vans	43.1	47.5	90.6	90.6	0.0	0.0	90.6
Retail industries	23.6	30.7	54.4	13.4	0.6	8.0	22.0
Total	265.4	769.3	1,034.6	231.4	74.7	15.9	321.9

Source: Estimate of the Survey Team

(2) Project Cost

The Project cost is estimated as in the following table.

(Unit: million JPY)

Item	Amount
1. Sub-projects	12,000
JICA ODA loan	10,800
Contributions by end-borrowers	1,200
2. Consulting services	418
3. Total project cost (1 + 2)	12,418
of which ODA loan portion	(10,800)

Source: Estimate of the Survey Team

Implementation Schedule of the Project

The implementation schedule of the Project is proposed as in the following table.

Pledge	March 2020
Loan Agreement	August 2020
Effectuation of the L/A	October 2020
Selection of Consultant for PIU	October 2020 to November 2021
Consulting Services for PIU	November 2021 to November 2026
Provision of Funds to end-borrowers	November 2021 to November 2026
Project completion date	November 2026

Source: The Survey Team

3. Environmental and Social Consideration

Sub-project Selection Standards

All the factories operating in Bangladesh has to acquire Environmental Clearance Certificate (ECC). ECC is categorized in Green, Orange-A, Orange-B and Red, and food processing industries as the main target sector of the Project belong to Orange-B and JICA Category B. In addition, other target sectors of the Project have been confirmed as not belonging to Red or JICA Category A. The Sub-project selection standards in Environmental and Social Consideration is proposed as: 1) Exclusion from the Red category of ECR and JICA Category A; 2) Exclusion for sectors listed on the Bangladesh Bank’s exclusion lists of Guidelines on Environmental & Social Risk Management for Banks and Financial Institutions in Bangladesh (ESRM) and BIFFL’s Environmental and Social Management System (ESMS); and 3) Having valid ECC, factory licenses, and fire licenses.

Strengthening Environmental and Social Monitoring Framework

BIFFL has appropriate capacity for environmental and social consideration as it has extensive project experiences with international donors such as ADB and JICA and has unique ESMS called Environmental and Social Monitoring Framework (ESMF).

On the other hand, the above BIFFL’s ESMF has not incorporated check system for assuring food safety which is critical for improving food value chain in the Project. In addition, BIFFL does not have enough expertise on Environmental and Social Due Diligence (ESDD) in food processing sector. In this regard, BIFFL needs to use ESDD checklist that covers food safety items tailored for the Project⁶ as well as to receive training on food safety.

⁶ Such checklist has been prepared by the support from the Survey Team.

Table of Contents

1. Overview of the Survey.....	1
1.1. Background.....	1
1.2. Objective of the Survey	2
2. Outline of Policy and Government Institutions Related to Agribusiness and Food Processing Industries in Bangladesh	3
2.1. Outline of National Policy and Policy related to Agribusiness and Food Processing Industries .	3
2.1.1. Perspective Plan of Bangladesh 2010-2021.....	3
2.1.2. Seventh Five Year Plan, (FY2016-FY2020).....	4
2.1.3. Industry Policy 2016.....	5
2.1.4. SME Policy 2019.....	7
2.1.5. Agro-food Processing Industry Promotion Policy 2020 (5 th Draft)	8
2.1.6. National Agricultural Policy (2018)	10
2.1.7. National Food and Nutrition Security Policy (NFNSP)	11
2.2. Implementation Structure and Roles of Government Agencies for Agribusiness and Food Processing Industries	12
2.2.1. Ministry of Industries: MoInd.....	13
2.2.2. Ministry of Agriculture: MOA.....	27
2.2.3. Ministry of Food	29
2.2.4. Ministry of Commerce: MOC.....	38
2.2.5. Other industry associations	42
2.3. Review of Donors' Support for Food Value Chain	48
2.3.1. World Bank, International Development Association (IDA).....	48
2.3.2. United States Agency for International Development: USAID	50
2.3.3. Delegation of the European Union to Bangladesh.....	52
2.3.4. International Fund for Agricultural Development: IFAD	52
2.3.5. Food and Agriculture Organization: FAO.....	53
2.3.6. Other projects.....	54
2.4. Government Initiative in Financing Agribusiness and Food Processing Industries	55
2.4.1. Bangladesh Bank ‘Refinance Scheme for Agro based Product Processing Industries in Rural Area’	58
2.4.2. Bangladesh Bank ‘Refinance Scheme for Dairy Farming’	60
3. Review of the Current Situation and Issues of Food Value Chain in Bangladesh.....	62
3.1. The Current Situation Analysis of Food Value Chain.....	62
3.1.1. Domestic Production of Major Crops	62

3.1.2. Outline of Processed Food Market	63
3.1.3. Overview of Food Related Industries	67
3.1.4. Current Situation and Issues on Food Value Chain of Selected Products	76
3.1.5. Current situation and issues of food processing on food safety	124
3.2. Current Situation and Issues on Major Processed Foods	134
3.2.1. Fruits	135
3.2.2. Vegetable	142
3.2.3. Spices	151
3.2.4. Cereals	156
3.2.5. Edible oil	160
3.3. Summary of Issues on Food Value Chain	168
3.3.1. Production	168
3.3.2. Distribution	169
3.3.3. Processing and Retail	171
4. Review of Financial Sector and Agribusiness and Food Processing Industries in Bangladesh	175
4.1. Key Issues in Banking and Financial Sector in Bangladesh	175
4.2. Review of Operational and Financial Highlights of Potential PFIs	180
4.2.1. Selection of Potential PFIs	180
4.2.2. Analysis of Operational and Financial Capacities of Potential PFIs	181
4.3. Challenges in Financing Agribusiness and Food Processing Industries	204
5. Proposed Plan of the Project	213
5.1. Background and Rationale of the Project	213
5.1.1. Growth of Domestic Consumer Market and Food Processing Industry	213
5.1.2. Issues and Development Situation of Food Processing Industry in Comparison with Other Countries	214
5.1.3. Issues of Food Value Chain to be addressed	218
5.1.4. Consistency with Japan's Cooperation Policy and Effective Utilization of Knowhow and Latest Technology	221
5.1.5. Contribution to the increase of the income and livelihood of farmers	222
5.2. Financing Scheme	224
5.2.1. Proposal on Fund Flow	224
5.2.2. Terms and Conditions of On-Lending Loan	236
5.3. Technical Support and Capacity Building	248
5.3.1. Technical Support for Financial Institutions	248
5.3.2. Capacity Building for Agribusiness and Food Processing Companies	249

5.3.3. Monitoring of Capacity Building.....	258
5.3.4. Proposed Consulting Services	259
5.4. Organization for Project Implementation	260
5.4.1. Organization for Project Implementation	260
5.4.2. Monitoring and Reporting	265
5.5. Estimation of the Project Cost.....	266
5.5.1. Funding needs by agribusiness and food processing industries.....	266
5.5.2. Project cost.....	301
5.6. Implementation Schedule of the Project.....	302
5.7. Performance Monitoring Indicator	303
5.7.1. Quantitative Effect.....	303
5.7.2. Qualitative Effect.....	305
6. Environmental and Social Considerations.....	306
6.1. Current Environmental and Social Considerations in Bangladesh.....	306
6.1.1. Environmental Pollution.....	306
6.1.2. Current Situation of the Natural Environment.....	309
6.1.3. Current Situation of the Social Environment.....	310
6.2. Policies and Regulations, and Organizations for Environmental and Social Considerations in Bangladesh	312
6.2.1. Policies and Regulations for Natural Environment	312
6.2.2. Policies and Regulations for Social Environment	314
6.2.3. Gaps of Environmental and Social Framework between Government of Bangladesh and JICA	316
6.2.4. Government Organizations Related to Environmental and Social Considerations	318
6.2.5. Environmental and Social Management System (ESMS) of Banks/FIs in Bangladesh	319
6.3. Sub-project Selection Standards and Procedures in Environmental and Social Considerations	325
6.3.1. Potential Impacts from Sub-projects.....	325
6.3.2. Sub-project Selection Standards	330
6.3.3. Selection and Monitoring Sub-projects	331
6.4. Capacity Building of BIFFL in Environmental and Social Considerations.....	333
6.4.1. Evaluation of the Capacity of BIFFL’s Environmental and Social Considerations.....	333
6.4.2. Improvement Plans for BIFFL in Environmental and Social Considerations	334
7. The Promotional Seminar.....	336
7.1. Seminar Program.....	336

7.2. Questions and Answers.....	338
7.2.1. Questions by the participants and answers by BIFFL and the Survey Team.....	338
7.2.2. Issues to be considered in the Project implementation	340

List of Tables

Table 1 Issues and Strategies related to Food Value Chain (Extract from Perspective Plan of Bangladesh 2010-2021)	3
Table 2 Crop Sub-Sector Promotion Strategies (Extract from the Seventh Five Year Plan)	5
Table 3 Policy Measures related to Agribusiness and Food Processing Industries under Industry Policy 2016.....	6
Table 4 Definition of Company Size according to Industrial Policy 2016 (Manufacturing Industry)	7
Table 5 Implementation Strategies and Action Plans in SME Policy 2019.....	8
Table 6 Organizations under the Ministry of Industries	15
Table 7 Training programs by SMEF	18
Table 8 Program of FSFO	19
Table 9 Training programs by SCITL.....	22
Table 10 Organizations under the MOA.....	27
Table 11 Government agencies that are responsible for food safety	30
Table 12 BFSA's five primary activities.....	31
Table 13 Items required by Food Safety Act 2013 (extract).....	35
Table 14 List of recent regulations for food safety set by BFSA	36
Table 15 Example of punishments related to food safety stipulated in the Food Safety Act 2013.....	37
Table 16 Items produced by BAPA's member companies	44
Table 17 Content of the training programs for agribusiness and food processing companies conducted by BAPA.....	46
Table 18 Other donors' projects for food value chain development in Bangladesh (World Bank)	49
Table 19 Other donors' projects for food value chain development in Bangladesh (USAID)	51
Table 20 Other donors' projects for food value chain development in Bangladesh (IFAD).....	53
Table 21 Other donors' projects for food value chain development in Bangladesh	54
Table 22 Examples of refinance schemes for agricultural sector by Bangladesh Bank	56
Table 23 Refinance schemes for agricultural sector by donors	57
Table 24 Terms and Conditions of Sub-loan	58
Table 25 Terms and Conditions of On-lending loan.....	59
Table 26 Terms and Conditions of Sub-loan	60
Table 27 Terms and Conditions of On-lending loan.....	61
Table 28 Major agriculture crop production (2017-18).....	62
Table 29 Major vegetable production (2017-18).....	63
Table 30 Major fruit production (2017-18).....	63
Table 31 Current market size and CAGR over the next five years of packed food.....	67

Table 32	Certifications obtained by BAPA member companies.....	68
Table 33	Capacity development needs of BAPA member companies	68
Table 34	Source of seeds by crop (%).....	69
Table 35	National demand, BCIC production, import volume, and consumption volume in 2018–19 (Lac MT)	71
Table 36	Agricultural mechanization in Bangladesh (Rice).....	73
Table 37	A grower’s price and retail price of each crop	74
Table 38	Overview of major supermarket chains in Bangladesh	76
Table 39	Paddy production (MT), area harvested (ha) and yield (kg/ha).....	77
Table 40	Time of sowing or transplanting, and time of harvest	78
Table 41	Major rice production district in Bangladesh	78
Table 42	Variety of rice, planted area, and production by season (2017–18).....	79
Table 43	Paddy yield in major rice producing countries	80
Table 44	Cost and profit of rice production (per acre) (BDT).....	81
Table 45	Agricultural mechanization in Bangladesh (Rice) (reposted).....	82
Table 46	Potato production, area harvested, and yield	91
Table 47	Major potato producing areas in Bangladesh	91
Table 48	Ten largest potato producing countries and their potato production volume and yield	92
Table 49	Potato production, area harvested, and yield of variety-wise (2017–18).....	92
Table 50	Production cost and profit of potato production (per acre) (BDT)	94
Table 51	Export and Import volume and value of potato processed products (2018).....	99
Table 52	Mango production in the world	101
Table 53	Major mango producing areas in Bangladesh	102
Table 54	Mango production inside and outside mango orchards	102
Table 55	Production area, production, and yield in major mango producing countries (2012)	103
Table 56	Production cost and profit of mango production (produce Guti in 1.67 acre) (BDT)	104
Table 57	Cash flow of mango production	104
Table 58	Tomato production, area harvested, and yield in Bangladesh.....	117
Table 59	Major tomato producing area (2017–18).....	117
Table 60	Tomato production and the yield of the top ten countries of tomato production and Bangladesh (2017)	118
Table 61	Production cost and price of tomato cultivation (BDT per acre).....	119
Table 62	Domestic production, export and import volume of tomatoes (2018).....	120
Table 63	Export and import volume and value of tomato processed products (2018)	123
Table 64	Certification acquired by BAPA member countries (reposted)	129

Table 65 Recommendations for food safety and quality improvement	132
Table 66 Major fruit production (2017–18).....	135
Table 67 Post-harvest losses of fruits at each stage in Bangladesh (%)	138
Table 68 Domestic production volumes as well as export and import volumes of major fruits (fresh and dry) (2018).....	138
Table 69 Export and import values of fruit processed products (2018).....	140
Table 70 Issues and countermeasures of the fruits food value chain.....	140
Table 71 Post-harvest losses of vegetables at each stage in Bangladesh (%).....	144
Table 72 Domestic production and trade volumes of major vegetables (fresh and chilled) (2018)	146
Table 73 Ratio of processed volumes to production volumes (potato and tomato).....	146
Table 74 Market sizes and growth rates for the next five years of vegetable processing products (million USD)	147
Table 75 Domestic productions, export and import volumes of major vegetables processed products (frozen) (2018)	148
Table 76 Issues and countermeasures of vegetable food value chain.....	149
Table 77 Domestic productions, export and import volumes of major spices (2018).....	152
Table 78 Ratios of processed volumes to production volumes of chili and turmeric	154
Table 79 Issues and countermeasures of spices food value chain	155
Table 80 Production of paddy and wheat	156
Table 81 Domestic productions, export and import volumes of rice and wheat (2018).....	157
Table 82 Market sizes and growth rates for the next five years – rice and wheat processed products	158
Table 83 Export and import values of wheat processed products (2018).....	158
Table 84 Issues and countermeasures of cereals food value chain.....	159
Table 85 Change in consumption volumes of edible oil in Bangladesh (thousand MT).....	160
Table 86 Changes in edible oil productions in Bangladesh (MT)	161
Table 87 Major import aims of major edible oils (2018).....	161
Table 88 Rice, husk, and rice bran produced by paddy (2017–18)	163
Table 89 Volume of rice bran oil in case all rice bran is used for rice bran oil (2017-18).....	164
Table 90 Market size and growth rate for next five years – edible oils (million USD).....	166
Table 91 Retail price of major edible oils (BDT per kg).....	166
Table 92 Issues and countermeasures of edible oil food value chain	167
Table 93 Issues and countermeasures for production	168
Table 94 Issues and their countermeasures for distribution.....	170
Table 95 Issues and countermeasures for processing and retail	171
Table 96 Domestic Financial Institutions and their Performances (as of the end of 2017).....	175

Table 97 Comparative Position of Provision Adequacy by Type of Banks.....	177
Table 98 Key Operating and Financial Indicators of Banks.....	182
Table 99 Key Operating and Financial Indicators of NBFIs.....	183
Table 100 Sector-wise Allocation of Loans and Advances of Dutch Bangla Bank.....	186
Table 101 Sector-wise Allocation of Loans and Advances of BRAC Bank.....	188
Table 102 Example of a Loan Project Provided with Agribusiness and Food Processing Industries by BRAC Bank.....	189
Table 103 Sector-wise Allocation of Loans and Advances of Eastern Bank.....	191
Table 104 Sector-wise Allocation of Loans and Advances of Dhaka Bank.....	192
Table 105 Sector-wise Allocation of Loans and Advances of SBAC Bank.....	194
Table 106 Sector-wise Allocation of Loans and Advances of IDLC Finance Limited.....	196
Table 107 Sector-wise Allocation of Loans, Advances, and Leases of IPDC Finance.....	198
Table 108 Sector-wise Allocation of Loans, Advances, and Leases of United Finance.....	200
Table 109 Sector-wise Allocation of Loans and Advances of BIFFL.....	204
Table 110 List of Training Courses Offered by BIBM in 2019.....	205
Table 111 List of Training Courses Offered by BBTA in 2019.....	207
Table 112 Collateral Conditions of Financial Institutions.....	212
Table 113 Comparison of Added Value and Share to GDP in Asian Countries.....	215
Table 114 Processing Ratio for Major Crops.....	216
Table 115 Comparison of Processing Ratio for Main Agricultural Products.....	216
Table 116 Post-harvest Loss Ratio in Bangladesh and India (%).....	217
Table 117 Post-harvest Loss Ratio of Rice in Asian Countries (%).....	218
Table 118 Number of ISO Acquisition per a Million Population in Asian Countries.....	218
Table 119 Added Value Ratio by Industry Scale.....	220
Table 120 Acquisition Ratio of ISO and HACCP.....	220
Table 121 Organizational and Financial Highlights of BIFFL and IDCOL.....	226
Table 122 Proposed Accreditation Criteria of PFIs.....	228
Table 123 Assessment of potential PFIs based on the accreditation criteria.....	229
Table 124 Advantages and Disadvantages of Fund Flow Option 1.....	233
Table 125 Advantages and disadvantages of Fund Flow Option 2.....	235
Table 126 Definition of Scale of Companies in Refinance Schemes of Bangladesh Bank.....	237
Table 127 Definitions of legal eligibility of end borrowers.....	237
Table 128 Typical Production Line or Equipment of Agribusiness and Food Processing Industries..	244
Table 129 Interest Rates of the Existing Policy Lending Schemes for SMEs.....	245
Table 130 Outline of a draft seminar agenda (food processing).....	251

Table 131 Proposed seminar schedule (food processing).....	253
Table 132 Outline of a draft seminar agenda (food safety)	254
Table 133 Proposed seminar schedule (food safety)	256
Table 134 Experience in food safety training and resource persons.....	257
Table 135 Proposed study tour and exhibitions.....	258
Table 136 Experts and M/M of the consulting services	259
Table 137 Function, Roles, Frequency of Meeting, and Members of the Steering Committee.....	261
Table 138 Function and Roles of Executing Partners.....	262
Table 139 Participants in the Working Committee and Focal Person from the Executing Partners....	264
Table 140 List of Monitoring Reports	266
Table 141 Quantity of mango pulp processed to mango juice (estimated).....	267
Table 142 Example of a mango pulp production facility (Non-aseptic line).....	268
Table 143 Estimated depreciation amount of existing mango pulp production facilities.....	269
Table 144 Example of a mango juice production facility.....	270
Table 145 Estimated depreciation amount of existing mango juice production facilities	271
Table 146 Estimated quantity of tomato pulp processed to ketchup	272
Table 147 Example of a ketchup production facility.....	272
Table 148 Estimated depreciation amount of existing ketchup production facilities	273
Table 149 Example of a potato chip production facility (1).....	274
Table 150 Example of a potato chips production facility (2)	275
Table 151 Estimated depreciation amount of existing potato chip and cracker production facilities .	276
Table 152 Example of a potato flake production facility	276
Table 153 Estimated depreciation amount of existing potato flake production facilities.....	277
Table 154 Example of a starch production facility.....	278
Table 155 Estimated depreciation amount of existing potato starch production facilities	279
Table 156 Example of a powdered spice production facility	280
Table 157 Market size and estimated growth rate	280
Table 158 Estimated depreciation amount of existing powdered spice production facilities.....	281
Table 159 Market sizes and estimated growth rates of major wheat products	281
Table 160 Example of a bread production facility	282
Table 161 Example of a biscuit production facility.....	282
Table 162 Example of a chanachur production facility.....	282
Table 163 Example of an instant noodle production facility.....	283
Table 164 Investment needs for production expansion of major wheat products.....	283
Table 165 Expected growth of major wheat products	284

Table 166 Investment needs for export promotion of major wheat products	284
Table 167 Estimated depreciation amount of existing facilities of wheat products	285
Table 168 Example of an edible oil production facility	286
Table 169 Estimated depreciation amount of existing production facilities of mustard oil, rice bran oil and sesame oil	287
Table 170 Estimated depreciation amount of existing organic fertilizer production facilities	288
Table 171 Estimated investments needs for the expansion of cold storage facilities	288
Table 172 Estimated depreciation amount of existing cold storage facilities.....	289
Table 173 Estimated depreciation amount of existing freezing, refrigerated and insulated vans.....	290
Table 174 Investment needs for new outlets (for freezers or refrigerators).....	291
Table 175 Estimated number of freezers and refrigerators in existing retail outlets	291
Table 176 Estimated depreciation amount of existing freezers and refrigerators in existing retail outlets	292
Table 177 Definition of the category of manufacturing companies by Ministry of Industries and the medians of investment amount.....	292
Table 178 Estimated distribution of existing investment amount by category.....	293
Table 179 Estimated funding needs for mango processing	294
Table 180 Estimated funding needs for tomato processing.....	294
Table 181 Estimated funding needs for potato processing	295
Table 182 Estimated funding needs for spice processing.....	295
Table 183 Estimated distribution of existing investment amount by category.....	296
Table 184 Estimated funding needs for wheat processing.....	297
Table 185 Estimated distribution of existing investment amount by category.....	298
Table 186 Estimated funding needs for edible oil production.....	298
Table 187 Estimated funding needs for organic fertilizer production	299
Table 188 Estimated funding needs of retail industries for freezing and refrigerating equipment.....	300
Table 189 Summary of investment needs and funding needs (million USD)	301
Table 190 Proposed project cost.....	302
Table 191 Annual financing plan.....	302
Table 192 Implementation Schedule of the Project.....	303
Table 193 Operation and Effect Indicators to Assess Quantitative Effect.....	303
Table 194 Items to Assess Qualitative Effect	305
Table 195 Air quality standards.....	306
Table 196 Air Quality Index (As of December 11 th , 2019)	307
Table 197 Sewage discharge standards	307

Table 198 Level of different parameters of Buriganga River during 2014-2016	308
Table 199 Noise quality standards.....	308
Table 200 Places beyond the noise standard limit.....	309
Table 201 Ecological Critical Areas	310
Table 202 Cultural and natural heritage sites in Bangladesh.....	310
Table 203 Distribution of ethnic minority population and sex ratio by division.....	311
Table 204 Major policies and regulations for natural environment.....	313
Table 205 Major policies and regulations for social environment.....	314
Table 206 Classification comparison.....	317
Table 207 Major differences in operational frameworks between JICA Guidelines and ECA/ECR ..	318
Table 208 Major government organizations involved in environmental and social considerations	318
Table 209 BB ESDD checklist (Generic).....	321
Table 210 BIFFL ESDD Checklist	324
Table 211 ESDD checklists for food (Dutch Bangla Bank)	325
Table 212 Results and Reasons for the scoping (case: food processing companies).....	326
Table 213 Categorization of eligible sectors	331

List of Figures

Figure 1 Organogram of the Ministry of Industries	14
Figure 2 Organogram of SMEF.....	16
Figure 3 Organogram of BSCIC.....	21
Figure 4 Industrial estates of BSCIC.....	23
Figure 5 Breakdown of companies (agribusiness and food processing industries) in industrial estates of BSCIC	25
Figure 6 Organogram of BSTI	26
Figure 7 Organogram of the Department of Agricultural Extension.....	28
Figure 8 Organogram of BFSI	33
Figure 9 Organogram of the Ministry of Commerce.....	39
Figure 10 Organogram of the Export Promotion Bureau	41
Figure 11 Ratio of BAPA's member companies by size.....	42
Figure 12 Geographic location of BAPA's member companies (left: head office, right: factory).....	43
Figure 13 Organogram of BAPA.....	45
Figure 14 World Bank's financial aid commitments to Bangladesh (USD million)	49
Figure 15 Actual GDP and GDP of the food processing industries (million BDT).....	63
Figure 16 Domestic production value of food, drink, and tobacco in Asian and Pacific countries.....	65
Figure 17 Sub-sector market size (million USD).....	66
Figure 18 Current market size (vertical axis and balloon size) and CAGR over the next five years (horizontal axis) of packed food.....	66
Figure 19 Paddy production, area harvested, and yield.....	77
Figure 20 Rice production map	78
Figure 21 Rice production in the Aus, Aman, and Boro seasons	79
Figure 22 Rice value chain (traditional value chain in Bogra District).....	84
Figure 23 New type of rice distribution channel.....	86
Figure 24 Changes in the value of 1kg paddy in the new type of distribution channel (BDT).....	86
Figure 25 Changes in the value of 1kg paddy to puffed rice.....	88
Figure 26 Wholesale price of paddy (2017).....	89
Figure 27 Wholesale price of rice (2017).....	89
Figure 28 Potato production, area harvested, and yield	91
Figure 29 Potato production map	91
Figure 30 Change in value of 1kg potato (BDT).....	98
Figure 31 Change in wholesale price of local variety potato (2017).....	99
Figure 32 Mango production in Bangladesh	101

Figure 33 Mango producing area map.....	102
Figure 34 General distribution channel of mango.....	106
Figure 35 New type of mango distribution channel studied.....	107
Figure 36 Market size of juice and pickles/chutney among BAPA members.....	109
Figure 37 Change in values of 1kg mango (mango juice) (BDT).....	113
Figure 38 Change in mango wholesale prices (2017).....	114
Figure 39 Tomato production, area harvested, and yield.....	117
Figure 40 Tomato production map.....	117
Figure 41 Tomato distribution channel in general.....	120
Figure 42 New type of tomato distribution channel.....	120
Figure 43 Change in values of 1kg tomato (tomato ketchup) (BDT).....	122
Figure 44 Change in tomato wholesale price (from 2017 to 2018).....	123
Figure 45 Change in major fruit production (thousand MT).....	136
Figure 46 Change in productions of major vegetables (thousand MT).....	143
Figure 47 Changes in major spice productions (thousand MT).....	151
Figure 48 Change in production of paddy and wheat (MT).....	156
Figure 49 Changes in productions of raw materials of edible oils (thousand MT).....	162
Figure 50 Mustard oil processing.....	164
Figure 51 Breakdown of the packed edible oils market.....	165
Figure 52 Trends of Total Loan Balance by Type of Banks (in billion BDT).....	176
Figure 53 NPL Ratio by Type of Banks (%).....	176
Figure 54 Trends of Advance Deposit Ratio (ADR).....	178
Figure 55 Trends in Weighted Average Interest Rates of Deposit and Lending (as of the end of June each year).....	179
Figure 56 Organogram of BIFFL (as of the end of 2019).....	201
Figure 57 Loan appraisal processes at BIFFL.....	202
Figure 58 Transition of Real GDP and Food Processing GDP (million BDT).....	213
Figure 59 Package Food Market Size in Bangladesh.....	214
Figure 60 Comparison of Countries for Share of Food Processing Industry and Agriculture GDP in relation with GDP Per Capita (Countries of which GDP per capita is lower than 10,000 USD).....	215
Figure 61 Main Goal and Expected Impacts of the Project.....	219
Figure 62 Image Size of Targeted End-borrowers.....	221
Figure 63 Option 1 of Fund Flow.....	232
Figure 64 Option 2 of Fund Flow.....	233
Figure 65 Fund Flow and Accounts.....	247

Figure 66 Organizations for Project Implementation	260
Figure 67 Proposal of Organization of the PIU in the Implementing Agency	264
Figure 68 Protected Area.....	309
Figure 69 Poverty headcount rates (2000-2016)	312
Figure 70 Web page for applying for licenses	315
Figure 71 Environmental and social management structure	319
Figure 72 Flowchart of environmental and social considerations.....	332

List of Photos

Photo 1 Seed processing equipment	70
Photo 2 Quality testing laboratory.....	70
Photo 3 Examples of biopesticides	72
Photo 4 Rice farming activities	81
Photo 5 Rice mill (semi-auto mill)	83
Photo 6 A paddy market and a rice market in the Bogra District	85
Photo 7 A puffed rice manufacturing facility	87
Photo 8 Major potato varieties in Bangladesh.....	93
Photo 9 A cold storage for potatoes.....	95
Photo 10 A processing line of potato chips	97
Photo 11 Equipment for adding seasonings to potato chips	97
Photo 12 Mango cultivation	105
Photo 13 Mango harvesting.....	106
Photo 14 Rajshahi mango wholesale market.....	107
Photo 15 Mango juice products.....	109
Photo 16 A mango pulp processing plant	110
Photo 17 A mango juice processing line.....	112
Photo 18 Tomato processed products	121
Photo 19 A tomato ketchup processing line	122
Photo 20 Examples that need to improve from hygienic viewpoints (1)	126
Photo 21 Examples that need to improve from hygienic viewpoints (2)	128
Photo 22 Good examples from hygienic viewpoints (1)	131
Photo 23 Good examples from hygienic viewpoints (2)	132
Photo 24 A spice market at rural area.....	153
Photo 25 Vessels for edible oil transportation (500 – 600 MT).....	165
Photo 26 Current situation of wastewater discharge	328
Photo 27 Current situations of food safety	329

Abbreviations

ADB	Asian Development Bank
ADR	Advance-Deposit Ratio
APBPC	Agro-Products Business Promotion Council
AQI	Air Quality Index
BADC	Bangladesh Agricultural Development Corporation
BAPA	Bangladesh Agro-Processors' Association
BARI	Bangladesh Agricultural Research Institute
BCSA	Bangladesh Cold Storage Association
BDT	Bangladesh Taka
BFSA	Bangladesh Food Safety Authority
BIFFL	Bangladesh Infrastructure Finance Fund Limited
BOD	Biochemical Oxygen Demand
BRRRI	Bangladesh Rice Research Institute
BSCIC	Bangladesh Small and Cottage Industries Corporation
BSTI	Bangladesh Standards and Testing Institution
CAGR	Compound Average Growth Rate
CAR	Capital Adequacy Ratio
CFS	Core Financial Solution
COD	Chemical Oxygen Demand
CRAB	Credit Rating Agency of Bangladesh
CRISL	Credit Rating Information and Services Limited
CRR	Cash Reserve Ratio
DAE	Department of Agricultural Extension
DAM	Department of Agricultural Marketing
DAP	Diammonium Phosphate
dB	Decibel
DFIs	State-owned Development Financial Institutions
DO	Dissolved Oxygen
DoE	Department of Environment
DoF	Department of Fisheries
DoLS	Department of Livestock Services
ECA	Environmental Conservation Act
ECAs	Ecological Critical Areas
ECC	Environmental Clearance Certificate
ECR	Environmental Conservation Rules
ECRL	Emerging Credit Rating Limited
EECPFP	Energy Efficiency and Conservation Promotion Financing Project
EHEDG	European Hygienic Engineering & Design Group
EIA	Environmental Impact Assessment
EPB	Export Promotion Bureau

ESMF	Environmental Social Monitoring Framework
ESMS	Environmental and Social Management System
ESDD	Environment Social Due Diligence
ESRM	Guidelines on Environmental & Social Risk Management
ETP	Effluent Treatment Plant
EU	European Union
FAO	Food and Agriculture Organization
FCBs	Foreign Commercial Banks
FSMS	Food Safety Management System
FSSC22000	Food Safety System Certification 22000
FVC	Food Value Chain
GAP	Good Agricultural Practice
GAIN	Global Alliance for Improved Nutrition
GDP	Gross Domestic Product
GFSI	Global Food Safety Initiative
GMP	Good Manufacturing Practice
GoB	Government of Bangladesh
HACCP	Hazard Analysis Critical Control Point
IDCOL	Infrastructure Development Company Limited
IEE	Initial Environmental Examination
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IMF	International Monetary Fund
IPM	Integrated Pest Management
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature and Natural Resources
JICA	Japan International Cooperation Agency
JICA GL	JICA Guidelines for Environmental and Social Considerations
MOA	Ministry of Agriculture
MOC	Ministry of Commerce
MoInd	Ministry of Industries
MOP	Muriate of Potash
NBFI	Non-Bank Financial Institution
NCDP	Northwest Crop Diversification Project
NGO	Non-Governmental Organizations
OJT	On-the-Job Training
PCBs	Private Commercial Banks
PFI(s)	Participating Financial Institution(s)
PIU	Project Implementation Unit
PM10(25)	Particulate Matter10(25)
QA	Quality Assurance

QC	Quality Control
RMG	Ready Made Garments
ROA	Return of Assets
ROE	Return on Equity
R&D	Research and Development
SAAO	Sub-Assistant Agriculture Officer
SCBs	State-owned Commercial Banks
SCDP	Second Crop Diversification Project
SCITI	Small and Cottage Industries Training Institute
SDC	Skill Development Centers
SLR	Statutory liquidity Ratio
SMAP	Small and Marginal Sized Farmers Agricultural Productivity Improvement and Diversification Financing Project
SMEF	Small and Medium Enterprise Foundation
SME(s)	Small and Medium-sized Enterprise(s)
SNV	Netherlands Organization for Development
TOR	Terms of Reference
TSL	Two-Step Loan
TSP	Triple Superphosphate
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
WB	World Bank
WHO	World Health Organization

1. Overview of the Survey

1.1. Background

Bangladesh has achieved average around 7% of annual growth rate from 2010 to 2018 (World Bank, 2019) led mainly by the textile industry that contributes about 80% of export. The country faces the challenge of diversifying its economy for sustainable economic growth to reach the goal to become a middle income country by 2021.

Agricultural sector of Bangladesh accounts for about 13% of GDP (Bangladesh Bank, 2017) and absorbs almost half of the working population (Agriyear book, Bureau of Statistics, 2017) in rural areas. While 63% of the whole national land can be used for farming (Master Plan for Agricultural Development in the Southern Region of Bangladesh, FAO, 2011), the size of farm land has been decreasing annually due to urbanization, therefore, it is urgent to improve agricultural productivity. In addition, as the demand for diverse agriculture and processed products is increasing along with the increase of middle-class population, it is important to promote capacity development for diverse and high-value added production of agriculture and processed products together with the improvement of productivity.

In agriculture in Bangladesh, post-harvest losses ratio of agricultural products is as high as 30 to 40% due to the shortage of infrastructures such as storage facilities including cold storage facilities and warehouses, processing facilities and rural roads (USAID, 2010). Most of agricultural and food processing companies have limited financial access due to both factors on companies and financial institutions. Some companies do not have well-developed business plans, whereas the financial institutions lack the knowledge and experience in credit protection and offer high loan interest rates and complicated loan application procedures. (Data Collection Survey on Agricultural Finance in Bangladesh, JICA, 2014). In sufficient capital investment inhibits diversification and high- value addition of agriculture.

In addition, the demand for safe agricultural and processed products controlled in quality from production to processing is increasing along with economic growth. In 2015, Bangladesh Food Safety Authority was established that has formulated regulations and standards for food safety and strengthened food inspection systems including training of food inspectors. According to interviews with 502 member companies of Bangladesh Agro-Processors' Association (BAPA), almost all of the responded 267 companies answered that they did not have sufficient knowledge on food safety and needed technical assistances (TA) (JICA survey, 2018). Promotion of food safety is to be further enhanced in Bangladesh.

Based on the above background, the Preparatory Survey (hereinafter called “the Survey”) for Food Value Chain Improvement Project (hereinafter called “the Project”) aims to formulate

an ODA loan project to tackle the major issues mentioned above. The Project will support agricultural and food processing companies by providing concessional financing through Two-Step Loan (TSL) and technical assistance about business management and improvement of food safety. It will also help Participating Financial Institution(s) (PFIs) for strengthening the loan provision system in agribusiness and food processing industries such as improvement of loan appraisal capacity and monitoring of credit capability. The Project is expected to contribute for the agribusiness and food processing industries to meet the domestic demand for high-value added products and to increase income of farmers that have business relationship with agricultural and food processing companies.

1.2. Objective of the Survey

The Survey aims to;

- review current situation and issues of agricultural finance and food value chain that includes potential demand of medium and long-term finance;
- examine detail of capacity building for enhancing the Project impact and;
- assess company size and products as the targeted beneficiaries of TSL.

In addition, the Survey also examines rationale, outline, cost, schedule, and implementation structure of the Project in order to appraise it within the Japan's Yen Loan Scheme.

2. Outline of Policy and Government Institutions Related to Agribusiness and Food Processing Industries in Bangladesh

2.1. Outline of National Policy and Policy related to Agribusiness and Food Processing Industries

The Perspective Plan of Bangladesh 2010-2021 governs the entire policy and planning in the country and its concepts are embodied in the Seventh Five Year Plan (2016-2020) and specific sector policy. With regard to agro-industry sector, in particular, concrete policy measures and action plans are formulated in Industry Policy 2016. This section reviews major agro-industry policies in terms of relevance of the Project.

2.1.1. Perspective Plan of Bangladesh 2010-2021

The Perspective Plan of Bangladesh 2010-2021 aims to become a middle-income country by 2021, the 50th anniversary of the founding of Bangladesh. It identified issues and summarized strategies in each sector such as agriculture, industry, IT, energy, transportation, urbanization, human resource development, poverty alleviation, and environment. With regard to industry sector, the plan targets to increase its average share in GDP from 17.1% during the period between 2004 and 2009 to 30% by the year 2021.

The issues and strategies related to industrialization, food security and crop sector are summarized as in the following table. As the table shows, the strategies such as diversification of export products, financial assistance for food processing SMEs, capacity building on management and technical aspects, promotion of organic fertilizer and improvement of productivity by breeding are closely related to the Project.

Table 1 Issues and Strategies related to Food Value Chain
(Extract from Perspective Plan of Bangladesh 2010-2021)

	Issues	Strategies
Industrialization	<ul style="list-style-type: none"> • The proportion of employment of manufacturing industry in entire working population is low and its location and sectors are not diversified. • The linkage with agriculture and service sector is weak. • Identify large scale manufacturing industries and strengthen the capacity of SMEs in order to compete with overseas market and imported products in domestic market. • Improve the skills of industrial 	<ul style="list-style-type: none"> • Prioritize to support SMEs that are located rural area and utilize local raw material. • <u>Upgrade the capacity of agro, livestock and fishery processing SMEs by providing financial, managerial and technical support in order to respond to growing domestic and international market.</u> • <u>As for global market, diversify export products which are concentrated on Ready Made Garments (RMG) by availing Generalized System of Preference (GSP) of Least Developed Country (LDC) status</u>

	workforce and productivity of equipment and machinery to accelerate industrialization and strengthen its foundation.	
Food Security	<ul style="list-style-type: none"> • Decrease in crop production due to natural disasters • International market price fluctuations • Failure to maintain stable domestic production • Lack of market monitoring system to control the syndication that causes food shortages and price fluctuations • Lack of income-generating activities that will improve the purchasing power of the poor 	<ul style="list-style-type: none"> • With the aim of strengthening agricultural production and ensuring food security, the goal is to eliminate food shortages by 2021 and to achieve self-sufficiency in food production and meet the nutritional needs of the people
Crop Sector	<ul style="list-style-type: none"> • Annual production of 300,000 tons of rice in preparation for population growth • Respond to increased food demand accompanying economic growth • Many producers face low selling prices due to market brokers, speculative price adjustments of large farmers in the dry season. • Large and middle scale farmers away from farming. There is no incentive to improve productivity and production because land reform is not implemented. • Wheat, legumes, cooking oil, onion, sugar, which account for about 10% of imports, need improvement. 	<ul style="list-style-type: none"> • Sustained self-sufficiency in rice production • Diversify crops with agro-ecological zoning information provision system to identify suitable areas for different crops • Prioritize coastal, Sylhet and northern poor areas • Promote balanced and recommended the use of chemical fertilizers, organic fertilizers, soil guides and soil testing facilities • Productivity improved by variety improvement • Correcting the yield gap by improving farming technology • Increase storage capacity of rice and fresh food up to 50,000 tons by 2015 and 1 million tons by 2021 • Reducing dependence on brokers through joint sales by establishing cooperatives

Source: Bangladesh government (2012) Perspective Plan of Bangladesh 2010-2021

2.1.2. Seventh Five Year Plan, (FY2016-FY2020)

The Seventh Five Year Plan (FY2016-FY2020) which is based on the Perspective Plan of Bangladesh 2010-2021 sets the goal of the average GDP growth rate as 7.4% during the planned period. The proportion of investment to GDP in 2020 is targeted at 34.4% (5% higher than the one in 2015) and manufacturing industry's share in GDP is targeted at 21%. In addition, the above plan targets to generate 12.9 million employment opportunities during the period. To achieve the target, it emphasizes the manufacturing sectors and such as export expansion by diversification of manufacturing products in addition to RMG, strengthening SME finance, upgrade skills of industrial workforce for responding to market needs, and promoting private sector participation to development of economic zones and infrastructure facilities. Agribusiness and food processing industry is expected to achieve high growth, in addition to IT, pharmaceutical, and shipbuilding

industries to realize the goals and targets. Furthermore, the plan aims structural transformation to increase the share of secondary sector (mainly mining and industry) and service sector as well as to modernize and diversify primary sector (mostly agriculture) which has the largest workforce.

The above plan is closely related to the Project in terms of export expansion by diversification of manufacturing products other than RMG, strengthening of SME finance, upgrading of industrial workforce and supply chain optimization for agricultural products.

The promotion strategies of crop sub-sector is summarized in the following table.

Table 2 Crop Sub-Sector Promotion Strategies (Extract from the Seventh Five Year Plan)

<ul style="list-style-type: none"> • Creating opportunity for sustainable agriculture • Application of scientific technology for high level of food production • Agriculture research • Crop zone and land utility plan • <u>Agricultural input, seed, fertilizer</u> • <u>Promotion of precision farming</u> • <u>Promotion of agricultural diversification and increase of horticultural crops</u> • Effective use of water resource • <u>Introduction of GAP</u> • <u>Agricultural mechanization</u> • <u>Strengthening of food processing industry</u> 	<ul style="list-style-type: none"> • <u>Value chain development (Utilization of Supply Chain Rationalization Project for such as vegetable, fruits and aromatic rice supported by the Ministry of Agriculture)</u> • <u>Agriculture finance</u> • <u>Agriculture extension</u> • Women mainstreaming in agriculture • Agriculture in coastal and marine islands • Seaweed as food and disease control • <u>Crop disease control</u> • <u>Biological plague protection</u> • Weather forecast based on technology • Rural human resource development
---	---

Source: Government of Bangladesh(2015) Seventh Five Year Plan (FY2016-FY2020)

2.1.3. Industry Policy 2016

Industry Policy is formulated by the Ministry of Industries (MoInd) and it is subject to renewal every five years. Industry Policy 2016 is the guiding principle for industry promotion during the period between 2016 and 2020. The policy sets specific targets of increasing industry sector’s share in GDP from 29% to 40% and manufacturing sector’s share in GDP from 18% to 25% in addition to the other goals including generating employment, achieving inclusive economic development. Moreover, the policy aims to increase export by diversification of products except RMG and by strengthening production capacity, and enhance women’s engagement in industry sector.

The policy prioritizes six industries: agribusiness and food processing, garment, ICT and software, pharmaceutical, and leather and jute industries. The policy emphasizes balanced development and industrialization in regions in the country that is to be implemented by the coordination among government agencies and private sector.

The policy measures related to agribusiness and food processing industries is summarized in the table below. It has close relation with the Project in terms of promoting business

management system and food safety standard through Food Safety Management System (FSMS) and ISO22000, strengthening value chain through certification such as Good Agricultural Practice (GAP) as well as the above mentioned export diversification.

Table 3 Policy Measures related to Agribusiness and Food Processing Industries
under Industry Policy 2016

Category	Action Plan	Implementing Agency
Nurturing Local Industries	<ul style="list-style-type: none"> Establish agricultural processing centers in all over Bangladesh. Provide technical support for agricultural processing industries. 	Ministry of Agriculture
Food Safety	<ul style="list-style-type: none"> <u>Formulate program and provide training of FSMS and ISO 22000-2005</u> <u>Establish safety quality standard in production process, which conforms with international standard</u> 	Bangladesh Standard and Testing Institute (BSTI), Ministry of Industries (MoInd), Ministry of Commerce (MOC), Small and Medium Enterprise Foundation (SMEF), Federation of Bangladesh Chamber of Commerce (FBCCI)
Quality Improvement	<ul style="list-style-type: none"> Support nurturing commercial agribusiness <u>Promote GAP certification and strengthen value chain</u> 	Ministry of Agriculture
Export Marketing	<ul style="list-style-type: none"> <u>Identify potential export markets and formulate program for market penetration</u> 	MOC, Export Promotion Bureau (EPB)

Source: MoInd, Industry Policy 2016

Under Industry Policy 2016, the size of manufacturing companies is defined as in the following table.

Table 4 Definition of Company Size according to Industrial Policy 2016
(Manufacturing Industry)

	Definition of Company Size ⁷	
	Existing Investment Amount ⁸	Number of Employees
Large Industry	More than BDT 500 million	More than 300
Medium Industry	BDT 150 - 500 million	121~300
Small Industry	BDT 7.5 - 150 million	31~120
Micro Industry	BDT 1.0 - 7.5 million	16~30
Cottage Industry	Less than BDT 1 million	Less than 16

Source: The Survey Team based on Industry Policy 2016

2.1.4. SME Policy 2019

SME Policy 2019 was officially approved by the Bangladeshi Cabinet in September 2019. It aims to formulate concrete SME promotion plan by updating “SME Promotion Strategy” which took effect in 2005. The implementation period of the above policy is from 2019 to 2024.

In Bangladesh, there are 7.8 million Micro, Small and Medium Enterprises (MSMEs) and the policy sets a target to increase their contribution in GDP from 25% in 2018 to 32% in 2024. With a view to achieving such target, the following six strategies are proposed:

1. Access to Finance
2. Access to Technology and Innovation
3. Access to Market
4. Access to Education and Training
5. Access to Business Support Service
6. Access to Information

The implementation strategies and major policy measures/action plans for the above strategies are summarized in the following table.

⁷ The company size is defined by either of the condition for existing investment amount or number of employees. If the company size definition is different between the former and the latter, larger size definition shall be applied.

⁸ “Existing investment amount” means that “Fixed asset amount excluding land and building (prevailing value)” and its concept is different from that of capital.

Table 5 Implementation Strategies and Action Plans in SME Policy 2019

	Implementation Strategies	Major Policy Measures/ Action Plans
1	Improving business environment and institutional framework	<ul style="list-style-type: none"> - Simplify business registration and licensing processes - Tax incentive for export oriented MSMEs - Strengthen and restructure BSCIC and SMEF
2	Increasing institutional funding facility	<ul style="list-style-type: none"> - Launch Credit Guarantee Scheme - Expand refinancing scheme, venture capital, Credit Wholesaling Programs, etc.
3	Increase competitiveness and access to SME products market	<ul style="list-style-type: none"> - Provide quality control, standard of testing, business management, product management, technical skills and capacity building for SME managers and workers - Support SME participation in trade fair and trade missions
4	SME business support services to the start-ups	<ul style="list-style-type: none"> - Establish on line based one stop service - Provide information service by Advisory Service Centre - Create SME website
5	Development of SME Cluster Business Network	<ul style="list-style-type: none"> - Improve infrastructure for SME clusters in industrial estates - Establish Incubation Centre - Provide collateral free single digit interest rate loans for potential women entrepreneurs
6	Increase the use of ICT and other technologies	<ul style="list-style-type: none"> - Provide essential ICT support - Disseminate environment friendly and energy saving technologies - Promote innovation by new technology
7	Development of education and training programs for entrepreneurs	<ul style="list-style-type: none"> - Develop standard training module and curriculum - Enhance capacity of educational training institutes - Develop on line training contents
8	Expansion of women entrepreneur development programs and services	<ul style="list-style-type: none"> - Develop special program for enhancement of women entrepreneurs - Develop special financing program for women entrepreneurs - Launch Women Entrepreneur Development Fund
9	Support backward and forward linkages with large industries and introduce standards and quality of SMEs products	<ul style="list-style-type: none"> - Offer special incentives to large industry - Support SMEs to get internationally accredited certificates as ISO - Simplify Mark License, Patent, Design & Trademarks certificates to SMEs
10	Develop capacity of establishing environmentally friendly industries and industrial waste management	<ul style="list-style-type: none"> - Awareness building for environment friendly SME industries - Promotion and development of environment friendly industrial technology - Incentives and training for capacity building of SME industrial waste management

Source: The Survey Team based on SME Policy 2019

2.1.5. Agro-food Processing Industry Promotion Policy 2020 (5th Draft)

Taking into account the importance of agricultural sector in Bangladesh, MoInd has

drafted the Agro-Processing Industry Promotion Policy that aims to promote agro-processing industry to accelerate economic growth by deepening linkages between industry and agriculture.

As of December 2020, MoInd has prepared the final draft and it is expected to be approved by the Cabinet by the first quarter of 2021, after going through the processes of Inter-Ministrial meeting and Industry Minister's approval.

It sets the following vision, mission and policy goals:

<Vision>

To make Bangladesh one of the most preferred manufacturing hub for agro food processing industries in Asia

<Mission>

Provide appropriate infrastructure and enabling manufacturing environment for steady growth and active participation in global value chain of agro food processing industry of Bangladesh through capacity development, technology transfer and accelerated investment in this sector.

<Policy Goals>

- During the policy implementation period (2020-2025), the food processing industry will be expanded and diversified towards making Bangladesh a regional food production and distribution hub, with particular emphasis on haral brand.
- Greater initiatives on total factor productivity (TFP) growth will be undertaken to strengthen the competitiveness of the industry.
- These include upgrading human resource and technology, enhancing R&D, undertaking the production and export of high value-added and niche products, and adopting attractive packages for the entrepreneurs.

The specific targets of the policy are mentioned as follows:

- (i) Attract new investments worth 5 billion US dollar in the sector by 2025;
- (ii) Create 100,000 additional employment opportunities in the sector by 2025;
- (iii) Enhance Agro-food sector's contribution in GDP from existing 2% to 4% by 2025 through better utilization and value addition of agricultural products;
- (iv) Undertake and accomplish minimum eight capacity building projects minimum 8 by BSCIC and BSFIC (at least one in each Division) to enhance competitiveness of food processing industry in both domestic and international markets by 2025.

In order to meet the above targets, the following 12 strategies are set:

- 1) Ensure the availability of the supply of raw materials;
- 2) Expand and diversifying food processing activities and promoting balanced growth of the targeted areas;
- 3) Enhance sectoral linkages and support services;
- 4) Intensify innovation and R&D;
- 5) Boost competitiveness for the steady increase of the export of Bangladeshi food products in regional and international markets;
- 6) Strengthen human resource development (HRD);
- 7) Reinforce institutional support and delivery system for the further development and promotion of the industry;
- 8) Facilitate modernization and expansion of existing food processing units;
- 9) Ensure rapid infrastructure development;
- 10) Prioritize local manufacturing
- 11) Confirm institutional framework for business development services
- 12) Ensure environmental friendly green management development activities

For the purpose of implementing the policy, the Government is expected to provide fiscal incentive including capital subsidy, interest subsidy, and various types of tax incentives. In addition, GoB is also considering to provide marketing assistance, development of Agro-Food Technology Park and commodity based cluster.

2.1.6. National Agricultural Policy (2018)

According to the latest 2018 version of National Agricultural Policy, which is subject to be updated in every five years, the problems surrounding agriculture are pointed out as such: 1) low productivity; 2) insufficient agricultural finance and infrastructure; 3) insufficient management capacity of agricultural marketing; 4) post harvest losses; 5) shortage of preservation capacity of agricultural products; 6) soil contamination due to usage of chemical fertilizer, and so on. The policy aims to realize safe, profitable and sustainable agriculture by : a) increase of productivity, production capacity and farmers' income; b) diversification of agricultural products; c) production of nutritious and safe food; d) improvement of marketing capacity; e) commercialization of agriculture; and f) appropriate utilization of agricultural resources.

In addition, the plan specifies the following actions which are closely related to the Project:

- To conduct training for farmers to disseminate Good Agricultural Practice (GAP) by introducing its standard in order to increase awareness of safe food production;
- To prioritize increase of added value for agricultural products value chain in order to assure appropriate market price and supply;
- To promote modern and high value added public and private sectors, in particular, usage of packaging and related facilities;
- To promote farmers to produce high quality export products through such means as GAP, organic cultivation, packaging and quality grading; and
- To initiate loan program for preservation of food with a view to assuring appropriate price of agricultural products.

2.1.7. National Food and Nutrition Security Policy (NFNSP)

The Food Planning and Monitoring Committee (FPMC)⁹ had prepared the draft of Food and Nutrition Security Policy (NFNSP), and the policy was approved by the Cabinet in 2020. As of December 2020, the committee is drafting action plan and Country Investment Plan (CIP) based on the policy.

In the normal practice, it takes two years to formulate a policy and make an action plan respectively, however, with the support from the Meeting the Under-nutrition Challenge (MUCH) which is financed by the United States Agency for International Development (USAID) and EU (European Union), the policy was formulated within a year. Likewise, the action plan is also expected to be prepared within a year. The outline of the NFNSP is as below.

- 1) Vision: All people of Bangladesh will attain food and nutrition security needed for a healthy and active life.
- 2) Goal: The goal of the National Food and Nutrition Security Policy of Bangladesh (NFNSP) is to improve the food and nutrition security status to the level needed to achieve the Food and Nutrition Security (FNS)-relevant SDG targets and fulfil related national and international commitments by 2030.
- 3) Objectives: The following five objectives have been identified for NFNSP.
 - a. To ensure availability of safe and nutritious food for healthy diets
 - b. To improve access to safe and nutritious food at an affordable price

⁹ The committee is chaired by the Ministry of Food and other relevant ministries as MoInd, MOA, MOC, Ministry of Health, Ministry of Fishery, and Ministry of Livestock are involved. The Food Planning and Monitoring Unit (FPMU) is the Secretariat of the committee.

- c. To enhance the consumption and utilization of healthy and diversified diets for achieving nutrition improvements
- d. To increase access to nutrition-sensitive social protection and safety nets across life cycle with a focus on vulnerable groups and regions
- e. To strengthen cross-sectoral food and nutrition security governance, coordination, capacity building and partnership for effective policy implementation

As the strategy for the above Objective b, NFNSP includes the supports for private food processing industries as follows (the underlined strategies are closely related to the Project):

- (Strategy 2.2 Improve value chain and marketing systems) Safe and nutrition-sensitive product development is the key to establish nutrition-sensitive food systems. NFNSP will strengthen the capacity of agro-processing entrepreneurs or those aspiring to join the sector by supporting improvements of their technical, managerial and business skills. Tailored training can be provided to the most vulnerable groups with the skills that can help them find employment opportunities in Small and Medium Enterprises (SMEs). The private sector food market chain involves hundreds of thousands of millers, wholesalers, and small traders who buy, process, store, transport and sell food throughout the country. Modern and nutrition-sensitive collection, milling, polishing, sorting, cleaning, packaging and preservation techniques will be promoted to cater both the domestic and export market demand
- (Strategy 2.3 Preserve/enhance nutrient content along the value chain) Build the capacity of the private sector to:
 - a. Carry-out effective participation and engagement with producers, distributors, marketers and retailers for testing food safety and recall management
 - b. Develop localized laboratories to examine compliance with food safety standards and effectively communicate the results with stakeholders

2.2. Implementation Structure and Roles of Government Agencies for Agribusiness and Food Processing Industries

Several government agencies, such as the Ministry of Industries and the Ministry of Agriculture have jurisdiction over the agribusiness and food processing industries in Bangladesh. This section describes the implementation structure and the roles of these government agencies.

2.2.1. Ministry of Industries: MoInd

In order to make Bangladesh an industrially developed middle income country, the Ministry of Industries (MoInd) has a mission to accelerate industrialization through formulating appropriate industrial policy, reformulating and renewing state-owned enterprises, developing SMEs, micro and cottage industries, protecting standards of products and intellectual property rights, and enhancing productivity. For achieving the mission, the MoInd has following functions¹⁰.

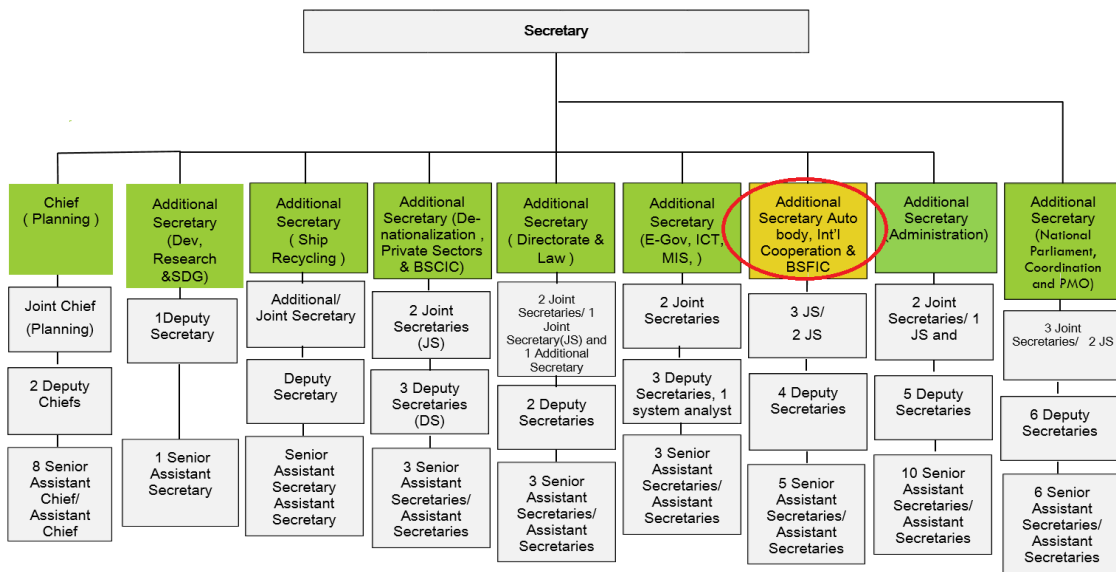
- Formulating, implementing, monitoring and updating of appropriate industrial policy
- Providing services for registering patent, design and trademarks and strengthening activities in protecting intellectual property
- Developing small, micro & cottage industries
- Determining and harmonizing national standards in consistent with the international standards of commodities and services
- Standardization, examination and certification of products
- Establishing, developing and regulating Eco-friendly and safe industrial infrastructure
- Keep continuing production of salt, sugar, fertilizer and other commodities
- Fortifying edible oil with vitamin A
- Providing policy support and other assistance to the development of ship building and ship recycling industries
- Enhancing productivity through providing training support to entrepreneurs on industrial management and technical know-how
- Generating employment opportunities through accelerating industrialization in public and private sector and joint ventures
- Inquiring into the reason of non-profitability of state owned enterprises and conduct research on the unsuccessful ventures both in public and private sector
- Improving overall management of state-owned enterprises

As mentioned above, MoInd is the government agency responsible for overall industrial policies. In particular, MoInd places emphasis on the food processing industry from the viewpoint of industrial diversification and promotion of exports, and it has been focusing on the promotion of the industry by drafting agribusiness and food processing policy. Therefore, MoInd has been

¹⁰ Website of the Ministry of Industries (<https://moind.portal.gov.bd/site/page/11aba03e-96b3-496b-a912-abc71adbca35/Vision-&-Mission>)

appointed as the sponsoring ministry of the Project by the Prime Minister's Office.

The organogram of MoInd is as follows (as of the end of December 2019). The Secretary will be the responsible person of the Project, and the International Cooperation Bureau shown in the figure below will be the department in charge. The International Cooperation Bureau has some posts including an Additional Secretary, a Joint Secretary, a Deputy Secretary and a Senior Assistant Secretary. At the end of December 2019, no person was assigned for the Deputy Secretary position.



Source: The Ministry of Industries

Figure 1 Organogram of the Ministry of Industries

In and under MoInd, there are following department, corporation, board, and foundation in the Table 8. Department/institutes are directly overseen by MoInd as its internal organizations. Corporation and Foundation are external institutions under MoInd. Corporation was established by the Act of Parliament and foundation was formulated under the Company Act. BAB, board, is an autonomous government agency established by Act of Parliament, which is closely working with MoInd.

Table 6 Organizations under the Ministry of Industries

Department/ Institutes	Bangladesh Standards and Testing Institution (BSTI) Bangladesh Industrial and Technical Assistance Center (BITAC) Bangladesh Institute of Management (BIM) Department of Patents, Designs and Trademarks (DPDT) National Productivity Organization (NPO) Office of the Chief Inspector of Boilers (Boilers)
Corporation	Bangladesh Chemical Industries Corporation (BCIC) Bangladesh Sugar and Food Industries Corporation (BFSIC) Bangladesh Steel and Engineering Corporation (BSEC) Bangladesh Small and Cottage Industry Corporation (BSCIC)
Board	Bangladesh Accreditation Board (BAB)
Foundation	Small and Medium Enterprise Foundation (SMEF)

Source: Website of the Ministry of Industries

Among the above organizations, the Small and Medium Enterprise Foundation (SMEF) and the Bangladesh Small & Cottage Industry Corporation (BSCIC) are expected to play important roles in promotion and capacity building for the end-borrowers in the Project. The outline of the organizations is explained in the following section.

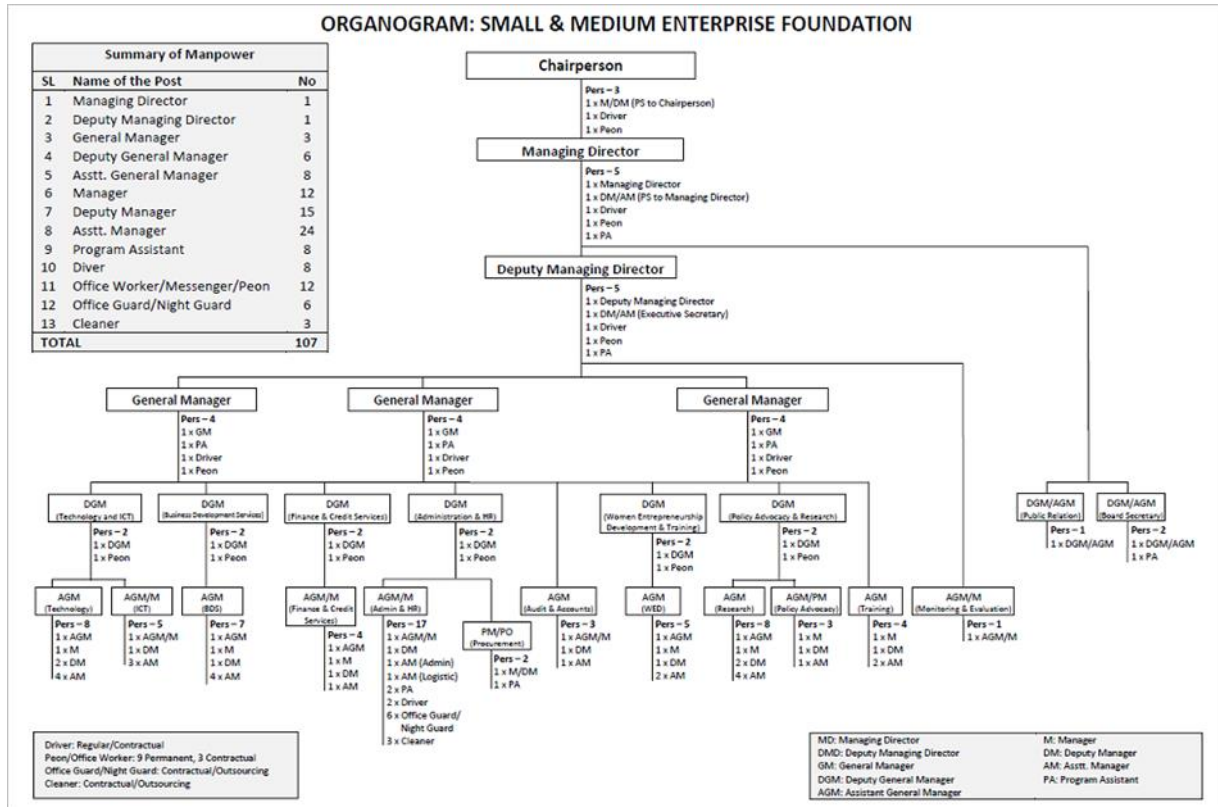
(1) Small and Medium Enterprise Foundation (SMEF)

1) Overview of the organization

SMEF was established by the Government of Bangladesh as the platform for planning, development, financing, awareness raising, evaluation and support services for the SME promotion, which is a key element of poverty alleviation in the medium to long term. SMEF has been seeking to provide the one-window support for SMEs' capacity development (SME Policy Strategies 2005). SMEF was registered with the Ministry of Commerce in 2006 and is an independent non-profit organization established by the MoInd with the support of the Government of Bangladesh and the Asian Development Bank (ADB) under the Company Act (Act XXVIII). SMEF has implemented various programs to promote SMEs in Bangladesh and has a role in supporting SME entrepreneurs, including female entrepreneurs.

2) Organizational structure (organogram, resource and budget)

The organogram of SMEF is as below.



Source: SMEF

Figure 2 Organogram of SMEF

- a. Budget for 107 employees has been approved (however, as of the end of 2018, SMEF has 62 employees, 44 officers and 18 staff members)
- b. The board of directors has 14 members (five government agencies, the remaining nine members are from industry associations, private companies, NGOs (Non-Governmental Organizations), universities, and etc.). The SMEF's Chairperson heads the board of directors, but the Managing Director is responsible for the foundation's operation. As of November 2019, the Managing Director has experiences as Additional Secretary in some agencies including the Ministry of Cultural Affairs, Ministry of Public Affairs, Cabinet Division, Local Government Division and the District Commissioner of Mymensing and Patuakhali.
- c. Revenue: BDT 228,837,413 (2018), Expenditure: BDT 200,159,014 (2018), Total Assets: BDT 3,774,412,798 (2018) (all figures are based on the audit report of March 2019)

3) Activities

- SME Advisory Service Center: Offering financing support for SMEs and entrepreneurs (e.g. providing guidelines for creating business plans and templates for business plans, sharing financing information, supporting for business launch, marketing, and various regulatory procedures necessary for business).
- SME Award: Awards are given to entrepreneurs at the micro, small, and medium-sized levels, both genders for each level and total of six people.
- Credit Wholesaling Program (CWS): It provides SMEs in specific clusters and sectors (such as agriculture and technology manufacturing) with loans with low-interest (single-digit) and no collateral through PFIs (banks and non-banks). It prioritizes small entrepreneurs outside of Dhaka and female entrepreneurs. According to the beneficiary list with 1,573 disbursements as of December 2018, the PFIs include MIDAS, IDLC, Mutual Trust Bank, NCC Bank and Dhaka Bank. The financing sectors in the list are mainly light industries such as light engineering, women entrepreneurs, clothing, crafts, electricity, plastic products, and jute products and there are four food-related companies with the sector of women entrepreneurs. According to interviews with SMEF, the non-performing loan ratio (NPL) of the program is less than 1% (10-15% for general financial institutions). The reason why NPL is low can be assumed that SMEF provides capacity building for target clusters before financing and introduce the upgraded companies to the PFIs, which conduct loan appraisal, afterwards.
- Capacity building: Human Resource Development (HRD) wing, which has five staff members, is the department responsible for the overall training programs for SMEs, and the department is responsible for the design and implementation of training programs. Apart from the department, the Financial Credit System, which has seven to eight staff members, supports improvement of financial access, and the Technology Development Wing, which has three engineers, is responsible for food safety. SMEF provides more than 100 training programs, including their ready-made training programs, generic training. About half of such training programs are designed by SMEF based on requests, tailor-made training, and provided to members of industry associations such as the Bangladesh Agro-Processors' Association (BAPA).
SMEF also dispatches resource persons (more than 200 people nationwide) to the training destinations for training assessment and design. The specific training programs are as follows.

- Entrepreneurship development and management leadership (e.g. business planning, marketing, business development and financial planning, and marketing management)
- Cluster based skill development program (e.g. food preparation and processing, food preservation and marketing)
- Technology development programs (e.g. hands on training on heat treatment and on material selection)
- Techniques of productivity improvement (e.g. productivity diagnosis, 5S, value-added productivity and waste minimization)

Table 7 Training programs by SMEF

Entrepreneurship development & Management leadership	<ul style="list-style-type: none"> (a) Entrepreneurship Development (b) New Business Creation (c) Develop Competitive Business Plan (d) Preparation of Project Profile and Project Appraisal (e) Improvement of Productivity (f) Marketing Management (g) Business Development and Financial Planning
Cluster based skill development program	<ul style="list-style-type: none"> (a) Food Preparation and Processing (b) Leather Products Production & Marketing (c) Bamboo Products Production & Marketing (d) Fashion Design & Dress making (e) Basic Beautification (f) Jute Products Production & Marketing (g) Artificial Jewellery & Pottery (h) Food Preservation & Marketing (i) Fast Food Production & Marketing (j) Screen Printing (k) Handicrafts etc.
Technology Development Program	<ul style="list-style-type: none"> (a) Hands on Training on Heat Treatment (b) Hands on Training on Welding & Cutting (c) Hands on Training on Surface Treatment (d) ICT in business communication (e) Hands on Training on Material selection.

Techniques of Productivity Improvement	<ul style="list-style-type: none"> (a) Basic concept of productivity (b) Productivity by objectives (c) Tools of motivation of productivity improvement (d) Productivity diagnosis (e) 5s: Japanese tools of productivity improvement (f) Green productivity (g) value added productivity (h) Gain-sharing of productivity (i) Total Quality management (j) Waste minimization
--	--

Source: Website of SMEF

- **Business Plan Competition:** A business competition was held in 2013 for SMEs nationwide.
- **Cluster Development:** SMEF took an initiative to organize 177 clusters nationwide from FY2011 to FY2012, and created a cluster map, which selected eight priority clusters (e.g. bread and confectionery, and coconut oil for foods). Five additional clusters, such as fibers, were selected afterward.
- **FSFO (FSMS) for ISO 22000: 2005):** SMEF holds this training every year for the purpose of implementing FSMS, and five days of classroom training has been provided to about 70 companies. SMEF also conducts hands-on training, with a training period of three to six months and training days (the number of days that consultants visit a company's factory) is about 15 days. 13 companies obtained the certification of ISO 22000: 2005 after taking the hands-on training among the companies that took the training.

SMEF hires the FSMS consultants from outside on a part-time contract and currently employs four consultants. The above-mentioned Technology Development Wing is in charge of the operation of this training. According to SMEF, ISO22000: 2005 certification bodies in Bangladesh include Intertek, SGS, Bureau Veritas, QCS Management Pvt Ltd., Bangladesh Accreditation Board (BAB), Bangladesh Standards and Testing Institution (BSTI), and others. The specific program is as below.

Table 8 Program of FSFO

1	Awareness: Aware our SMEs about ISO22000: 2005
2	Advertisement: Paper, SMEF website, letter to Association
3	Application collection
4	Applicant's factory visit
5	Selection of SMEs
6	Select a Food Safety Team Leader (FSTL) from selected SME

7	Arrange Professional development training for FSTLs & Certificate giving
8	Appoint Consultant for SMEs
9	Implementation of FSMS in SMEs (gap analysis, recommendation, documentation, training, record keeping etc.)
10	Audit by third party
11	Certification

Source: SMEF

- SME Fair: SMEF provides marketing opportunities with SMEs through fairs held at national and regional levels. There are also exhibitions of food and agriculture products.

(2) Bangladesh Small & Cottage Industry Corporation (BSCIC)

1) Organizational structure

BSCIC was founded in 1957 and aims to promote SMEs and cottage industries under MoInd. BSCIC has the following missions¹¹.

- Provide technical and administrative support to businesses and communities to improve productivity, quality and the environment
- Pursue economic development and promote strategic alliances with customers and national and international specialized agencies
- Create a workplace that encourages creativity, innovation, professional growth and positive value
- Instill the concept of a learning organization in SMEs, promote export orientation, and share the rewards of their efforts with communities, customers, employees, suppliers, managers and shareholders

To achieve the above missions, BSCIC plays the following roles.

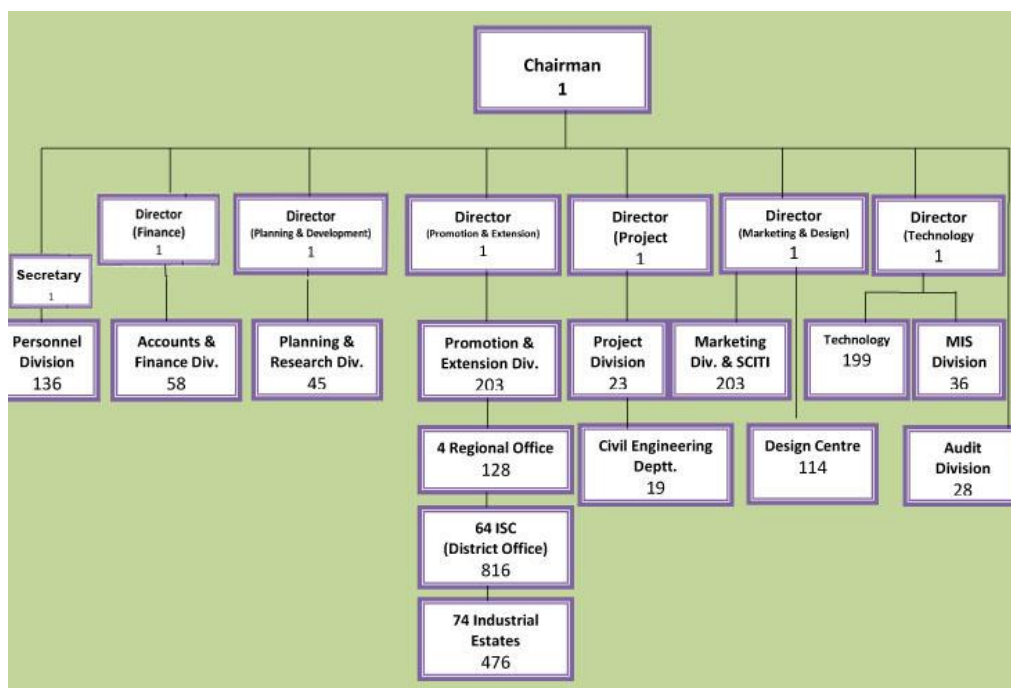
- ✓ Provide information to companies (industrial trends, marketing, design, production technology, IT, etc.)
- ✓ Provide opportunities for consultation to companies (investment, credit provision, utilities, etc.)
- ✓ Provide training to companies (entrepreneur development, technical skills improvement, etc.)

¹¹

http://bscic.portal.gov.bd/sites/default/files/files/bscic.portal.gov.bd/page/7f53a44c_94be_45ee_a419_2c1360ef90bc/Mission%20%26%20Vision_F.pdf

In addition to the head office in Dhaka, BSCIC has four regional offices, 64 district offices and 74 industrial estates. There are about 2,500 employees in BSCIC and staffing is prioritized in the district offices. The district offices have 816 employees and industrial estates have 476 employees respectively. The organogram of BSCIC is illustrated in the following figure.

The board has eight members. Two Additional Secretaries are assigned as the chairman and the director in charge of the planning respectively. Four Joint Secretaries, one Deputy Secretary, and one Corporate Secretary are assigned as other directors' positions.



Source: Website of BSCIC

Figure 3 Organogram of BSCIC

2) Activities

➤ Capacity building

BSCIC provides training for companies to develop entrepreneurship and other skills. The Small and Cottage Industries Training Institute (SCITI) and 15 Skill Development Centers (SDC) under BSCIC are the providers of the training programs. SCITI, which is mainly responsible for business management such as financial management and marketing, has six faculties, namely Entrepreneurship Development Faculty, General Management Faculty, Industrial Management Faculty, Financial Management Faculty, Marketing Management Faculty and Research and Consultancy Faculty. The training program by the organization is as

follows. SDC, on the other hand, supports the companies for more practical assistance, such as installing indoor wiring and computers.

Table 9 Training programs by SCITI

Entrepreneurship Development Faculty	ED-01: Entrepreneurship Development for New Business Creation ED-02: Innovation & Entrepreneurship Development For SMEs ED-03: To Establish Small Industry/Business Profitable ED-04: Women Entrepreneurship Development ED-05: Any Other Course on request by Stake Holder
General Management Faculty	GM-01: Office Management GM-02: Human Resource Management GM-03: Human Resource Management & Social Compliance GM-04: Management Information System (MIS) GM-05: Any Other Course on request by Stake Holder ED-06: Any Other Course on request by Stake Holder
Industrial Management Faculty	IM-01: Industrial Management & Industrial Plan Preparation IM-02: Industrial Management & Compliance IM-03: Production Management and Product Development & Design IM-04: Quality Management & Productivity Improvement IM-05: Cottage Industries Management ED-06: Any Other Course on request by Stake Holder
Financial Management Faculty	FM-01: Book-Keeping and Accounting FM-02: Small & Medium Industries Financing FM-03: Financial Management FM-04: Product Costing & Pricing FM-04: Cost Reduction Techniques FM-05: Any Other Course on request by Stake Holder
Marketing Management Faculty	MM-01: Export Marketing MM-02: Branding & Sales Techniques in a Competitive Market MM-03: Marketing Management, Sales Promotion & Marketing Plan Preparation MM-04: Searching Product Market and Techniques of Enhancing Sales MM-05: Any Other Course on request by Stake Holder
Research and Consultancy Faculty	RC-01: Publish Study Reports on Growth Potential, Sectoral and Sub-sectoral and Area Potential Studies including basic research RC-02: Organize Seminars and Workshops as and when offered RC-03: Undertake Consultancy works as and when Offered. ED-04: Assist other Faculties in Developing curricula, training manuals and designing courses. ED-05: Publish Periodicals and Annual Reports on SCITI's

	<p>Activities.</p> <p>ED-06: Evaluation of Training Courses on their Completion</p> <p>ED-07: Coordinate Meetings of the Advisory council</p> <p>ED-08: Coordinate Meetings of the curriculum development committee</p> <p>ED-09: Prepare MIS report of the SCITI</p>
--	---

Source: Website of SCITI

- Supporting corporate activities by developing industrial estates in rural areas

The 74 industrial estates (industrial parks) are almost uniformly distributed throughout the country as the figure below and have a comprehensive network covering local areas.



Source: Website of BSCIC

Figure 4 Industrial estates of BSCIC

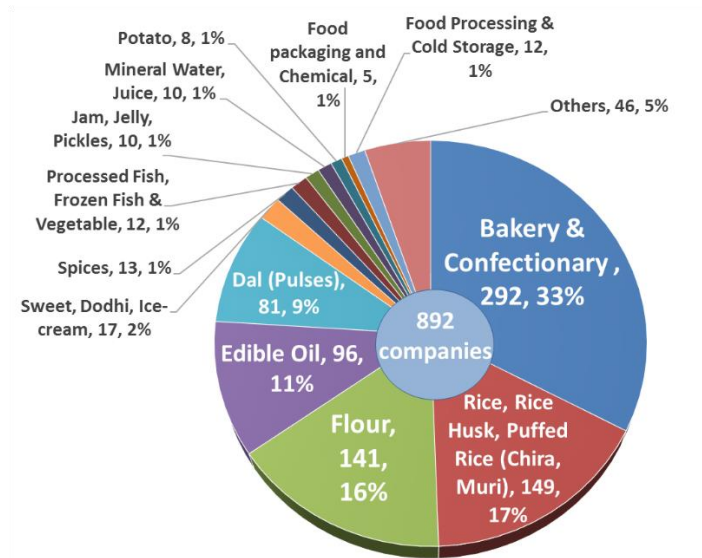
Not only cottage and small companies but also large companies such as PRAN, a major food processing company in Bangladesh, have plots in the industrial estates. According to the information obtained from BSCIC in December 2019, total 10,000 plots in the industrial estates were allocated to 5,883 companies. The breakdown by region is that there were 2,830 plots in Dhaka district, 1,323 plots in Chattogram district, 1,004 plots in Rashahi district and 726 plots in Khulna district. The total investment amount by the tenant companies is approximately BDT 174 billion (as of 2012-13)¹².

Among the total tenants, there are 1,580 agribusiness and food processing related companies, including organic fertilizers and agricultural machinery-related companies. The breakdown by region is 389 in Dhaka district, 463 in Chattogram district, 500 in Rajshahi district and 228 in Khulna district. For food processing industry, there are about 1,000 companies. Although BSCIC does not have formal statistics on the sizes of the companies, according to the person in charge of the industrial estates in BSCIC, 99% of the tenant companies belongs to small industries and only the remaining 1% is medium and large industries, and micro and cottage industries are not in the estates.

The figure below shows the percentage of food processing companies by product. Bakery and confectionery accounts for 33%, followed by rice-related processed products, wheat-related processed products, and edible oils.

BSCIC has provided plots to companies after improving the infrastructure environment within the estates, and provides resident companies with utility connection services such as water and electricity.

¹² BSCIC at a Glance, http://bscic.portal.gov.bd/sites/default/files/files/bscic.portal.gov.bd/page/bb219bc8_9e6f_4e36_81a1_2cbf8b20d415/BSCI%20at%20a%20glance2.pdf



Note: According to BSCIC, there are about 1,000 food processing companies in the industrial estates. But the number of the companies based on the obtained information from BSCIC is 892, so the above figure is based on the number.

Source: The Survey Team based on documents from BSCIC

Figure 5 Breakdown of companies (agribusiness and food processing industries) in industrial estates of BSCIC

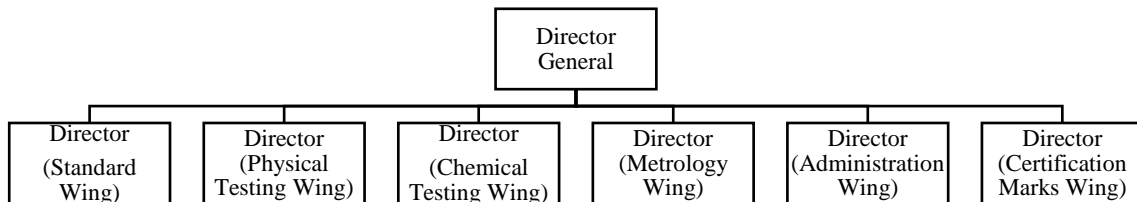
(3) Bangladesh Standards and Testing Institution (BSTI)

BSTI (Bangladesh Standard and Testing Institution) was established in 1985 by the merger of Bangladesh Standards Institution and Central Testing Laboratories. BSTI formulates standards, conducts inspections and provides certifications in the form of the BSTI mark, for various kinds of products such as agricultural and food products, chemical products, electrical and electronic equipment, hemp and textile products, and machines that are manufactured, distributed and consumed in Bangladesh.

For example, BSTI has developed more than 4,200 standards for various products such as clay bricks for buildings and laundry soaps, and about half of them are consistent with international standards. The BSTI's standards include product certification standards for 181 items. Among them, 72 items are for agriculture and food products. Only certified products can have the BSTI mark. The processes to receive the BSTI certification are: 1) preparation and submission of application documents, 2) inspection of production sites, 3) laboratory test using samples, 4) evaluation of the test result, 5) evaluation by the certification committee, and 6) approval by BSTI managers. BSTI conducts on-site inspection and analyzes products in their own

laboratories. It has the authority to grant the necessary certifications for selling the products including food products.

The below figure is the organogram of BSTI. The Standard Wing sets standards and the Certification Marks Wing is responsible for product certification.



Source: BSTI

Figure 6 Organogram of BSTI

Standards regulated by BSTI and some issues to be addressed

As mentioned above, BSTI has established standards for 72 agriculture and food product items¹³. Those items are required to meet the standards and attach the BSTI mark on products when they are sold in domestic market. According to interviews with food processing companies and others, it takes around six months to one year or more for BSTI to conduct laboratory test, especially when acquiring licenses (certifications) for new products because the number of laboratories is limited. Such a long process sometimes make the timing of companies’ product launch to the market delayed significantly. Therefore, it is necessary to improve the mark licensing processes.

The certification issued by BSTI should be renewed every three years. According to the interviews with BSTI, although it is mandate to conduct audits at least twice a year, the audits are being selectively conducted for companies with high-risk due to limited audit capacity in BSTI. BSTI also stipulates penalties such as fines for companies which violate rules and regulations. In 2018, 1,873 audits were conducted, of which 1,323 were cases instituted in mobile courts and surveillance team, and 948 were cases disposed in mobile courts and surveillance team. As there are many cases of violations, it is necessary to enhance BSTI’s monitoring capacity and awareness of compliance for corporates side¹⁴.

In addition to these product certifications, BSTI has stipulated ‘*the Code of Hygienic*

¹³ The items includes mustard oil, refined sugar, semolina flour, bread, biscuits, macaroni, canned and bottled fruits and fruit squash.

¹⁴ According to BSTI, the reasons for the many violations are regarded as: (1) lack of knowledge and interest in domestic laws, and (2) not wanting to pay license fees.

Conditions for Food Processing Unit’ based on Codex Standards¹⁵ for hygiene in food manufacturing sites. However, the content regarding the sanitation of food facilities is limited to general provision such as ease to clean and the specific concept of sanitary design is not specified.

As for global trends, the European Hygienic Engineering & Design Group (EHEDG) is aiming to publish a draft of a specific standard (guidelines) by 2021 for sanitary design, which is expected to become a global standard. This is established based on the Global Food Safety Initiative (GFSI), which can be a standard for exporting to international markets of such as developed countries. However, the national standard of Bangladesh has yet to reach that level.

2.2.2. Ministry of Agriculture: MOA

The following departments, corporations, boards, and foundations are established within and under MOA.

Table 10 Organizations under the MOA

Department	Department of Agricultural Marketing (DAM) Department of Agricultural Extension (DAE)
Institutions /Agencies under MoA	Agriculture Information Service (AIS) Bangladesh Agricultural Development Corporation (BADDC) Bangladesh Agricultural Research Council (BARC) Bangladesh Agricultural Research Institute (BARI) Bangladesh Rice Research Institute (BRRI) Bangladesh Jute Research Institute (BJRI) Bangladesh Sugarcane Research Institute (BSRI) Bangladesh Institute of Nuclear Agriculture (BINA) Cotton Development Board (CDB) National Agriculture Training Academy (NATA) Seed Certification Agency (SCA) Barind Multipurpose Development Authority Bangladesh Institute of Research and Training on Applied Nutrition (BIRTAN) Soil Resources Development Institute (SRDI) Hortex Foundation (Hortex)

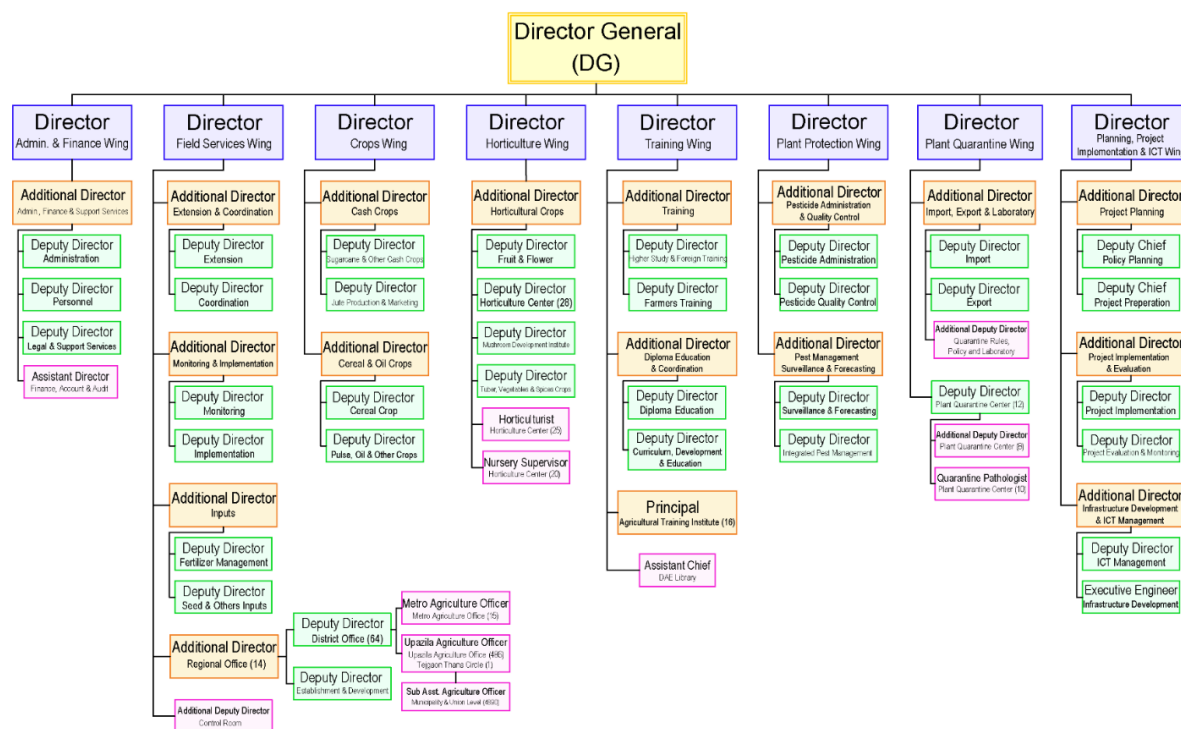
Source: Website of the Ministry of Agriculture

The followings are the primary departments and organizations in MOA.

¹⁵ Codex Standards are international food standards set by Codex Alimentarius Commission. The commission was established by FAO and WHO for the purpose of protection of the health of consumers and ensuring fair practices in the international food trade.

(1) Department of Agricultural Extension: DAE

DAE was established in 1982 and has regional and district offices. It is responsible for providing comprehensive agricultural extension services to farmers. DAE is the largest organization in MOA and has about 26,000 employees in total including about 13,000 Sub-Assistant Agriculture Officers (SAAOs) and 2,000 technical staff. SAAOs visit farmers and farmers' groups to provide advices on seeds, fertilizers, pesticides, agricultural inputs and cultivation.



Source: The Department of Agricultural Extension

Figure 7 Organogram of the Department of Agricultural Extension

(2) Department of Agriculture Marketing: DAM

DAM aims to create a better market and business environment for producers, traders and consumers. It collects and organizes data such as retail, wholesale and producer sales prices and shares the data on its website.

Based on Agricultural Marketing Act issued in 2018, DAM is now under restructuring. DAM currently has 409 employees, with a plan to increase the number to 868.

(3) Bangladesh Agricultural Development Corporation: BADC

BADC is a public corporation that controls agricultural input suppliers such as seeds,

non-nitrogen fertilizers and irrigation equipment. BADC is obliged to produce and supply four seeds (rice, wheat, jute and potato) and other major seeds.

BADC aims to supply 250,000 MT of high-quality seeds by 2020-21 to achieve self-sufficiency in grain by disseminating high-quality seeds and increasing agricultural productivity. BADC produces 35% of wheat and 32% to 34% of rice among the domestic demand¹⁶. As for fertilizers, BADC imports and distributes non-urea fertilizers such as Triple Superphosphate (TSP), Muriate of Potash (MOP), and Diammonium Phosphate (DAP) based on intergovernmental agreements.

(4) Horticulture Export Development Foundation: Hortex Foundation

Hortex Foundation was established in 1993 as a non-profit organization with a support of MOA, and it sets a mission to develop and promote an agribusiness that handles high value-added products. It provides services related to quality production, quarantine pest management, appropriate crop sorting, grading and packaging to promote the export of high-quality horticulture and agricultural crops to agribusiness companies and farmers, in addition to cold chain management, sanitation and phytosanitary measures, and marketing.

2.2.3. Ministry of Food

The Ministry of Food is responsible for formulating and implementing food policies in Bangladesh. It has seven departments under the Directorate General of Food, including (i) Administration, (ii) Procurement, (iii) Supply distribution and marketing, and (iv) Accounting.

The Bangladesh Food Safety Authority (BFSA) has been established under the Ministry of Food. Details of the BFSA will be described later in this section.

One of the main activities of the Ministry of Food is the Public Food Grain Distribution, which distributes cereals to the low income households at a low cost, but it does not cover vegetables and fruits. One of the distribution programs, the Food Friendly Program, provides the low income households with 30 kg / month of rice at 10 BDT / kg (the rice includes micronutrients such as iron and zinc).

In addition to the Ministry of Food, MoInd, MOA, the Ministry of Commerce, the Ministry of Health, and the Ministry of Fisheries and Livestock are involved in food policies in Bangladesh.

¹⁶ As described later, according to Bangladesh Seed Association (BSA), private sector produces 90% of vegetable seeds, 95% of hybrid rice, 98% of hybrid corn and 70% of potato seeds among the good seeds.

Under the Cabinet, the Food Planning and Monitoring Committee, which serves as a forum for minister-level consultations, was established. The leading ministry of the committee is the Ministry of Food, and the Food Planning and Monitoring Unit under the Ministry of Food serves as the Secretariat. The Additional Director of the Ministry of Food acts as the Director General of the Food Planning and Monitoring Unit.

Government agencies related to food safety

In Bangladesh, 18 ministries and agencies have been in charge of food safety, and the Bangladesh Food Safety Authority (BFSA) established in February 2015 is the organization that oversees food safety management across multiple ministries under the Food Safety Act 2013. Currently, the following organizations are involved in food safety management in Bangladesh.

Table 11 Government agencies that are responsible for food safety

Organizations	Food Value Chain				
	Production	Process and packaging	Distribution and sales	Export	import
Department of Agriculture Extension	⊙			△	△
Department of Livestock	⊙			△	△
Department of Fisheries	⊙	⊙	△	⊙	
Directorate General of Health Services		○	⊙		
Local Government Engineering Department		○	⊙		
Bangladesh Standard and Testing Institution		⊙	⊙		○
Directorate of National Consumer Rights Protection		○	○		
Bangladesh Food Safety Authority	△	△	△*	△	△
Bangladesh Custom				○	⊙

Note: ⊙: in charge mainly, ○: in charge partially, △: in charge but limited

Source: JICA (2019) Interim Report of Data Collection and Confirmation Study on Food Hygiene and Food Safety

DAE, the Department of Livestock Services and the Department of Fisheries are mainly responsible for food safety in the production of agricultural crops, livestock products and fisheries products. The Directorate General of Health Services under the Ministry of Health and Family Welfare and the Local Government Division are responsible for the manufacturing processed

foods and for ensuring the safety of foods in markets, such as at restaurants, retail sources and supermarkets.

BSTI standardizes, certifies and tests for products in various industries including food products. The Directorate of National Consumer Rights Protection aims to protect the right of consumers to enjoy goods and services with the right quality and price from a standpoint of consumer protection.

(1) Bangladesh Food Safety Authority (BFSA)

1) Overview of the organization

As mentioned above, BFSA was established in February 2015 as an organization that oversees food safety across multiple ministries based on the Food Safety Act 2013 under the Ministry of Food. According to the Food Safety Act 2013, the main duties and functions of BFSA is to regulate and monitor the activities related to manufacture, import, processing, storage, distribution and sale of food, and to coordinate the activities of all the organizations concerned with food safety management. However, the organization itself is still in the development stage and it has been receiving technical support for the enhancement of the organizational capacity provided by the Government of Bangladesh and USAID through FAO. BFSA has been also receiving support from other overseas organizations managing food safety, such as USFDA (U.S. Food and Drug Administration) and FSSAI (Food Safety and Standards Authority of India). In addition, JICA is also planning to provide technical assistance to BFSA.

According to BFSA, they have five primary activities as below.

Table 12 BFSA's five primary activities

- | |
|---|
| <ol style="list-style-type: none">1) Monitoring and punishment of food safety2) Coordination of food safety laboratories3) Establishment of food safety standards4) Risk management and consumers' concern5) Accounting, human resource and corporate affairs |
|---|

Source: The Survey Team based on an interview with BFSA

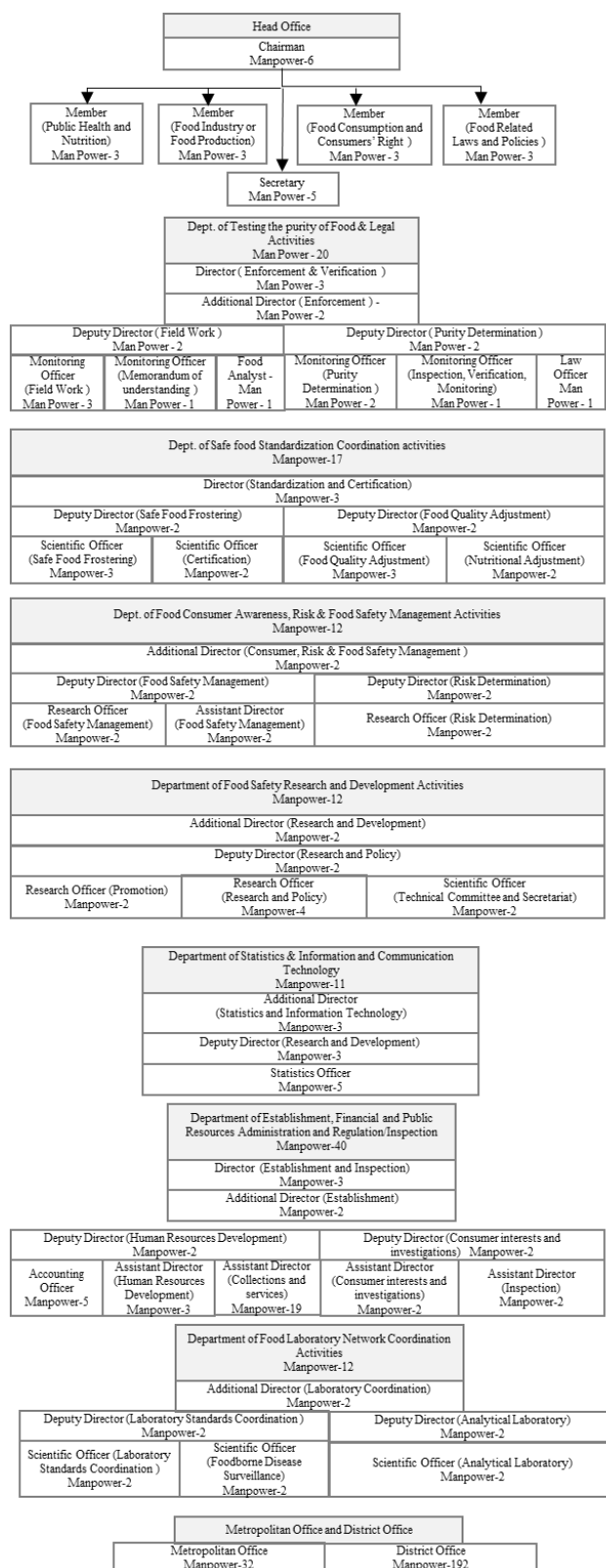
2) Organizational structure

BFSA is approved by the government to have the maximum 371 employees. BFSA has 4 Members, who are in charge of 1) public health and nutrition, 2) food industry or food production, 3) food consumption and consumers' right, and 4) food related laws and policies,

respectively. Under the Members there were some Directors were appointed temporarily for the Departments but there were no officer staff under the Directors in the headquarters nor food safety officers in rural areas for 4 years after the establishment of BFSA.

In 2019, BFSA is allowed to start recruiting its own staff. Until 2020, BFSA recruited 29 Technical officers for the headquarters such as Scientific Officer and Research Officer and 68 assistants including Office Assistant and Data Entry Operator. For rural areas, 67 Food Safety Officers, 45 Sample Collector Assistant and 72 Office Assistant were recruited. As a result 294 in total out of 371 posts are filled.

They started their work in October 2020 but all the recruited staff are recent graduates and have no work experience. BFSA became much stronger than before through the recruitment but how to grow the freshmen is an issue for BFSA for the time being.



Source: The Survey Team based on BfSA's information

Figure 8 Organogram of BfSA

In 2017, the BFSA Strategic Plan (2017-2021) was formulated. The strategic plan has the following six goals, and BFSA proceeds its activities based on this plan.

- 1) To make the BFSA a core center and a national central agency for food safety management
- 2) To strengthen food regulations and food safety standards, and train all inspectors so that they are able to perform their duties
- 3) To enforce food regulations effectively and consistently, and coordinate activities of all government agencies involved in food safety
- 4) To create a national mechanism to provide the best scientific advice to support policies and enforcement decisions of food safety
- 5) To ensure sufficient inspection capacity to support food regulations by enhancing the capacity of food inspection organizations and strengthening cooperation with inspection organizations nationwide
- 6) To encourage the food industry to adopt the highest standards for food safety and communicate with all stakeholders to raise consumer awareness of food safety

Source: BFSA

3) Laws and regulations for food safety

In Bangladesh, the Food Safety Act 2013 has been enacted in response to the growing need for food safety in the country. It aims to coordinate activities related to manufacture, import, processing, storage, distribution, marketing and sales of food, to establish appropriate food safety management methods using scientific processes and state-of-the-art technologies, and ensure the right of people to access safe food.

The Act is composed of 13 chapters. Chapter 5 describes prohibitions related to food safety management systems and Chapter 6 regulates responsibilities of food business operators. It is assumed that the Act sets the standards for food processing companies.

Table 13 Items required by Food Safety Act 2013 (extract)

Item	Content
Prohibitions related to Food Safety Management System (Chapter 5)	<ul style="list-style-type: none"> - Use of poisonous elements - Use of radioactive, heavy metals etc. in excess of acceptable limit - Production, import or marketing of adulterated article of food or food ingredient, etc. - Production of sub-standard food, etc. - Uses of food additives or processing aids - Keeping of used industrial oil, industrial waste, adulterants, pollutants, etc. in food establishment - Expired article of food or food ingredients - Uses of growth promoters, insecticides, pesticides or drug residues, microbes, etc. - Genetically modified food, organic food, functional food, proprietary food, etc. - Food packaging and labelling - Production, sale, etc. of food in unhygienic process regarded as hazardous to human health - Sale of diseased or decomposed fish, meat, milk, etc. - Food serving or catering in hotels, restaurants or food premises - Manufacture of food by a person suffering from any contagious disease - Manufacture, sale, etc. of misbranded food - Keeping and exhibiting the name, address and receipt or challan of the concerned parties - Production, sale, etc. of food without registration - Rendering cooperation to the Authority or any person authorized by it - False or misleading information in advertisement - Making, printing or propagating of false advertisement
Special Responsibilities of Food Business Operators (Chapter 6)	<ul style="list-style-type: none"> • Withdrawal of substandard or risky or poisonous food • Special liabilities of producers, packers, distributors and sellers of food

Source: The Food Safety Act 2013

BFSA has set the following regulations on food safety by September 2019 to complement the operations of the Food Safety Act 2013 and to harmonize with international organizations such as the Codex Alimentarius Commission. The organization is considering drafting two additional regulations in the future.

Table 14 List of recent regulations for food safety set by BFSA

Food Safety (Food Contact Material) Regulations, 2019
➤ Regulations on the safety of containers and packaging materials that make contact with food
Food Safety (Food Hygiene) Regulations, 2018
➤ It stipulates various hygiene controls such as sanitation control, waste management and drainage system at food processing facilities, health guidance for public health workers
Food Safety (Contaminants, Toxins and Harmful Residues) Regulations, 2017
➤ Regulations on contaminants, toxins and harmful residues in food. It specifies the maximum residual concentration of pesticides and a list of pesticides, fungicides and others that are allowed to be used in food
Use of Food Additives Regulations, 2017
➤ It indicates that domestically produced food must comply with the standards of BSTI, CODEX, and ISO, and specifies a list of additives that are allowed to be used in food
Food Safety (Technical Committee) Rules, 2017
➤ It stipulates the members and management methods of the Technical Committee (Food Safety Technical Committee) that is stipulated in Chapter 3, Article 17 of the Food Safety Act 2013
Food Sample collection, testing and analysis Regulations, 2017
➤ It defines collection methods and procedures of food sample, formats, etc. Companies have access to certified public and private laboratories
Food Safety (Labeling) Regulations, 2017
➤ It stipulates the labeling of domestically produced food and imported food. Labels on food packaging should include manufacturer / supplier name, food type, production lot number, interior content, date of manufacture, packaging date, expiration date, ingredient information and food additive information
Food Safety (Food processing and administration system) Rules, 2014
➤ Regulations regarding procedures for auditors to seize violating samples and procedures for administrative actions

Source: The Survey Team based on website of BFSA and USDA (United States Department of Agriculture)

4) Monitoring and penal rules of food safety

With regard to monitoring and penalties for food safety, a monitoring team in BFSA visits

mainly markets and companies to check food safety. In case a food manufacturer does not meet food safety standards, BFSA imposes administrative penalties. This monitoring is also being carried out locally, in cooperation with the Deputy Commissioner. The specific description of offences and punishments are explained in Chapter 9 and the schedule at the end of the Food Safety Act 2013 as shown below. Basically, an offender is required to submit a corrective action plan, and if not submitted by the deadline, another punishments such as imprisonment, fines, product recall, trial and suspension of operation will be imposed.

Table 15 Example of punishments related to food safety stipulated in the Food Safety Act 2013

Description of offences	Punishment for the offences committed first time	Punishment for repetition of offences
To use or include any chemical or its ingredients or substance, insecticides or pesticides or food color or flavoring matter, or any other intoxicated additives or processing aid in any article of food which may cause injury of toxicity to human health or store, market or sell any article of food or food ingredient possessing such matter.	Imprisonment for a period not exceeding five years but not less than four years, or a fine not exceeding Taka ten lac but not less than Taka five lac, or with both.	Imprisonment for five years or a fine of Taka twenty lac, or with both.
To use or include any food additive or processing aid in violation of maximum acceptable limit set out by regulations, in any article of food or food ingredient; or import, process, store, distribute or sell such produced food or food ingredient processing such matter.	Imprisonment for a period not exceeding three years but not less than one year, or a fine not exceeding Taka six lac but not less than Taka three lac, or with both.	Imprisonment for three years or a fine of Taka twelve lac, or with both.
To import, process, store, distribute or sell any article of food or food ingredients after the date of its expiry.	Imprisonment for a period not exceeding three years but not less than one year, or a fine not exceeding Taka six lac but not less than Taka four lac, or with both.	Imprisonment for three years or a fine of Taka twelve lac, or with both.

Source: The Food Safety Act 2013

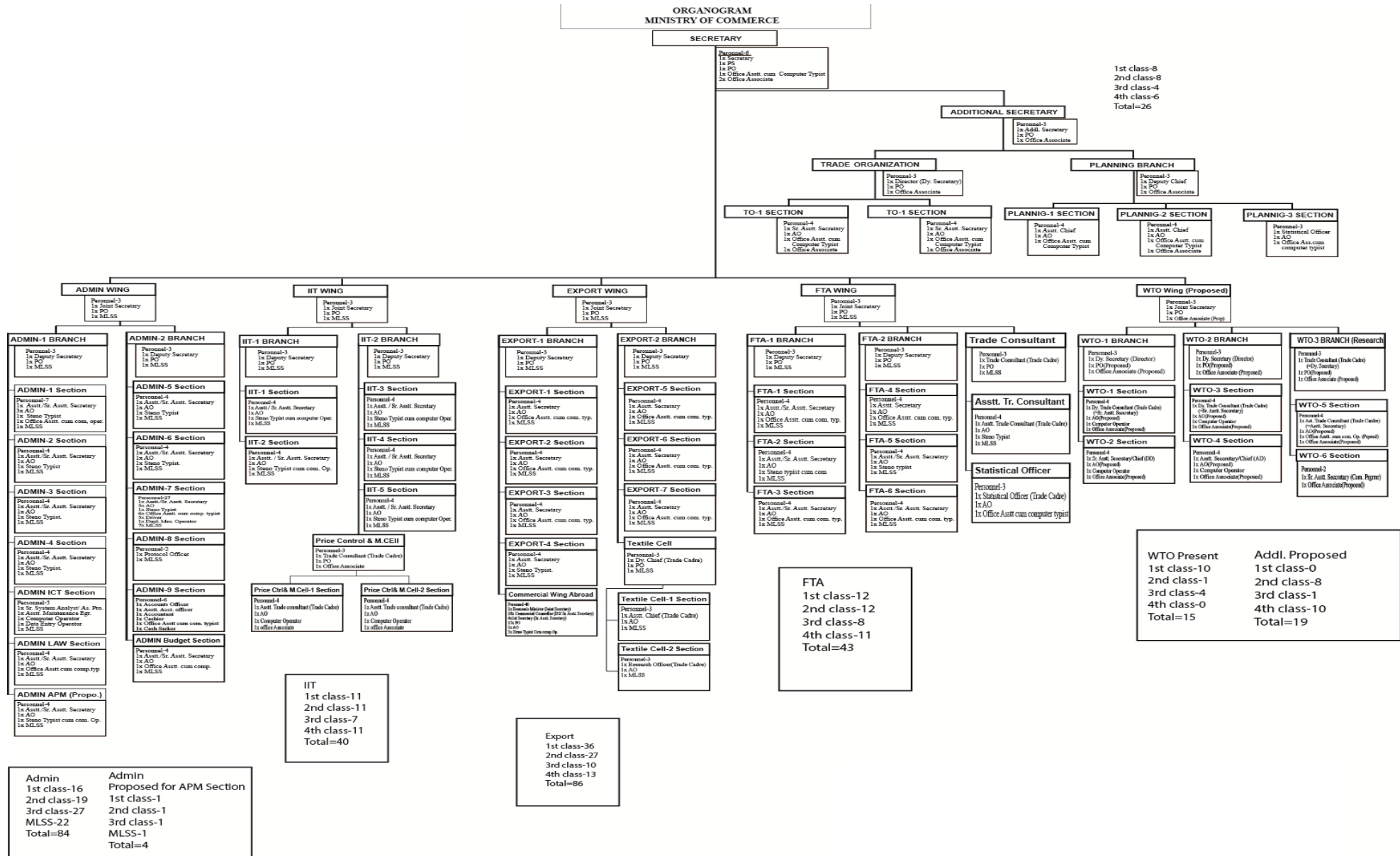
Food safety standards have been formulated by BFSA as mentioned before. BFSA has

the authority to monitor companies whether they follow these standards and if not, punish violators.

In the past, inspections had been conducted at markets and factories on an ad hoc basis, but if new officers are employed in BFSA as planned, inspections in each region will start on a full scale. On the other hand, checklists and guidelines for the inspection have not been formulated yet, and they are expected to be developed in the future with the cooperation of donors such as JICA.

2.2.4. Ministry of Commerce: MOC

The Ministry of Commerce is responsible for controlling, regulating and promoting domestic and foreign trade in Bangladesh. As shown in the organogram below, it has five wings, namely the Secretariat (Admin Wing), Insurance and Domestic Trading Bureau (IIT Wing), Export Bureau (Export Wing), FTA Bureau (FTA Wing) and WTO Bureau (WTO Wing), and about 320 staff members.



Source: Website of the Ministry of Commerce

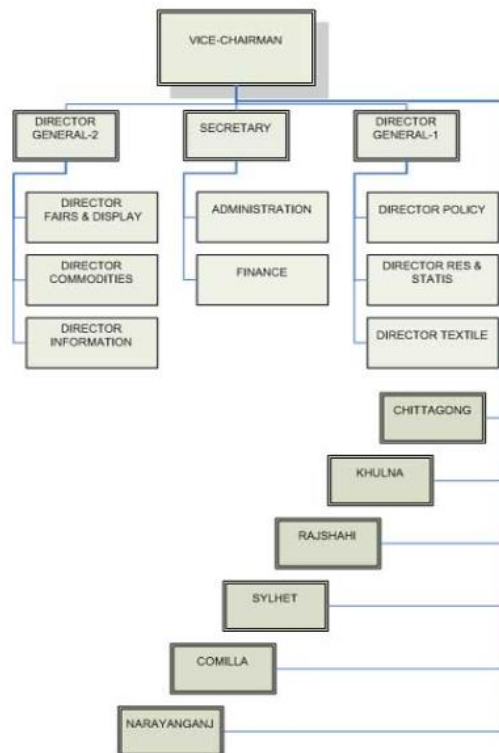
Figure 9 Organogram of the Ministry of Commerce

The Ministry of Commerce has developed an Export Policy every three years. The Export Policy (2018-21) targets to increase the amount of export from USD 36.7 billion in 2018 to USD 60 billion in 2021 through diversification of exports. 15 priority industries set in order to achieve this goal are:

- 1. High value added Readymade Garment and Garment Accessories
- 2. Software and IT enable services, ICT products
- 3. Pharmaceutical products
- 4. Ship & Ocean going fishing trawler
- 5. Footwear & Leather products
- 6. Jute products
- 7. Plastic products
- 8. Agro -Products & Agro -Processed products
- 9. Furniture
- 10. Home Textile & Terry Towel
- 11. Home Furnishing
- 12. Luggage
- 13. Denim
- 14. Active pharmaceutical ingredients, and
- 15. Reagents.

In addition, preferential treatment system such as export subsidies is available for these sectors.

As a major agency involved in export promotion, Export Promotion Bureau (EPB) was established in 1977 under the control of the Export Wing. EPB is headquartered in Dhaka, with regional offices in Chattagram, Rajshahi, Khulna, Comila and Sylhet.



Source: Website of the Export Promotion Bureau

Figure 10 Organogram of the Export Promotion Bureau

EPB is mainly responsible for supporting private sectors to enter into overseas markets. EPB's Trade Information Center provides export-related information to companies and serves as a platform for connecting foreign importers and Bangladeshi exporters.

In addition, with a view to promoting diversification of export products by supporting exporters to increase their competitiveness in international markets, EPB provides cash incentive (2 – 20%) against export receipts of exporting companies. The Bangladesh Agro-Processors' Association (BAPA), described below, issues certificates, by which exporters can apply for the subsidy program.

EPB formulated the Road Map on Food Processing Export Policy in 2018 to promote export of the processed food products which are one of the most prioritized products in the above 15 target industries of the Export Policy (2018-21). It sets medium- to long-term export targets such as USD 1 billion by 2021, USD 6 billion by 2023, and USD 25 billion by 2041. It focus on seafood such as crabs, fruits such as mango, potatoes, vegetables, spices, honey and other related products. However, according to an interview with an EPB executive, the targets were not set by cumulating the amount of individual product targets, but rather by a broad target as a whole.

The roadmap also shows some directions such as strengthening the supply chain through

contract farmers, diversifying agricultural products and processed agricultural products, and improving quality of such products by complying with international standards.

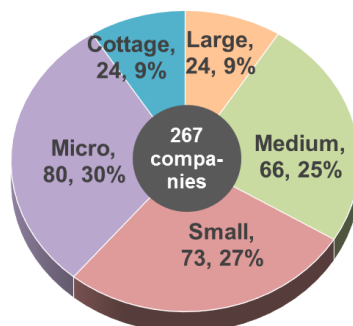
2.2.5. Other industry associations

(1) Bangladesh Agro-Processors' Association: BAPA

1) Overview of the organization

BAPA is a non-profit trade association that is affiliated to agricultural processors and is governed by the Ministry of Commerce. At the time of the foundation in 1998, it has 13 agricultural processors, and the CEO of Pran-RFL Group, Mr. Marhum Maj Gen Amjad Khan Chowdhury, founded the association. The number of member companies as of October 2019 was 292 and the amount of their total exports was USD 371 million in 2017-2018.

Looking at BAPA's member companies by size, the micro-sized companies has the largest proportion of 30%, which is followed by small-sized companies (27%) and medium-sized companies (25% (the number of companies is as of August 2018). The large-sized companies include six affiliated companies of PRAN, BRAC Dairy & Food Project, which handles dairy products, Olympic Industries Limited, a major biscuit manufacturer, and Ispahani Foods Limited, which manufactures a wide range of snack foods.

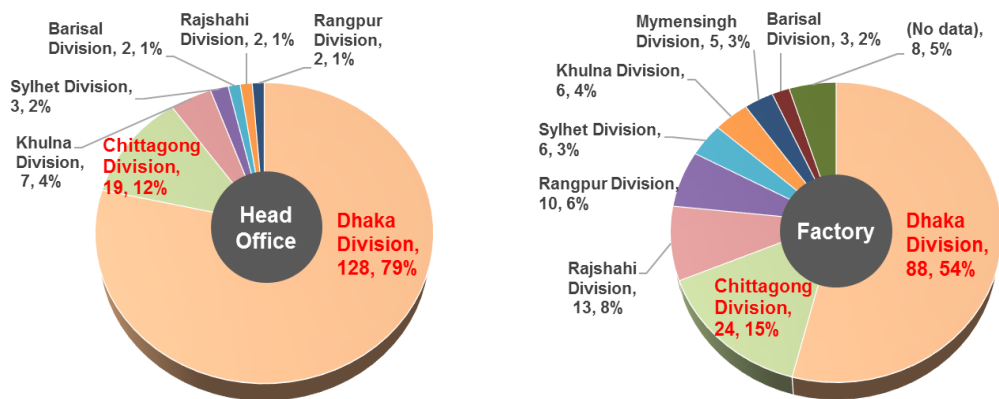


Source: The Survey Team based on the information from BAPA¹⁷

Figure 11 Ratio of BAPA's member companies by size

The geographical locations of the member companies' head offices and factories are shown in the figure below, indicating that the majority of the member companies' bases are located in Dhaka and Chattogram.

¹⁷ The number of 267 was described in the obtained information from BAPA in September 2018.



Source: The Survey Team based on the information from BAPA

Figure 12 Geographic location of BAPA's member companies (left: head office, right: factory)

The following table shows the breakdown of items manufactured by the member companies. The most common processed foods are rice products, followed by spices, bakery products, and snacks called Chanachur. About 20 to 30 companies produce juices, vegetables, fruits, pickles and frozen vegetables.

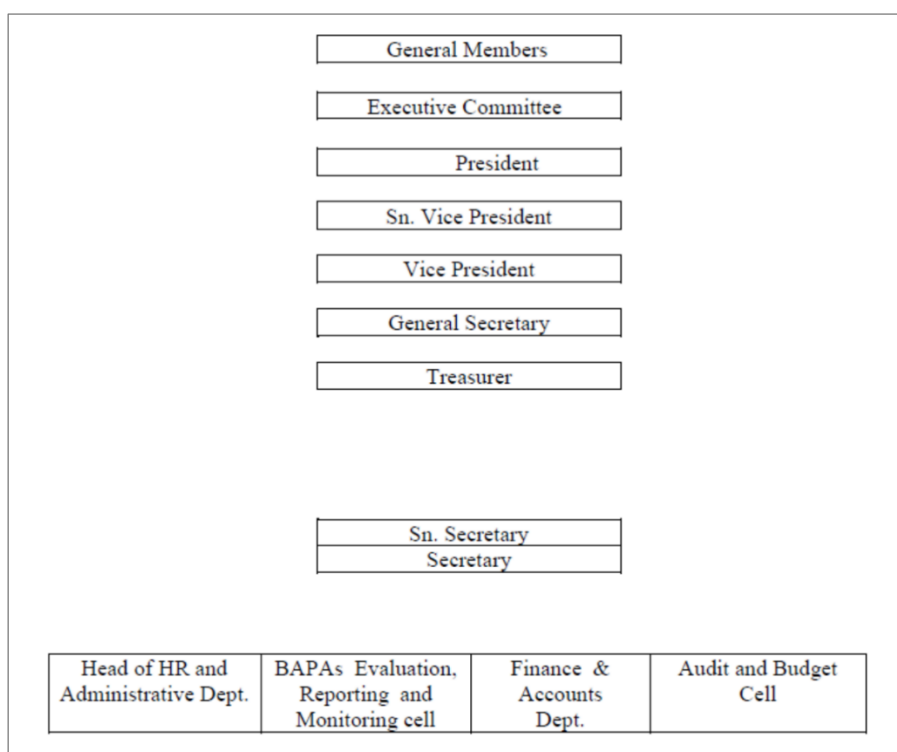
Table 16 Items produced by BAPA's member companies

Item	Number of handling companies
Rice Products	118
Spices	99
Bakery Products	87
Chanachur	83
Semei	49
Drinks	38
Pickles	37
Fruits	30
Vegetables	29
Confectionary	28
Frozen Vegetables	25
Other Frozen Items	22
Vegetable Oil	20
Processed Potato	20
Noddles	18
Dairy	17
Snacks	13
Source	7
Dry Foods	6
Industrial Material	4
Others	5

Source: The Survey Team based on the information from BAPA

2) Organizational structure

The organogram of BAPA is shown as follow. As of October 2019, the Executive Committee has 15 members. Under the Committee, there are 13 officers and working staff under the President. The head office is located at Dhaka and there are no regional offices.



Source: Information from BAPA

Figure 13 Organogram of BAPA

3) Activities

BAPA is engaged in various activities for the purpose of promoting the food processing industry and exports. BAPA issues certificates of subsidies, that are managed by the Ministry of Commerce, for export companies, and shares the information on agricultural processed products among members. Other major activities are described below.

➤ SEIP¹⁸-BAPA Project

The SEIP project has been co-financed by ADB and SDC (Swiss Agency for Development and Cooperation), and has been implemented in Bangladesh since 2014. Bangladesh Bank and several industrial associations are the executing agencies of skill development training programs.

The SEIP-BAPA project was launched in April 2017, providing vocational training for non-employee workers, and then providing employment opportunities at 18 food processing companies affiliated with BAPA such as PRAN. The activity is being carried out and the target number of trainees by December 2020 is set at 11,000.

¹⁸ SEIP stands for ADB's program 'The Skills for Employment Investment Program'

➤ Training programs for agribusiness and food processing companies

BAPA has been conducting training programs (seminars and workshops) for agribusiness and food processing companies since 2016 in collaboration with the Agro-Products Business Promotion Council (APBPC).

The content of the training programs covers a broad range of topics such as quality control, supply chain management, food safety, HACCP (Hazard Analysis Critical Control Point), ISO and GMP (Good Manufacturing Practice).

The training programs held recently are as shown in the table below. One training program receives about 40 to 50 participants. Companies that are not members of BAPA are also accepted for training programs.

Table 17 Content of the training programs for agribusiness and food processing companies conducted by BAPA

No	Year	Subjects	Venue	Organized by	Remarks
1	2016	Labor Market Information	Time Square, Sunrise Plaza, Dhaka	APBPC & BAPA	Seminar
2	2016	Supply Chain Management & Preservation	Sreemongal, Moulabi Bazar	APBPC & BAPA	Training
3	2016	Potato, Tomato & other vegetables procession & preservation	Rangpur Parjaton, Rangpur	APBPC & BAPA	Training
4	2016	Improvement of Quality of Pineapple, Spices	Chattogram	APBPC & BAPA	Training
5	2017	Utilization of By-products in Fruits & Vegetables processing Industries	Natore	APBPC & BAPA	Training
6	2017	Food Safety of Agro Processed Products & Strategy for ensuring it	Dhaka Club	APBPC & BAPA	Seminar
7	2017	Standard Operation Procedure based on GMP & HACCP	BARI, Gazipur	APBPC & BAPA	Training
8	2017	Effective Policy of Enhanced National Productivity of Agro Processed Products	Seft, Selim Centre	APBPC & BAPA	Seminar
9	2017	Profile & Directory of BAPA 2017 Preparation	BAPA	APBPC & BAPA	Directory
10	2018	Efficient and nutrition sensitive post-harvest transformation and value addition of agro -process products	Daffodil Int. University, Dhaka	APBPC & BAPA	Seminar

No	Year	Subjects	Venue	Organized by	Remarks
11	2018	Appropriate use of Modern Technologies to produce agro processed products	Daffodil Int. University, Dhaka	APBPC & BAPA	Seminar
12	2018	Opportunities and Important Steps for New Entrepreneurs in Agro-Food Processing	TMSS, Bogra	APBPC & BAPA	Training
13	2018	Agriculture Productivity Development	Sylhet	APBPC & BAPA	Training
14	2018	Role of Agro Processing Business	Comilla	APBPC & BAPA	Training
15	2018	Production & Processing of Export Quality Honey	DIU	APBPC & BAPA	Training
16	2018	Standard Pre and Post-harvest management and marketing of ripe mango	Shibgonj, Chapai Nawabgong	APBPC & BAPA	Training
17	2019	Occupational GHP and Regulatory GAP for Agro Products Processing Industries Efficiency Improvement in Bangladesh	Daffodil Int. University, Dhaka	APBPC & BAPA	Workshop
18	2019	Food Safety in Bangladesh-Prospects & Challenges	Chattogram	APBPC & BAPA	Training
19	2019	Workshop on Prospects & Barriers of Export in Agro-Processing Sector in Bangladesh	NSDC, Tejgaon, Dhaka	APBPC & BAPA	Workshop
20	2019	Development of agro-processing Cold-Chain, focusing on fruits & vegetables processing & post-harvest	Daffodil Int. University, Dhaka	APBPC & BAPA	Seminar

Source: BAPA

In addition, BAPA has 52 external resource persons who belong to the University of Dhaka, BFSI, BSTI, BALI (Bangladesh Agricultural Research Institute) and others who have expertise in various fields such as quality control, food safety, packaging and bakery production.

➤ **BAPA Food Pro International Expo**

BAPA invites international exhibitions every year and convenes agribusiness and food processing companies and food processing machinery manufacturing companies for the exhibitions. The 7th exhibition, which took place over three days in November 2019, was expected to attract more than 15,000 visitors from over 20 countries.

2.3. Review of Donors' Support for Food Value Chain

This section outlines the assistance policies of major donors and their projects on fostering the food value chain in Bangladesh.

Through the Agricultural Value Chains Project, USAID provided technical assistance and grants to several stakeholders, including 42 private companies, so as to improve agricultural value chains and increase farmers' incomes. The project was completed in January 2019, and the next phase will be implemented after March 2020 (as of October 2019). Both USAID's upcoming project and the Project are related to food value chain development, and can collaborate for the effective management and larger impact; while the USAID's project will provide technical assistance and grants, the Project will provide loans to private companies. In addition, the USAID's project is planned to include various activities that directly benefit farmers, such as the dissemination of Global GAP and input suppliers educating farmers on proper pesticide management.

Other international partners also serves farmers support and food value chain development: the World Bank's National Agricultural Technology Program (NATA) Phase 2, SNV's project which aims at improving consumer awareness and access to certified safe tomato and mango products in Bangladesh, and Global Alliance for Improved Nutrition (GAIN)'s project to train local service providers. In order to maximize the contribution to farmers as well as the development of the value chain, the Survey Team proposes to generate synergy between the Project and these projects to improve farmers' incomes and livelihoods as well as develop the food value chain.

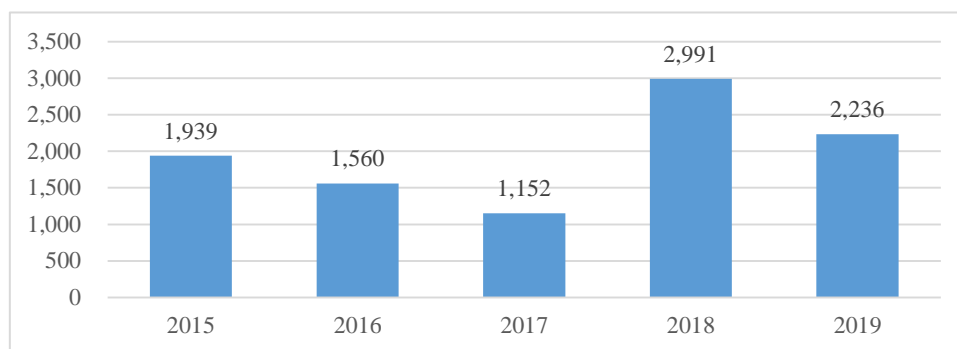
2.3.1. World Bank, International Development Association (IDA)¹⁹

The World Bank Group's Country Partnership Framework (CPF) for 2016–2020 is helping Bangladesh achieve its vision of joining the ranks of middle-income countries by the country's 50th anniversary of independence in 2021. During this period, the World Bank Group's technical and financial assistance has focused on: (i) accelerating growth by helping to remove bottlenecks for increasing electricity supply and improving transport connectivity; (ii) fostering social inclusion by building on Bangladesh's impressive gains in human and social development; and (iii) strengthening climate and environmental management with an aim to enhance Bangladesh's resilience to natural disasters, improving water and natural resource management, and modernizing agriculture. The framework is anchored in the government's seventh Five Year

¹⁹ World Bank website (<https://www.worldbank.org/en/country/bangladesh/overview#2>)

Plan, which covers the same period.

The World Bank, through its concessional lending arm, the International Development Association (IDA), has provided USD 12.09 billion for 46 active projects; over a quarter of all foreign aid in Bangladesh has been provided by the World Bank, making it the country’s largest external funder.



Note: Amounts include IBRD and IDA commitments

Source: World Bank

Figure 14 World Bank’s financial aid commitments to Bangladesh (USD million)

The table below summarizes the outline and comparison between each major project and the Project. In addition, the Ministry of Agriculture has requested a project valued at USD 900 million, including value chain support to the World Bank.

Table 18 Other donors’ projects for food value chain development in Bangladesh (World Bank)

Donor	Project	Outline	Comparison with the Project
World Bank	National Agricultural Technology Program Phase 2	<p>Project period: From 2015 to 2021, for six years.</p> <p>Project budget: USD 214 million.</p> <p>Project components:</p> <ul style="list-style-type: none"> i) Agricultural technology development, ii) Crop development support (productivity improvement, diversification, improvement of market access), iii) Fishery development, iv) Livestock development, and v) Project management. <p>Counterparts (CPs) of each project components:</p> <ul style="list-style-type: none"> i) Bangladesh Agricultural Research Council (BARC), ii) DAE, 	<p>The project provides only technical assistance, not financing. The project seems to show good knowledge on value chain development. Cooperation between these projects and the Project are recommended.</p>

Donor	Project	Outline	Comparison with the Project
		iii) Department of Livestock Services (DoLS), and iv) Department of Fisheries (DoF).	
	Livestock and Dairy Development Project	Project period: From December 2018 to September 2023 Project budget: USD 578.66 million Project components: i) Productivity enhancement, ii) Market linkage and value chain development, iii) Risk management and climate resilience in livestock production system, iv) Project management and monitoring evaluation. Implementing Agency: DoLS.	Component ii) includes matching grants to private companies for feed entrepreneurs; manure entrepreneurs; small-scale chilling, processing, and storage facilities; private service providers or technologies for product diversification; and climate smart agriculture. As of October 2019, the details, including the range of matching grants, are under consideration, but it could be between USD 1,000 and USD 315,000. The range of matching funds would be a bit smaller than the loan amount of each sub-project of the Project so there is no overlap between this project and the Project.
	Bangladesh Sustainable Coastal and Marine Fisheries	Project period: From October 2018 to December 2023 Project budget: USD 281.60 million The components of the projects: i) Enabling activities for sustainable fisheries sector investment and growth, ii) Improving infrastructure and production practices, iii) Community empowerment and livelihoods, and iv) Project management and monitoring. Implementing agency: DoF.	Component ii) includes grants, but the details are summarized in grant facility manuals that are not yet finalized.

Source: The Survey Team based on an interview with the World Bank and World Bank's documents

2.3.2. United States Agency for International Development: USAID

USAID focuses on food security and the environment, democracy and governance, health, education, and humanitarian assistance in Bangladesh²⁰. Regarding food security, the U.S. Government has been working to improve access to nutritious domestic food. For example, the Feed the Future initiative, which the U.S. Government has been implementing across developing

²⁰ USAID website (<https://www.usaid.gov/bangladesh/our-work>)

countries²¹, aims at improving productivity and agricultural diversity in targeted areas of southern Bangladesh as well as accelerating private sector competitiveness by promoting economic growth, good corporate practices, and supply chain development to benefit poor farmers and businesses. Additionally, USAID assists the formulation and implementation of food policy in Bangladesh through research, monitoring, training, and coordination within the government agencies. In summary, USAID has been implementing the following projects.

Table 19 Other donors' projects for food value chain development in Bangladesh (USAID)

Donor	Project	Outline	Overlapping or similarity with the Project
USAID	Agricultural Value Chains Project	It was implemented from 2014 to 2019, and targeted eight crops, such as pulses, mangoes, and tomatoes to apply the Market Systems Development (MSD) approach, which focuses on system changes by collaborating with stakeholders, including the private sector. As a result, the project collaborated with 42 private companies. It ended in January 2019, but the next phase is under preparation.	Both this project and the Project are related to the value chain development in the agricultural field. The USAID project is highly complementary because the USAID project provides technical assistance and grants, while the Project provides loans to private companies. The project periods of both projects seem to overlap. The synergy effect can be expected as a result of the collaboration.
USAID/ Food and Agriculture Organization (FAO)	Institutionalization of Food Safety in Bangladesh for Safer Food	USAID provided finance, and FAO provided technical assistance (the initial project budget of FAO was USD 4.46 million). The project purposes are: i) Comprehensive and effective national food safety governance, ii) Effective integrated approaches to food safety in all primary sources of production, and iii) Enabling the environment for improved third party verification/inspection and certification to national food control ²² . It was planned from September 2013 to September 2016, but it was extended to December 2019. The government counterpart was Ministry of Food.	It is highly relevant in the field of food safety in terms of technical assistance to the Ministry of Food and BFSA, but there is no similarity to a yen loan project (i.e, providing finance to a private company).
USAID/EU/	Meeting the	USAID and the Delegation of the	The Food and Nutrition Security

²¹ Feed the Future invests in a select set of countries that are committed to improving their own food security and nutrition. Target countries include Bangladesh, Ethiopia, Ghana, Guatemala, Honduras, Kenya, Mali, Nepal, Niger, Nigeria, Senegal, and Uganda (<https://www.usaid.gov/what-we-do/agriculture-and-food-security/increasing-food-security-through-feed-future>)

²² FAO (2013). FAO Government Cooperation Program - project agreement for "Institutionalization of Food Safety in Bangladesh for Safer Food"

Donor	Project	Outline	Overlapping or similarity with the Project
FAO	Undernutrition Challenge (MUCH)	European Union to Bangladesh provided finance, and FAO provides technical assistance. The government counterpart is the Food Planning and Monitoring Unit (FPMU) under Ministry of Food. The target of the project is the Development of Country Investment Plan (CIP) 2 and Food and Nutrition Security Policy.	Policy (draft) includes the importance of assisting private companies. It is necessary to pay attention to the contents of the CIP 3 that will be prepared after the Food and Nutrition Security Policy is finalized.

Source: The Survey Team based on an interview with USAID and USAID's documents

2.3.3. Delegation of the European Union to Bangladesh

The assistance provided by the Delegation of the European Union to Bangladesh is designed based on the 2014–2020 Multiannual Indicative Programme for Bangladesh, and focuses on the following points:

- Strengthening the democratic government;
- Food security and nutrition; and
- Education and skills development.

Approximately Euro 300 million of the total budget of Euro 700 million is allocated to “food security and nutrition” over seven years. Meeting the Undernutrition Challenge (MUCH) is a project that is co-financed by USAID, with the Food and Agriculture Organization (FAO) providing technical assistance. The Food Planning and Monitoring Unit (FPMU) under the Ministry of Food aims to develop the Country Investment Plan (CIP) 2 and the Food and Nutrition Security Policy under MUCH.

All EU projects are grant-based projects. The “food security and nutrition” component basically targets the improvement of stunting in the poorest community at a grass roots level, while MUCH focuses on policy.

2.3.4. International Fund for Agricultural Development: IFAD

- IFAD invests in the people of rural areas in Bangladesh²³ with the following objectives:
- Enable poor people in vulnerable areas to better adapt their livelihoods to climate change;
 - Help small producers and entrepreneurs benefit from improved value chains and gain greater market access; and

²³ IFAD website (<https://www.ifad.org/en/web/operations/country/id/bangladesh>)

- Empower marginalized groups, including poor rural women, both economically and socially.

IFAD has been implementing several projects that mainly target agriculture and rural areas. The projects that provide financing to private companies are summarized in the table below.

Table 20 Other donors’ projects for food value chain development in Bangladesh (IFAD)

Donor	Project	Outline	Overlapping or similarity with the Project
IFAD	Promoting Agricultural Commercialization and Enterprises (PACE) project (2014–2021)	The project aims to increase sales or income of micro enterprises as well as create employment by providing loans and technical assistance. The total budget is USD 93 million, and the implementing agency is the Palli Karma Sahayak Foundation (PKSF).	The project provides finance, but only to micro enterprises so that there is no overlap between PACE and the Project.
	Rural Microenterprise Transformation Project (RMTS) (under planning)	The project is planned as a successor to PACE. In addition to providing finance through microfinance institutions, finance through non-banking entities for small and medium enterprises is planned to be included.	As of September 2019, the detailed design of the project was under consideration, but the range of finance for small and medium enterprises would be between BDT 500,000 and 5 million with an interest rate of about 18%. Under the Project, the size of target end-borrowers would be larger, and the maximum amount of sub-loans would be higher, so that RMTS and the Project can be differentiated from each other.

Source: The Survey Team based on an interview with IFAD and IFAD’s documents

2.3.5. Food and Agriculture Organization: FAO

The Country Programming Framework 2019–2020 for Bangladesh that was prepared by FAO, and based on the policy and development plan of the Government of Bangladesh as well as the comparative advantage of FAO, set up the following three programme pillars:

- Healthy, safe, and nutritious food;
- The sustainability of productive ecosystems; and
- Resilient and inclusive agri-economic growth.

As of December 2019, FAO Bangladesh is implementing 49 projects. Among them, projects related to the Project are “Institutionalization of Food Safety in Bangladesh for Safer Food” and “Meeting the Undernutrition Challenge (MUCH)”, which USAID and the Delegation of the European Union to Bangladesh financially support.

2.3.6. Other projects

The outline of the projects related to the Project that are implemented by other major donors are summarized in the table below.

Table 21 Other donors' projects for food value chain development in Bangladesh

Donor	Project	Outline	Overlapping or similarities with the Project
Asian Development Bank (ADB)	PRAN Agribusiness project (2012 and 2019)	ADB provided a USD 25.10 million loan for liquid glucose, wheat milling, and frozen food processing line in 2012, and a USD 14.20 million loan for potato chips, potato flakes, and the pasta processing lines at Habignj Industrial Park that is 120km from Dhaka) in 2019 to PRAN Group, one of largest food processing companies in Bangladesh.	ADB can provide loans directly to the food processing company, but the size of loans is relatively large so that the Project could not overlap. The size of the loans and interest rates differ from project to project, and are controlled by the headquarters.
	Skills for Employment Investment Program (SEIP) - Bangladesh Agro Processors Association (BAPA)	SEIP collaborates with different industrial associations for human resource development. BAPA became a counterpart to SEIP-BAPA, and collaborates with 18 food processing companies to provide training to candidate employees (the youth). SEIP-BAPA aims to provide training on four subjects, such as production technology and quality control, to 11,000 youths from 2017 to 2020. As of September 2019, 9,662 people attended the training, 8,138 completed it and received certificates, and 8,121, almost all of people who received a certificate, were employed. The total budget of SEIP is USD 1.07 billion with the project period from 2014 to 2021. The project period of SEIP-BAPA is from 2014 to 2020, but may be extended.	This project focuses on only candidate employees (the youth) so this project does not overlap with the capacity building of the Project.
IFC	Support to PRAN (2009)	IFC provided USD 15 million for snacks, drinks, rice, and dairy processing facilities.	This is similar to the Project in terms of loans made to food processing companies, but the amount of investment is larger than that provided by the Project.
	Support to PRAN (2011)	IFC provided a USD 7 million loan for dairy procurement and processing facilities.	-do-

Donor	Project	Outline	Overlapping or similarities with the Project
	Support to PRAN (2012)	IFC provided a USD 15 million loan to Natore Agro, PRAN Group for fruit and vegetable processing.	-do-
	Support to PRAN (2018)	IFC provided USD 65 million to PRAN Agro Business Limited for expanding existing capacity, and BDT 1,800 million (up to USD 20 million) for refinancing the working capital of PRAN Agro Limited and Natore Agro Limited. In addition to the loans that is worth USD 85 million in total, advisory services for food safety were also provided.	-do-
SNV	Improving consumer awareness and access to certified safe tomato and mango products in Bangladesh	It was implemented from January 2016 to December 2019 to provide GAP and good handling practice training to 10,000 mango and tomato farmers. The project selected 10 farmers group and three food processing companies, and supported them on receiving their HACCP certification.	The project period does not overlap with that for the Project, but the Project can help farmers by introducing those who receive their HACCP certificate to food processing companies.
GAIN	Local Service Provider (LSP)	It aims to train 1,080 LSPs who provide training of production technology and business management to farmers.	The Project can help farmers by sharing LSP information to food processing companies.

Source: The Survey Team (interviews with the donors, etc.)

2.4. Government Initiative in Financing Agribusiness and Food Processing Industries

The major government initiative in agricultural financing in Bangladesh is the Agricultural and Rural Credit Policy and Programme published and revised every year by Bangladesh Bank. The program is announced annually to ensure adequate flow of agricultural and rural credit timely and elaborately in uncomplicated way at the farmers level, and sets the target of agricultural loans provided by all scheduled banks.

The 2019-2020 version of the program imposes the following targets on scheduled banks.

- Bangladesh Bank sets BDT 241.24 billion as agriculture and rural loan disbursement target for banks, raising by around 11% from BDT 218 billion set for the previous year.
 - The breakdown of the above target BDT 241.24 billion is that BDT 103.75 billion is allocated for state-owned and specialized commercial banks and BDT 137.49 billion is distributed for private and foreign commercial banks.

- Banks have to disburse 60% of the loans in the crop sector, a minimum 10% to the fisheries sector and 10% to the livestock sector.
- Each Bank is requested to allocate 2% of their total outstanding loans to agriculture and rural loans. If a bank fails to meet the target, it has to keep 3% of the unachieved target amount as reserve in Bangladesh Bank. Bangladesh Bank will return the fund to the bank only if it can later disburse the previous year's undistributed amount.
- Banks are supposed to reduce the use of Micro-finance Institution linkage and disburse credit directly through own branches.

Bangladesh Bank operates several refinance schemes to achieve these goals. The outline of each refinance scheme in the agricultural sector is as follows.

Table 22 Examples of refinance schemes for agricultural sector by Bangladesh Bank

Refinance scheme	Content
Refinance Scheme for Share-croppers	It provides loans without collateral to landless share-croppers. The fund size is BDT 6.0 billion, the final interest rate is 19%, and the loan tenure is three years. The loan amount per loan is from BDT 5,000 to 350,000.
Refinance Scheme for Dairy Farming	It provides loans with dairy farmers and rural sole proprietors involved in the dairy industry. The fund size is BDT 2.0 billion, the final interest is 4% and the loan tenure is three years. The loan amount per loan is up to BDT 10,000,000.
Refinance Scheme for the Jute Sector	It provides loans for working capital to manufacturers and exporters of jute-related products. The fund size is BDT 2.0 billion, and the loan amount per loan is up to BDT 10,000,000.
Refinance Scheme for Agro based Product Processing Industries in Rural Area	It provides loans to agro-based products processors. The fund size is BDT 7.0 billion, the final interest is up to 10% and the loan tenure is one to five years. The loan amount per loan is up to BDT 100,000,000. The loans are limited to local companies and factories.

Source: The Survey Team based on Bangladesh Bank Annual Report 2017-2018

There are also several refinance schemes in which donors provide funds and Bangladesh Bank manages them. In the agricultural sector, there are the following programs supported by

ADB, IFAD (International Fund for Agricultural Development) and JICA.

Table 23 Refinance schemes for agricultural sector by donors

Donor	Refinance scheme	Content
ADB	ADB Funded Northwest Crop Diversification Project (NCDP)	It started from 2001 to provide loans to farmers to promote the economic growth of Northwest region in Bangladesh and diverse and intensify High-Value Crops. As of June 2018, total fund of BDT 3.0 billion was disbursed. The number of farmers covered by the project is 0.33 million.
ADB	ADB Funded Second Crop Diversification Project (SCDP)	It started from 2011 to expand the NCDP's activities conducted in the Northwest region into new project areas including Southwest region in Bangladesh. As of June 2018, total fund of BDT 2.03 billion was disbursed. The number of farmers covered by the project is 0.2 million. The loan amount per loan is up to BDT 300,000.
IFAD	Marginal And Small Farm Systems Crop Intensification Project (MSFSCIP)-Kurigram District	It started from 1987 for small and micro farmers. The loan component is BDT 140 million. As of June 2018, the revolving fund account balance was BDT 60 million.
JICA	Small and Marginal Sized Farmers Agricultural Productivity Improvement and Diversification Financing Project (SMAP)	It provides loans to small and micro farmers through participating microfinance institutions to increase agricultural productivity. Agricultural technical guidance is also provided to farmers who borrow the loans. The tenure of the project is 2014 – 2021, the fund size is around BDT 8 billion, the final interest rate is less than 19% and the loan tenure is from three months to two years. The loan amount per loan is from BDT 5,000 to 200,000.

Source: The Survey Team based on Bangladesh Bank Annual Report 2017-2018

Of the above refinance schemes, 'Refinance Scheme for Agro based Product Processing Industries in Rural Area' and 'Refinance Scheme for Dairy Farming' are similar to the Project in terms of loan objectives and purposes. Details of the two schemes are shown as follows.

2.4.1. Bangladesh Bank ‘Refinance Scheme for Agro based Product Processing Industries in Rural Area’

The government of Bangladesh committed to the refinance scheme in 2001 as a project funded by Bangladesh Bank that has a long history of financing since 2003. As of the end of 2018, the fund size had been expanded to BDT 7.0 billion, and a total of BDT 15.68 billion had been disbursed to 2,902 companies. The disbursed amount was increased to BDT 16.99 billion at the end of June 2019. According to data as of the end of June 2018, 43.6% of the total disbursed amount was for one-year working capital, 12.8% of that was for medium-term loans for one to three years, and 43.6% of that was for long-term loans for three to five years.

In the structure of this refinance scheme, government funds are subleased from the executing financial institution, Bangladesh Bank, to PFIs, which then lend to the end-borrowers. Bangladesh Bank is required to lend to the PFIs at Bangladesh Bank rate of 5%, and the margin imposed on the end-borrowers by the PFIs is up to 5%, so the interest borne by the end-borrowers is up to 10%.

The end-borrowers that can be financed are micro, small, and medium sized companies as defined by the notification of Bangladesh Bank in June 2017. Sub-projects that can be eligible for financing are the agricultural processing industry specified by Bangladesh Bank. The sub-projects should be operated in the areas other than Dhaka, Chattogram and Narayanganj. In addition, since fixed assets (excluding land and buildings) owned by the end-borrowers must be BDT 100 million or less, implies only smaller companies are eligible among medium-sized companies.

The terms and conditions of the sub-loans for end-borrowers and the sub-lending from Bangladesh Bank to the PFIs are shown in the table below.

Table 24 Terms and Conditions of Sub-loan

Lender	PFIs (Eligible banks and financial institutions)
Borrower	Clients of PFIs (SMEs)
Currency	Bangladesh Taka
Amount	Up to BDT 100 million
Limit Amount of Finance	Under this scheme, Bangladesh Bank will refinance 100% of cost of the qualified sub-project.
Terms and Conditions	
Term	Long term: up to five years Medium term: up to three years

	Working Capital: One year
Interest rate	Maximum 10% (bank rate 5% fixed + margin 5% max)
Repayment Schedule	To be determined between PFI and Borrower based on regulations of the PFI and its relation with customers.
Interest payment	To be determined between PFI and Borrower based on regulations of the PFI and its relation with customers.
Prepayment	To be determined between PFI and Borrower based on regulations of the PFI and its relation with customers.
Security	To be determined between PFI and Borrower based on regulations of the PFI and its relation with customers.

Source: The Survey Team based on the information of Bangladesh Bank

Table 25 Terms and Conditions of On-lending loan

Lender	Bangladesh Bank
Borrower	Eligible PFIs
Currency	Bangladesh Taka
Amount	Up to BDT 100 million
Terms and Conditions	
Term	Long term: up to five years Medium term: up to three years Working Capital: One year
Maturity	Synchronized with that of the respective Sub-loan, i.e., Equal to the maturity of the Sub-loan.
Interest rate	Bangladesh Bank Rate (currently at 5% p.a.)
Interest payment / Repayment	Long and Medium term: in quarterly installments within maturity period. Three to six months grace period allowable matching to the same allowed to end-borrowers. Working capital: Yearly with accrued interest.
Penalty	Overdue not expected, as Bangladesh Bank will realize the installment amount plus applicable additional interests (If any) by debiting them against the current account of the concerned PFI maintained with Bangladesh Bank. If a PFI avails refinance facility providing wrong information, Bangladesh Bank can recover the amount at one time with additional 5% IR.

Security	PFI will submit to Bangladesh Bank a Demand Promissory Note equal to the refinance loan that will act as an ongoing guarantee against total receivable from the PFI against refinance loan receivable plus any lawful charge or expense as is applicable.
----------	---

Source: The Survey Team based on the information of Bangladesh Bank

2.4.2. Bangladesh Bank ‘Refinance Scheme for Dairy Farming’

The refinance scheme was launched in 2015 with the purpose of reducing dependence on imports of milk and dairy products, improving the nutritional status of the citizens, and increasing employment. In the scheme, government funds are subleased from the executing financial institution, Bangladesh Bank, to PFIs, which then lend the amount to end-borrowers. The fund size is BDT 2.0 billion and 14 banks and other financial institutions have participated as the PFIs. 18,429 end-borrowers had been financed and BDT 1.93 billion had been refinanced by the PFIs by 2018.

Bangladesh Bank lends to the PFIs at the Bangladesh Bank rate of 5%, and the PFIs add a margin of 4%, but the PFIs can receive an interest subsidy of 5% from the government, so the final interest rate for end-borrowers from the PFIs is 4%.

The eligible end-borrowers are dairy farmers and rural sole proprietors involved in the dairy industry, but they are not eligible if they have previously defaulted on agricultural loans. Projects can be financed in this scheme are purchasing and fattening of cattle and calves, milk production, and artificial insemination of excellent breeds.

The terms and conditions of the sub-loans for end-borrowers and the sub-lending from Bangladesh Bank to the PFIs are shown in the table below.

Table 26 Terms and Conditions of Sub-loan

Lender	PFIs (Eligible banks and financial institutions)
Borrower	Clients of PFIs (Dairy, Artificial Insemination farmers)
Currency	Bangladesh Taka
Amount	Up to BDT 10 million
Limit Amount of Finance	100% of cost of the qualified sub-project.
Terms and Conditions	
Term	End-borrowers: Three years
Interest rate	End-borrowers 4%
Repayment Schedule	Determined between PFI and Borrower based on PFI rules and its

	relation with customers
Interest payment	Determined between PFI and Borrower based on PFI rules and its relation with customers
Prepayment	Determined between PFI and Borrower based on PFI rules and its relation with customers
Security	Determined between PFI and Borrower based on PFI rules and its relation with customers

Source: The Survey Team based on the information of Bangladesh Bank

Table 27 Terms and Conditions of On-lending loan

Lender	Bangladesh Bank
Borrower	Eligible PFIs
Currency	Bangladesh Taka
Amount	Based on Participation Agreement between Bangladesh Bank and PFI
Terms and Conditions	
Term	Five years
Maturity	Revolving refinance
Interest rate	PFIs: Refinanced at 5% + gets another 5% from Bangladesh Bank to cover loss and margin
Interest payment	Every year
Penalty	Based on Participation Agreement between Bangladesh Bank and PFI
Security	Based on Participation Agreement between Bangladesh Bank and PFI

Source: The Survey Team based on the information of Bangladesh Bank

3. Review of the Current Situation and Issues of Food Value Chain in Bangladesh

3.1. The Current Situation Analysis of Food Value Chain

3.1.1. Domestic Production of Major Crops

As shown in the table below, the total agriculture crop production in 2017–18 was 67,930 thousand MT, of which 53.4% and 14.3% came from rice and potato, respectively, totaling 67.7% of total agriculture crop production. In this regard, Bangladesh heavily relies on rice and potato.

Table 28 Major agriculture crop production (2017–18)

Crops		Production (thousand MT)	%
Cereals	Rice	36,279	53.4%
	Wheat	1,098	1.6%
	Maize	3,288	4.8%
	Other cereals	1	0.0%
	<i>Subtotal</i>	40,666	59.9%
Pulses	<i>Subtotal</i>	389	0.6%
Oil seeds	Coconut	467	0.7%
	Rape and mustard	352	0.5%
	Soybean	99	0.1%
	Groundnut	67	0.1%
	Til (sesame)	35	0.1%
	Other oil seeds	7	0.0%
	<i>Subtotal</i>	1,027	1.5%
	Spices and condiments	Chilies	141
Onion		1,737	2.6%
Garlic		462	0.7%
Turmeric		150	0.2%
Ginger		79	0.1%
Coriander seeds		17	0.0%
Other spices and condiments		8	0.0%
<i>Subtotal</i>		2,594	3.8%

Crops		Production (thousand MT)	%
Sugar crops	Sugar cane	3,639	5.4%
	Date palm (juice)	181	0.3%
	Date palm (fruits)	37	0.1%
	Palmyra palm (juice)	91	0.1%
	G. Palmyra Palm (Talsas)	74	0.1%
	Ripe Tal	160	0.2%
	<i>Subtotal</i>	4,182	6.2%
	Tea	<i>Subtotal</i>	78
Vegetable	<i>Subtotal</i>	4,074	6.0%
Fruit	<i>Subtotal</i>	4,948	7.3%
Other food crops	Potato	9,725	14.3%
	Sweet potato	247	0.4%
	<i>Subtotal</i>	9,972	14.7%
Total		67,930	100.0%

Note: The crops for which production exceeded 1 million ton are highlighted.

Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Vegetable production in Bangladesh was 4,074 thousand MT in 2017–18. As shown in the table below, the production of Brinjal was 516 thousand MT, which is 12.7% of the total vegetable production. This was followed by tomatoes (385 thousand MT, 9.5%) and cabbages (322 thousand MT, 7.9%).

The fruit production in Bangladesh was 4,948 thousand MT in 2017–18. As shown in the table below, the production of mangoes was at 1,166 thousand MT, which is 23.6% of the

total fruit production. This was followed by jackfruit (1,076 thousand MT, 21.7%) and bananas (810 thousand MT, 16.4%). These three kinds of fruits form 61.7% of the total fruit production.

Table 29 Major vegetable production (2017–18)

		Production (thousand MT)	%
1	Brinjal	516	12.7%
2	Tomato	385	9.5%
3	Cabbage	322	7.9%
4	Pumpkin	303	7.4%
5	Radish	281	6.9%
6	Cauliflower	274	6.7%
7	Katcha Papaya	257	6.3%
8	Water Gourd	232	5.7%
9	Arum	230	5.6%
10	Green Banana	157	3.9%
	Others	1,117	27.4%
	Total	4,074	100.0%

Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Table 30 Major fruit production (2017–18)

		Production (thousand MT)	%
1	Mango	1,166	23.6%
2	Jack Fruit	1,076	21.7%
3	Banana	810	16.4%
4	Green Coconut	445	9.0%
5	Guava	242	4.9%
6	Watermelon	227	4.6%
7	Pineapple	208	4.2%
8	Papaya (ripe)	132	2.7%
9	Ber	114	2.3%
10	Litchi	94	1.9%
	Others	434	8.8%
	Total	4,948	100.0%

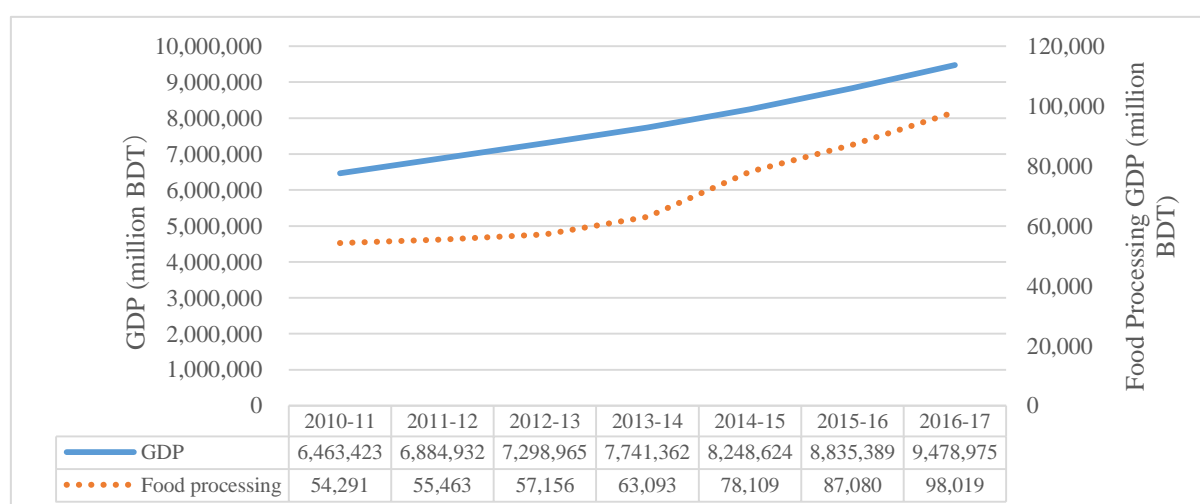
Note: The crops of the production exceeded 1 million ton are highlighted

Source: BBS (2019) Yearbook of Agricultural Statistics 2018

3.1.2. Outline of Processed Food Market

(1) The change in the food processing industry in Bangladesh

The food processing industry in Bangladesh has been expanding with economic growth, as the figure below shows.



Source: BBS (2019) Statistics Yearbook Bangladesh 2018

Figure 15 Actual GDP and GDP of the food processing industries (million BDT)

(2) Comparison with neighboring countries

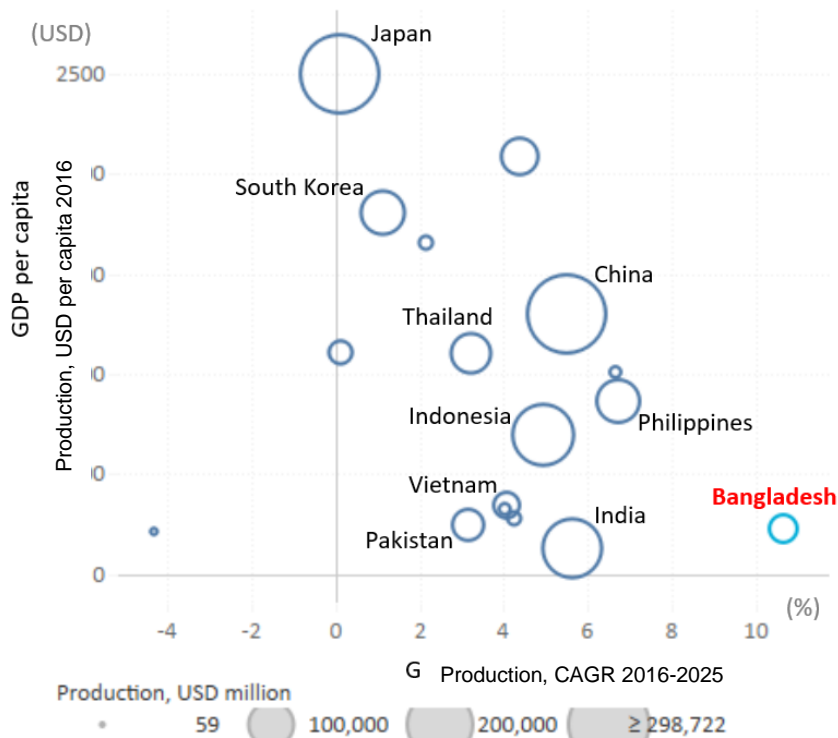
The figure below shows the per capita production of food, drink, and tobacco in 2016 (vertical axis), Compound Average Growth Rate (CAGR) of domestic production from 2016 to 2025 (horizontal axis), and the domestic production in 2016 (size of balloon) ²⁴.

The figure indicates that as of 2019 February the CAGR for Bangladesh is higher than that of neighboring countries (just over 10%), but its per capita production of food, drink, and tobacco is smaller than India, China, and other neighboring countries.

According to the report published by the International Monetary Fund (IMF) in October 2019²⁵, the annual economic growth ratio of Bangladesh is estimated to be 7.4% in 2020 and 7.3% in 2024 respectively, and the food, drink and tobacco industry is expected to expand faster than the overall economy growth. This means that the food, drink, and tobacco industry is expected to lead the Bangladesh economy.

²⁴ The production values of China and Japan are far larger than other neighboring countries. If their actual production volume was included in this graph, the graph would become unbalanced; their values would be outliers. Therefore, countries with more than USD 100 billion are divided into three groups: a) Korea, which has a production value of USD 100 billion; b) India and Indonesia, which have a production value of about USD 200 billion; and c) China and Japan, which have far larger production values than the others. The balloon size is adjusted accordingly. As a result, the balloon size of these countries do not reflect actual production volume.

²⁵ IMF (2019) World Economic Outlook (2019 Oct). The report estimated annual growth ratio of Bangladesh's real GDP would be 7.8% in 2019, 7.4% in 2020, and 7.3% in 2024, respectively. However, it should be noted that because of the influence of COVID-19, IMF revised the annual growth ratio of real GDP downward to 3.8% in 2020 according to the World Economic Outlook (2020 Oct) published by IMF in 2020.



Source: Euromonitor International

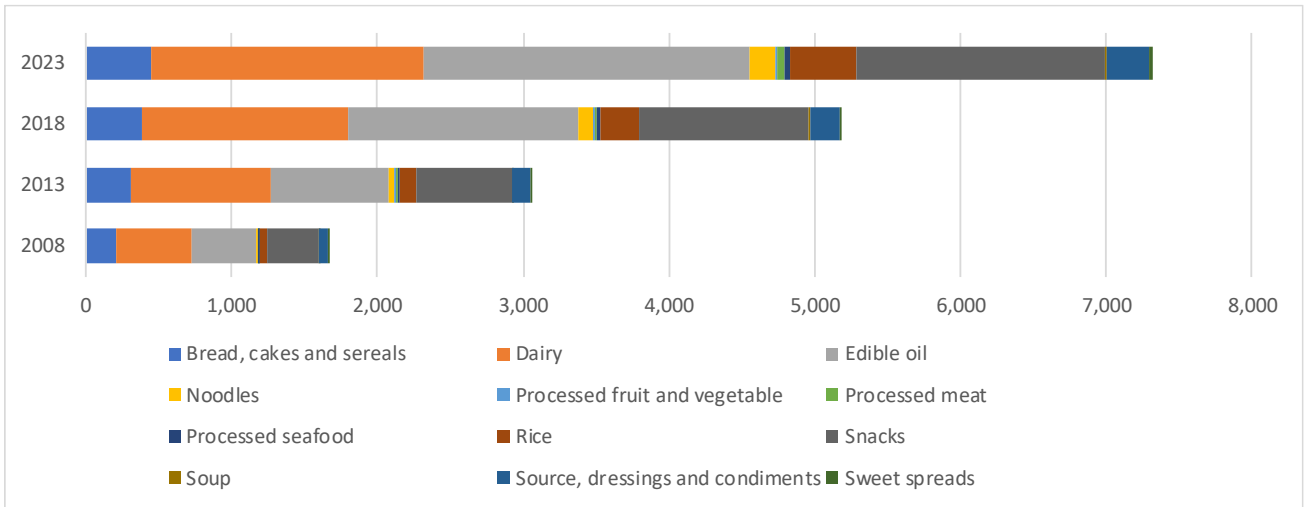
Figure 16 Domestic production value of food, drink, and tobacco in Asian and Pacific countries²⁶

(3) Trends of the packed food market

The processed food can be divided into packed products which are mainly sold to consumers and bulk products which are intermediate products for further processing or sold in bulk. The figure below shows the changes in the domestic market size of packed products (excluding beverages) over the past ten years, including the forecast for the next five years.

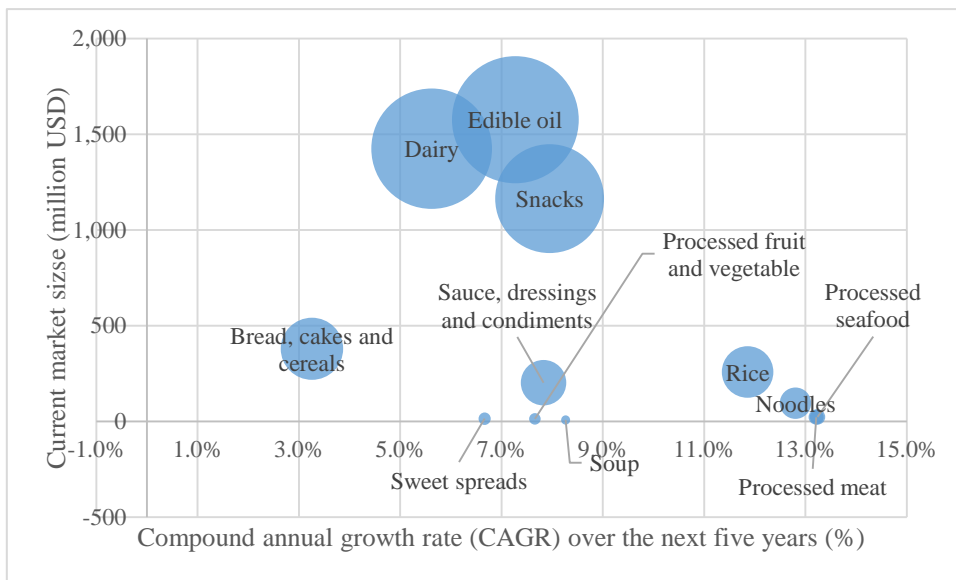
The market size, which was USD 1.66 billion in 2008, expanded to USD 3.056 billion in 2013 and USD 5.182 billion in 2018. It is expected to reach USD 7.322 billion in 2023.

²⁶ The domestic production values of China, Japan, Indonesia, India, and Korea are USD 1961.8 billion, USD 339.9 billion, USD 185.5 billion, USD 181.6, and USD 103 billion, respectively, while GDP per capita of China, Japan, Indonesia, India, and Korea are USD 1,427, USD 2,677, USD 710, USD 140, and USD 2,010, respectively.



Source: Euromonitor International (2019) Packed Food in Bangladesh

Figure 17 Sub-sector market size (million USD)



Source: Euromonitor International (2019) Packed Food in Bangladesh

Figure 18 Current market size (vertical axis and balloon size) and CAGR over the next five years (horizontal axis) of packed food

Table 31 Current market size and CAGR over the next five years of packed food

Sub-sector	CAGR over the next five years	Current market size (million USD)	Sub-sector	CAGR over the next five years	Current market size (million USD)
Bread, cakes, and cereals	3.3%	380	Rice	11.9%	259
Dairy	5.6%	1,424	Snacks	7.9%	1,163
Edible oil	7.3%	1,576	Soup	8.3%	8
Noodles	12.8%	96	Sauce, dressings, and condiments	7.8%	202
Processed fruit and vegetable	7.7%	13	Sweet spreads	6.7%	15
Processed meat	13.2%	23			
Processed seafood	13.2%	24	all	7.2%	5,182

The figure above illustrates the market sizes and CAGRs over the next five years of the sub-sectors of packed foods. As shown in the figure above, edible oil, dairy products and snacks have the largest market share, and are expected to grow annually at 7.2%, 5.6% and 7.9%, respectively, over the next five years. Bread, cakes and cereals is expected to grow only 3% p.a. over the next five years but they have the fourth largest market size among the packed food. The current market size of processed fruit and vegetable is relatively small, but is expected to grow at 7.7% per year. In addition, processed seafood and processed meat are expected to grow at 13.2%.

3.1.3. Overview of Food Related Industries

This section summarizes the major industries related to the food value chain, such as food processing, seed, fertilizer, agrochemical, agricultural machinery, cold storage, packaging (for processed food), packaging (plastic crate for agricultural crop transportation), and retailers.

(1) Food processing

The Bangladesh Agro-Processors' Association (BAPA) consists of 292 food processing companies in Bangladesh as of the end of 2019. The table below summarizes the survey results for BAPA member companies.

Of the 267 companies that responded to the survey, the numbers of cottage, micro, small, medium, and large companies are 24, 80, 73, 66, and 24, respectively.

While all companies have BSTI certificates, smaller companies do not necessarily have certificates on product management and food safety management, such as the ISO9001, ISO22000, and HACCP certificates.

Table 32 Certifications obtained by BAPA member companies

Size of company	Total	BSTI	ISO9001	ISO22000	HACCP
Cottage	24	100.0%	4.2%	0.0%	0.0%
Micro	80	100.0%	7.5%	3.8%	3.8%
Small	73	100.0%	27.4%	8.2%	8.2%
Medium	66	100.0%	71.2%	37.9%	43.9%
Large	24	100.0%	100.0%	100.0%	95.8%
Total	267	100.0%	36.7%	21.7%	22.8%

Source: Data provided by JICA

The table below shows the capacity development needs of BAPA member companies. All member companies are willing to have training on food safety, while all companies, except large companies, are willing to have training on business management.

Table 33 Capacity development needs of BAPA member companies

Size of company	Number	Business Management	Financial Management	Procurement	Marketing	R&D	Food Safety
Cottage	24	100.0%	37.5%	100.0%	100.0%	0.0%	100.0%
Micro	80	100.0%	26.3%	96.3%	96.3%	5.0%	100.0%
Small	73	100.0%	13.7%	97.3%	97.3%	2.7%	100.0%
Medium	66	100.0%	95.5%	12.1%	12.1%	93.9%	100.0%
Large	23	52.2%	52.2%	0.0%	0.0%	100.0%	100.0%
Total	266	95.9%	43.2%	67.7%	67.7%	34.2%	100.0%

Source: Data provided by JICA

(2) Seeds

Seeds are very basic and vital inputs for increasing crop production, and are produced and distributed by both the public and private sectors. Bangladesh Agricultural Development Corporation (BADC) under the MOA produces and supplies quality seeds, while private companies import, produce, and supply quality seeds to the market.

As shown in the table below, many farmers still use home-grown seeds, so the proportions of farmers who use quality seeds provided by the public sector and private companies are not necessarily high. This situation indicates that the development and distribution of high quality seeds is one of the challenges in the food value chain considering the production.

Table 34 Source of seeds by crop (%)

		Own	Neighbor	Retailer (Private)	BADC dealer	NGO dealer	Others	Total
Rice	Aus	48.2	5.9	31.7	2.4	11.8	0.0	100.0
	Aman	60.4	8.0	22.6	8.3	0.1	0.6	100.0
	Boro	32.3	7.1	30.7	28.8	0.6	0.5	100.0
Wheat		45.3	2.7	34.8	15.4	0.0	1.8	100.0
Brinjal		41.2	20.6	35.3	0.0	0.0	2.9	100.0
Potato		13.3	13.3	66.7	6.7	0.0	0.0	100.0
Tomato		12.0	0.0	88.0	0.0	0.0	0.0	100.0
Mustard		50.9	5.6	34.3	9.3	0.0	0.0	100.0
Jute		2.9	0.6	67.3	9.4	5.3	14.5	100.0

* Formal source includes retailers, BADC dealers, NGO dealers, mobile vendors, private companies

Source: Bangladesh Institute of Development Studies (2016) Bangladesh Development Studies - Formal vs. Informal Seeds

According to Bangladesh Seed Association (BSA), the private sector produces 90% of vegetable seeds, 95% of hybrid rice, 98% of hybrid maize, and 70% of potato seeds, which are among the quality seeds. This suggests that the role of the private sector in the seed industry is very important.

BSA has about 600 member companies. Ten companies of these 600 are large companies that undertake research and development (R&D) activities, seed production and sales, as well as the import and export of seeds.

BSA also has 100 medium sized seed companies that mainly import and sell seeds. Only a few of them produce seeds.

A hybrid onion variety, developed by a private seed company, is larger than, yet has the same pungency as, conventional varieties. The variety is expected to double the yield of conventional varieties, and has a longer storage life under ambient temperatures because of its low water content. Bangladesh imports a high volume of onions; in fact, it was reported that there was a sharp rise in onion price in 2019 after the Government of India banned the export of onions. Therefore, to ensure stable market conditions for both consumers and food processing companies that procure raw onions, it is important to promote the seed industry that can develop and disseminate new varieties that offer better yield and longer storage life.

Seed production is generally outsourced to contract farmers. Seed production requires a certain level of production techniques, but farmers can ensure their sales channel and stable income through contract farming. The produced seeds are processed using processing equipment, and stored in temperature- and humidity-controlled warehouses. According to BSA, there is a potential need for investment in seed processing equipment, temperature- and humidity-

controlled warehouses, packaging equipment, and laboratories for R&D.



Size grading machine (made in India)



Weight grading machine (made in India)



Seed coloring machine (made in India)



Seed dryer (made in India)



Sealing machine for seed package (made in China)



Printing machine for seed packages (made by Hitachi, Japan)

Source: The Survey Team

Photo 1 Seed processing equipment



Moisture content test



Moisture meter



Germination test chamber (temperature and moisture-controlled)

Source: The Survey Team

Photo 2 Quality testing laboratory

(3) Fertilizer

The import, production, and distribution of major fertilizers, such as Triple Superphosphate (TSP), Diammonium Phosphate (DAP), Muriate of Potash (MOP), are under the control of the government. Bangladesh Chemical Industries Corporation (BCIC), under the Ministry of Industry, procures 100% of urea (of which approximately 40% is domestically produced, with the rest imported), while Bangladesh Agricultural Development Corporation (BADC) procures about 60% of non-urea fertilizers.

The retail prices of major fertilizer are fixed by the government (e.g. TSP at BDT 22/kg, DAP at BDT 25/kg, and MOP at BDT 15/kg), and the government provides subsidies. All fertilizer producers, importers and dealers are required to register with Bangladesh Fertilizer Association (BFA). Local committees for fertilizer and seed monitoring at Upozila level decide the distribution volume of major fertilizers for each fertilizer company to ensure that enough volume of fertilizers is distributed to farmers.

Table 35 National demand, BCIC production, import volume, and consumption volume in 2018–19 (Lac MT)

	Demand	BCIC production	Imported by BCIC	Imported by BADC	Imported by private sector	Consumption
Urea	25.50	10.00	15.50			25.95
TSP	7.00	0.75		3.75	2.50	7.81
DAP	9.00	1.00		4.00	4.00	7.63
MOP	-			5.50	3.00	7.24

Source: Bangladesh Fertilizer Association

The Government of Bangladesh promotes organic fertilizer, but does not determine prices or distribution volumes, unlike with other major chemical fertilizers.

According to BFA, although the size of the organic fertilizer market reached 100,000 MT, and is expected to grow by 20% per year, farmers have not yet used enough volume of organic fertilizer. Currently, there are about 50–60 organic fertilizer manufacturing companies.

The major ingredients of organic fertilizer are cow dung, poultry litter, and agriculture wastage. The equipment necessary to produce organic fertilizer are mixers, sieves, packaging machines. The investment cost of a small-sized processing facility is about BDT 500 million in total.

(4) Agrochemical

Bangladesh Crop Protection Association (BCPA) consists of 477 agrochemical

companies as of August 2019, with 277 having voting rights at the General Meeting of the association. Agrochemical companies that produce and import agrochemicals are eligible to participate in the association, while dealers and retailers are not.

The size of the agrochemical market in Bangladesh is estimated to be BDT 30 billion. Agrochemical companies mainly import, repack, and sell agrochemicals in the domestic market, while some of them also formulate agrochemicals. Such agrochemical companies rarely undertake R&D activities. As the sales of pesticide in 2018 decreased because of a fall in damaged crops due to pests, it seems that the enough volume of agrochemical is already used in Bangladesh.

The market size of biopesticide has been expanding since its sales began in 2009 in Bangladesh. Currently, there are a few biopesticide producing companies that already have registered with the government, and a further eight to ten producing companies are currently in the registration processes. There is no association for biopesticide producers, wholesalers, or distributors.

Ispahani Agro limited is the market leader in Bangladesh. It sells biopesticide for vegetable, fruit, and tea, and plans to sell one for rice in near future.



Pheromone traps for fruit flies
(Laboratory of BARI)

Commercial products of pheromone
traps
(Laboratory of BARI)

Natural enemy insect
(insect egg of pest) (laboratory of
BARI)

Source: The Survey Team

Photo 3 Examples of biopestisides

(5) Agricultural machineries

The levels of agricultural mechanization in Bangladesh are summarized in the table below. Land preparation and irrigation are mostly mechanized, but rice planting and rice harvesting are not, although agricultural mechanization is expected to reduce the production cost and increase productivity through timely production and harvesting.

In Bangladesh, hiring agricultural machineries is commonly observed. In addition, ACI

Motors, one of the major local dealers of imported agricultural machineries, provides loans to purchasers of agricultural machineries.

Table 36 Agricultural mechanization in Bangladesh (Rice)

Activities	Mechanization %	Note
Cultivation	98%	Power tiller 60%, Tractor 38%
Irrigation	95%	Diesel pump 68%, electrical pump 25%, and solar pump 2%
Seedling and planting	Mostly manual	Rice trans planter less than 1%
Harvesting	Mostly manual	Thresher 80%, Reaper 2%, and Combine harvester 2%

Source: ACI

The Bangladesh Agricultural Machinery Merchant Association consists of about 2,000 of spare parts dealers and workshops in Bangladesh.

According to the association, there are some domestic manufacturers that manufacture power tillers and threshers, but large agricultural machineries, such as tractors and combine harvesters, are mainly imported.

In the 1980s, about 50% to 60 % of spare parts were domestically manufactured, while about 30% and 10% were imported from Japan and India, respectively. Currently, about 90% of spare parts are imported from China, while the remaining 10% is domestically manufactured.

As agricultural machineries and spare parts are mainly imported, financial support for the purchasers of agricultural machineries might be needed to further agricultural mechanization.

(6) Cold Storage

Bangladesh Cold Storage Association (BCSA) consists of 263 cold storage companies. According to BCSA, the total number of cold storage facilities in Bangladesh is 428 and has the capacity of 5.5 million MT. This includes 33 cold storage facilities owned by BADC.

About 90% of the total capacity of cold storage facilities is used for potatoes, suggesting that about 50% of potatoes produced in Bangladesh can be stored in cold storage facilities.

About half of the potatoes stored in cold storage facilities are owned by farmers, while the rest are owned by traders or exporters.

There are some cold storage owners who provide loans to farmers, taking the potatoes stored in their cold storage facilities as collaterals. Some such farmers purchase potatoes from other farmers and work as small-scale middlemen.

Although there are sufficient cold storage facilities for potatoes, those for other crops, such as onions, garlic, and ginger, are not sufficiently established. The table below summarizes fluctuations in growers' prices and the retail prices of potatoes, garlic, and onions; the price

fluctuations of garlic and onions are much larger than those of potatoes. Multipurpose cold storage facilities that can store onions, garlic, and ginger are therefore expected to contribute to the price stability of such crops. Such price stability would benefit both consumers and farmers.

Table 37 A grower's price and retail price of each crop

Crop	Price	Range of price (difference between minimum and maximum price)		
		2016	2017	2018
Potato local	Grower's price (BDT/Quintal)	1,690 – 2,150 (1.27 times)	1,200 – 1,900 (1.58 times)	950 – 2,400 (2.53 times)
	Retail price (BDT/kg)	19 – 39 (2.05 times)	16 – 25 (1.56 times)	18 – 29 (1.61 times)
Garlic local	Grower's price (BDT/Quintal)	5,100 – 12,800 (2.51 times)	5,500 – 8,000 (1.45 times)	3,100 – 5,000 (1.16 times)
	Retail price (BDT/kg)	50 – 150 (3 times)	50 – 290 (5.8 times)	44 – 67 (1.52 times)
Onion local	Grower's price (BDT/Quintal)	2,000 – 4,500 (2.25 times)	1,950 – 6,800 (3.49 times)	1,900 – 5,000 (2.63 times)
	Retail price (BDT/kg)	24 – 37 (1.54 times)	20 – 100 (5.00 times)	25 – 65 (2.6 times)

Source: DAM website

(7) Packaging (for processed food)

Flexible package materials are used for packaging potato chips, spices, and other food items. Manufacturers of such flexible package materials are members of the Bangladesh Flexible Packaging Industries Association. The manufacturers of the films wrapped around plastic bottles can be members, but plastic bottle producers cannot.

About 60% of flexible packaging is manufactured domestically, and the remaining is imported. By shifting from import to domestic production, it is possible to eliminate 25% to 30% of the packaging costs and the lead time from order to delivery. The domestic supply of such flexible packaging can also benefit food processing companies because they can determine the design, quality, and volume of packages more easily and frequently than otherwise.

It is estimated that there are about 1,000 food processing companies in total, including 100 large or medium food processing companies, which use flexible packaging materials to pack their food products. A few large food processing companies, such as PRAN Group, manufacture flexible packaging materials, while other food processing companies purchase the materials from flexible package manufacturing companies.

According to the association, there are about 80 flexible package manufacturing companies in Bangladesh. Among them, seven to eight companies operate nationwide, while 20–

30 medium-scale companies and 50–60 small-scale companies operate at regional or district levels, such as Chattogram, Barisal, and Cox's Bazar.

The association estimates that 50%–60% of flexible packaging is manufactured by large companies, while 20%–30% and 10%–15% are manufactured by medium- and small-scale manufacturers, respectively.

The association requires members to strictly comply with the rules and regulations set by the government as well as the food safety standards and quality standards. Because of this reason, the association has only 30 large or medium sized manufactures. Some small sized manufacturers sometimes do not even register for business operation with the government.

According to several stakeholders in Bangladesh, the size of the packaging material supply is sufficient, although 40% of such materials are imported, and the prices of imported materials are slightly higher than the domestic materials.

(8) Packaging (plastic crate for agricultural crop transportation)

Although plastic crates are expected to be properly used to help reduce post-harvest losses caused by damaged agricultural crops during transportation, they are not yet widely used in Bangladesh.

Plastic crates currently used for vegetable and fruit transportation in Bangladesh are those that were originally used for importing vegetables and fruits from India.

One of the largest plastic manufacturers, Bengal Polymer Wares Limited, developed such plastic crates for vegetable and fruit transportation based on a proposal by Agri-business Trade Competitiveness Project (Katalyst) by Swisscontact (a non-governmental organization in Switzerland). However, the number of plastic crates sold by Bengal Polymer Wares for the last eight years is only 3,000, which can be explained by the following reasons: i) the benefits of plastic crate are not appreciated by farmers and transporters; ii) the prices of plastic crates are high; and iii) farmers and transporters do not have space to store plastic crates.

Domestically manufactured plastic crates do not compete with the second-hand ones, as the price of a second-hand Indian plastic crate is about BDT 100, while the one manufactured by Bengal Polymer Wares Limited costs BDT 450.

(9) Retailers

There are some supermarket chains in Bangladesh. Overview of the major supermarket chains in Bangladesh are summarized in the table below.

Table 38 Overview of major supermarket chains in Bangladesh

	Shwapno	Meena Bazar	Agora
Name of company	ACI Logistics Limited	Gemcon Food and Agricultural Products Ltd.	Rahimafrooz Superstores Limited
Year of establishment	2008	2002	2001
Number of shops	The number of own shops is 61, while the number of franchise shops is 66. 121 shops are located in Dhaka, two shops in Chattogram, and four shops in Sylhet. The total floor area is 347,034 feet ² .	17 shops are located in Dhaka, and one in Chattogram. The total floor area is 54,000m ² .	14 shops are located in Dhaka, one in Chattogram, and two in Sylhet (17 in total). (4 shops were closed in past one year.)
Sales	It is estimated that Shwapno has about 45% of total supermarket sales in Bangladesh.	About BDT 2.2 billion. The average growth rate is about 6%.	(Not disclosed.)
Procurement	The company has distribution and processing centers in Savar and Dhaka. The company became a member of Global GAP.	The company directly purchases crops from farmers and suppliers in Kawran Bazar. The company sorts and repackages at its own processing unit.	The company has not started contract farming yet.
Investment needs	USD 10 million to USD 100 million for the establishment of cold chains, processing, the expansion of a chilling capacity at shop level (USD 5 million used for the pilot project)	Investments for its own crop production is planned (the details are still being developed)	Loans are not required, as European investment funds have a stake.

Source: The Survey Team

During interviews, it was confirmed that some supermarket chains had plans to introduce or expand processing facilities, and are expected to increase the value addition of agricultural crops.

In general, one supermarket outlet has seven to eight refrigerating or freezing facilities for display and storage purposes. Supermarket chains do not have cold storage facilities in their distribution centers, as suppliers directly deliver frozen items to the outlets.

3.1.4. Current Situation and Issues on Food Value Chain of Selected Products

In order to review current situation and issues on the food value chain, the Survey Team selected four crops as the target for a field study. Rice and potatoes were selected because of their large production volumes. Mangoes and tomatoes were selected because their production volumes are relatively large, and are processed for various other products.

This section summarizes the current situation and issues of each selected crop based on the results of a field study and desk research including a review of statistic data and other related reports.

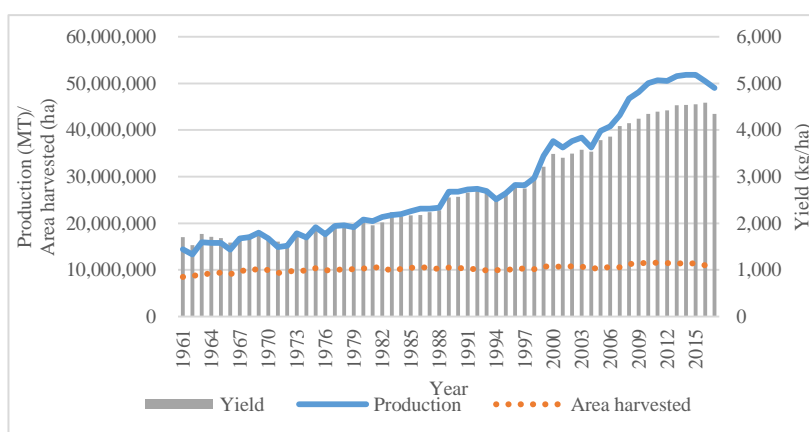
(1) Rice

1) Production

a) Production volume

As Table 28 indicates, rice, which accounts for 53.4% of the total agricultural production in Bangladesh, is the most important crop. Due to the government’s initiative to ensure food security, the rice production volume has been increasing. Paddy production in Bangladesh has more than tripled from 14.43 million MT in 1961 to 48.89 MT in 2017. As a result, Bangladesh became the fourth largest paddy producing country in the world after China (214.43 million MT), India (168.50 MT), and Indonesia (48.98 million MT). The volume of paddy production in Bangladesh is also larger than that in other major rice-producing countries in Southeast Asia, such as Vietnam (42.76 million MT, the fifth largest paddy producing country in the world) and Thailand (33.38 million MT, the sixth largest paddy producing country in the world).

As the figure and table below shows, paddy production increased with yield.



Source: FAOSTAT

Figure 19 Paddy production, area harvested, and yield

Table 39 Paddy production (MT), area harvested (ha) and yield (kg/ha)

Year	Production (MT)	Area harvested (ha)	Yield (kg/ha)
1961	14,426,184	8,483,516	17,005
1966	14,363,000	9,075,000	15,827
1971	14,896,689	9,297,682	16,022
1976	17,628,320	9,882,050	17,839
1981	20,445,872	10,460,925	19,545
1986	23,110,032	10,609,152	21,783
1991	27,242,000	10,244,503	26,592
1996	28,182,000	10,200,000	27,629
2001	36,269,000	10,661,000	34,020
2006	40,773,000	10,579,000	38,541
2011	50,627,000	11,528,000	43,917
2016	50,452,866	11,000,809	45,863
2017	48,980,000	11,272,000	43,453

Source: FAOSTAT

Bangladesh has three rice production seasons, namely Aus, Aman, and Boro. Rice is mainly produced during the Aman and Boro seasons. Of the total rice production of 36.27 million MT in 2017, 2.71 million MT (7.4% of total rice production) were produced during the Aus season,

while 13.99 MT (38.6%) and 19.58 MT (54.0%) were produced during the Aman and Boro seasons, respectively. The time of sowing and transplanting, as well as the time of harvest of each season are shown in the table below.

Table 40 Time of sowing or transplanting, and time of harvest

Season	Variety	Time of sowing or transplanting	Time of harvest
Aus	Local (broadcast)	Mid-March to mid-April	Mid-June to early August
	High yield variety (transplant)	Mid-March to mid-April	July to August
	High yield variety (broadcast)	Mid-March to mid-April	Late July to August
Aman	Local (broadcast)	Late-June to early September	December to early January
	High yield variety (transplant)	Mid-March to mid-April	Mid-November to mid-December
	High yield variety (broadcast)	Late-June to mid-August	December to early January
Boro	Local (broadcast)	Mid-November to mid-January	April to May
	High yield variety (transplant)	December to mid-February	Mid-April to June
	High yield variety (broadcast)	December to mid-February	Mid-April to June

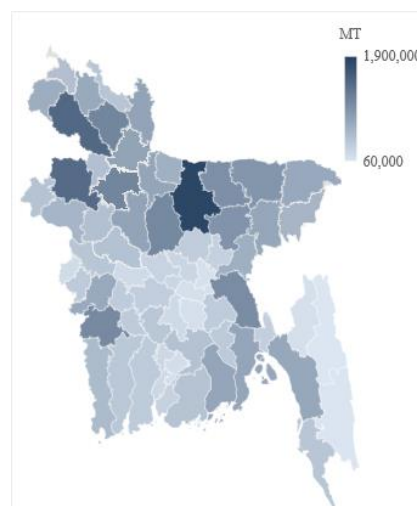
Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Rice is cultivated nationwide in Bangladesh. The areas with large rice production are the Mymensingh District, Mymensingh Division (1.83 million MT), the Dinajpur District, Rangpur Division (1.45 million MT), and the Naogaon District, Rajshahi Division (1.42 million MT), as detailed in the table and figure below.

Table 41 Major rice production district in Bangladesh

	District	Division	(MT)	Share (%)
1	Mymensingh	Mymensingh	1,831,173	5.0%
2	Dinajpur	Rangpur	1,452,197	4.0%
3	Naogaon	Rajshahi	1,422,095	3.9%
4	Bogra	Rajshahi	1,232,886	3.4%
5	Rangpur	Rangpur	1,126,708	3.1%
6	Tangail	Dhaka	1,092,428	3.0%
7	Jessore	Khulna	1,076,817	3.0%
8	Comilla	Chattogram	1,050,299	2.9%
9	Netrakona	Mymensingh	1,015,549	2.8%
10	Kishoreganj	Dhaka	966,261	2.7%
	Total		36,278,332	100.0%

Source: BBS (2019) Yearbook of Agricultural Statistics 2018



Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Figure 20 Rice production map

b) Productivity

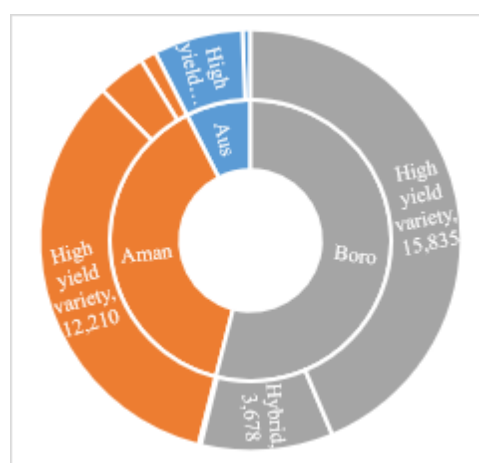
The Bangladesh Rice Research Institute (BRRI), the Bangladesh Institute of Nuclear Agriculture (BINA), and universities have mainly developed high yield varieties.

According to the Yearbook of Agricultural Statistics 2018 published by Bangladesh Bureau of Statistics (BBS), the proportion of use of high yield variety and hybrid variety were high, especially during the Boro season. As the following table shows, almost 100% of rice cultivated during the Boro season in 2017-18 was either high yield variety or hybrid variety.

Table 42 Variety of rice, planted area, and production by season (2017–18)

Season	Variety	Area		Production		Yield (kg/acre)
		('000 acre)	(%)	('000 ton)	(%)	
Aus	Local	396	14.9%	223	8.2%	562
	High yield variety	2,260	85.1%	2,487	91.8%	1,100
	Subtotal	2,656	100.0%	2,710	100.0%	1,020
Aman	Local (broadcast)	903	6.4%	442	3.2%	490
	Local (transplant)	2,313	16.5%	1,341	9.6%	579
	High yield variety	10,818	77.1%	12,210	87.3%	1,228
	Subtotal	14,034	100.0%	13,993	100.0%	997
Boro	Local	80	0.7%	62	0.3%	777
	High yield variety	9,992	83.2%	15,835	80.9%	1,558
	Hybrid	1,935	16.1%	3,678	18.8%	1,900
	Subtotal	12,007	100.0%	19,575	100.0%	1,630
	Total	28,697		36,278		1,264

Source: BBS (2019) Yearbook of Agricultural Statistics 2018



Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Figure 21 Rice production in the Aus, Aman, and Boro seasons

As shown in the table below, although the paddy yield in Bangladesh is lower than those in Australia and Egypt, which have large rice production, and those in other major Asian rice producing countries, such as China, Vietnam, and Indonesia, it is higher than those in neighboring countries, such as Pakistan and India. As there is yield gap between the research level and farmers' fields, BRRI has been working to minimize it²⁷. The reasons for the above yield gap were regarded as: inappropriate farm management such as timing of transplanting; an unbalanced application of fertilizer; and inappropriate weed and pest management²⁸.

²⁷ BRRI Annual Report 2018–19 Preface

²⁸ Journal of International Cooperation for Agricultural Development (2016) Rice cultivation in Bangladesh: Present scenario, problems, and prospects

Table 43 Paddy yield in major rice producing countries

Country	Yield (kg/ha)
Australia	9,820.8
Egypt	9,301.5
U.S.A.	8,414.7
China	6,909.3
Japan	6,671.2
Viet Nam	5,547.6
Indonesia	5,154.7
Bangladesh	4,345.3
Pakistan	3,852.5
India	3,848.0
Thailand	3,145.0

Source: FAOSTAT

c) Cultivation

The rice farmers visited during the field study in the Bogra District explained that they undertook the following activities for rice cultivation. The necessary labor and input for those activities are summarized in the table below.

- Land preparation: by hiring a tractor;
- Fertilizing: using both organic and chemical fertilizer;
- Seedlings: by purchasing seeds and growing seedlings;
- Transplanting: by hiring laborers;
- Weeding: by hiring laborers;
- Fertilizing and spraying for pests: by hiring laborers;
- Irrigation: by using a pump; and
- Harvesting: by hiring laborers.

Table 44 Cost and profit of rice production (per acre) (BDT)

Activity	Month/ times	How to do it	Input	Cost of input (total)	Labor			Production cost (total cost)
			Necessary input (seed, fertilizer, agro-chemical etc.)		Required manday (hired labor)	Per day cost for labor	Labor cost (total)	
Land preparation	Sep	Tractor		1,800				1,800
Fertilizing	Sep	Own	Organic fertilizer: 2,000 Potash: 1620 Phosphate: 1,600	7,020				7,020
Planting	Sep	Laborer	Seed: 500 Insect killer: 700 Urea: 400 Organic fertilizer: 1,200	2,800	2 days * 6 persons	500	6,000	8,800
Fertilizing and spraying	Sep-Dec	Laborer	Urea: 1,500 Insects killer: 1,200	2,700	1 day * 9 persons	500	4,500	7,200
Weeding	Sep-Dec	Laborer			1 day * 9 persons	500	4,500	4,500
Irrigation		Shallow pump	Shallow pump (with electricity)	4,500				4,500
Harvesting	Dec	Laborer			1 day *9 persons	500	4,500	4,500
Total Cost								36,820
Production and Sales (3000kg * BDT 20/kg)								60,000
Profit								23,180

Source: The Survey Team



Land preparation with the power tiller



Transplanting by laborers



Some farmers purchase seedlings

Source: The Survey Team

Photo 4 Rice farming activities

d) Harvesting

Two or three crops per year that combine rice and other crops are common in Bangladesh. In this case, farmers have to harvest the crop in a season, and prepare the land for the next season before it starts. Although land preparation is almost mechanized using power tillers or tractors, rice planting and rice harvesting are not yet mechanized, and depend on laborers. As summarized in the table below, the usage ratio of the rice transplanting machine and combine harvester are only 1% and 2%, respectively. However, because of recent labor shortages, paddy fields sometimes cannot be harvested in a timely manner, causing the harvest volumes to decrease²⁹. In

²⁹ The Daily Star (2018) Labour crisis hits Boro harvest (<https://www.thedailystar.net/business/potatofarmersdistracted1343416>)

this regard, agriculture mechanization, especially the introduction of combine harvesters, is urgently needed.

Table 45 Agricultural mechanization in Bangladesh (Rice) (reposted)

Activities	Mechanization %	Note
Cultivation	98%	Power tiller 60%, Tractor 38%
Irrigation	95%	Diesel pump 68%, electrical pump 25%, and solar pump 2%
Seedling and planting	Mostly manual	Rice trans planter less than 1%
Harvesting	Mostly manual	Thresher 80%, Reaper 2%, and Combine harvester 2%

Source: ACI

2) Distribution (paddy and rice)

Paddy and rice are traditionally distributed by farmers to consumers through complex channels, such as wholesale markets near the production areas, wholesale markets near consumers, and retailers. However, processing companies or supermarket chains have established a new type of distribution channel: procuring paddy directly from farmers.

a) Rice mill

Paddy is milled and sold to consumers in the form of polished rice. Rice mills are categorized into three types, namely husking mill, semi-auto mill, and auto mill.

Parboiled rice, which is milled from boiled paddy, is common in Bangladesh. Rice mills that are not automated require physical labor for each step, such as boiling and drying paddy.



Small semi-auto mill



A processing line without boiling facilities



Paddy to be brought to other facilities for boiling



Sun drying of paddy



Transportation of paddy and rice



Storage of paddy and rice

Source: The Survey Team

Photo 5 Rice mill (semi-auto mill)

According to the Bangladesh Auto Rice Mill Owner's Association, whose members include semi-auto and auto mills, large companies, such as ACI, PRAN, and City Group, have large auto mill plants with a capacity of 20 to 100 MT per hour, while medium-sized semi-auto or auto mills generally have a 5 to 16 MT per hour capacity. The association estimates that approximately 600 auto or semi-auto mills, and 3,400 husk mills are operated in Bangladesh. The association also estimates that about 25% of paddy are milled by large auto mills. According to BRRI, about 20% to 25% of paddy are milled by husk mills, and the rest are milled by auto or semi-auto mills. Satake is famous among Japanese rice mill machineries. About 60%, 20%, 10%, and 10% of rice mill machines are made in China, Japan (Satake), India, and Europe (Buhler)³⁰, respectively. Japanese and European rice mill machines are recognized as expensive, but high quality, and therefore enjoy a certain market share in Bangladesh.

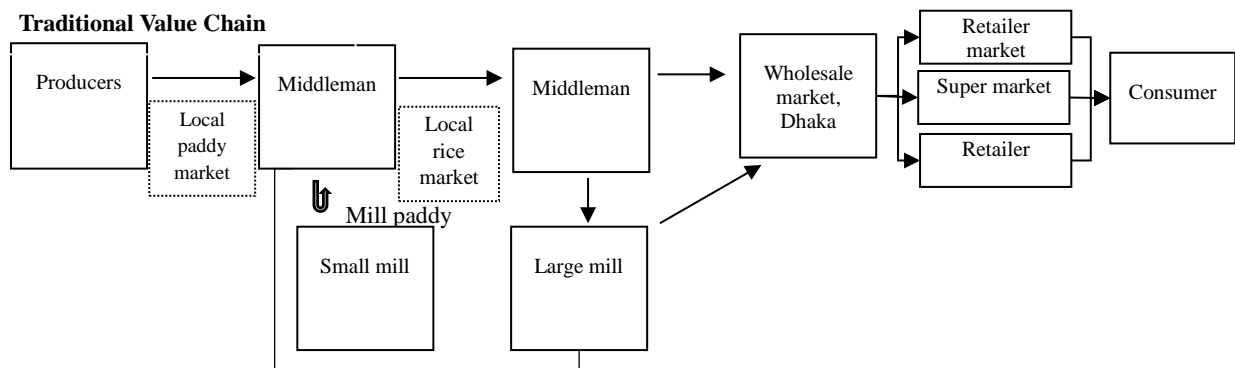
³⁰ Bangladesh Auto Rice Mill Owner's Association

b) Distribution channel

i) Traditional rice distribution channel

The traditional rice value chain is complex. The farmers visited by the Survey Team in the Bogra District during the field study stated that the paddy and rice are distributed to consumers in the following way (see the figure below).

- Farmers bring paddy, which they store at home, to the local paddy market when they need cash.
- Large middlemen purchase paddy at the local paddy market, then mill or purchase rice at the local rice wholesale market, remove stones or dust, then sell the rice to wholesalers near consumers. Sometimes, large middlemen sell paddy or rice purchased at the local wholesale market to auto or semi-auto mills without any processing. Those auto or semi-auto mills are relatively large-scale, and sometimes use European or Japanese machineries. Those auto or semi-auto mills sell rice to the wholesale market near consumers.



Source: The Survey Team

Figure 22 Rice value chain (traditional value chain in Bogra District)



Paddy wholesale market in the Bogra District. Paddy are sold along the street.

Rice wholesale market in the Bogra District

Two bags are displayed in rice whole markets as samples for buyers.

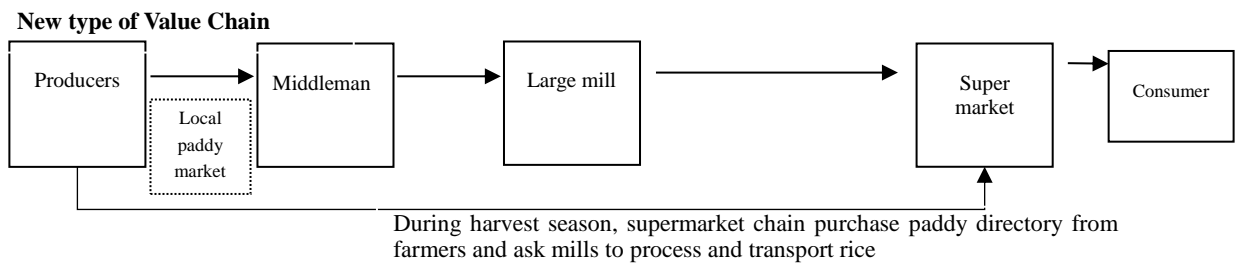
Source: The Survey Team

Photo 6 A paddy market and a rice market in the Bogra District

The process of milling rice can be made more efficient by shifting from husking mills or semi-auto mills to auto mills. Better mills improve the yield rate and increase value addition by removing stone, and broken and discolored rice. However, the rice sector involves many stakeholders; therefore, the impact of the promotion of sophisticated auto mills to farmers and rural people should be carefully analyzed.

ii) New types of rice distribution channel

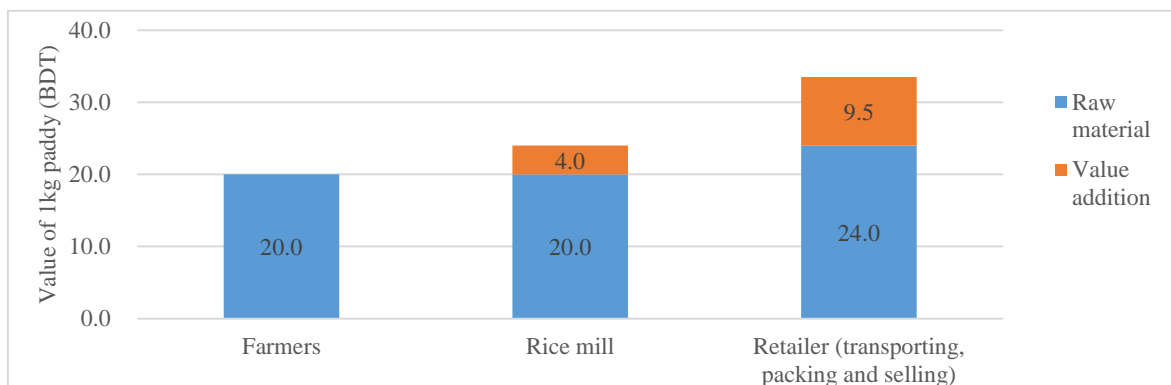
New types of distribution channel can include contract farming through large food processing companies, and direct purchasing through supermarket chains. The figure below summarizes distribution channels of direct purchases through supermarket chains. The supermarket chains purchase paddy directly from farmers during harvest season, and ask rice mills to mill the paddy. The rice is transported to a processing center of the supermarket chains, and is packed at the center. Packed rice is distributed to retail shops, and is sold to consumers. Outside the paddy harvest season, the supermarket chains ask rice mills to procure and mill paddy. The rice mills procure paddy through local wholesalers, mill the paddy, then sell the rice to the supermarkets. Rice mills and supermarket chains do not generally store paddy and rice for long durations.



Source: The Survey Team

Figure 23 New type of rice distribution channel

Changes in the value of 1kg paddy in the new types of distribution channel is summarized in the figure below. In the case of rice milling, the value addition is smaller than those for mango juice and potato chips, as mentioned later.



Source: The Survey Team

Figure 24 Changes in the value of 1kg paddy in the new type of distribution channel (BDT)

3) Processing

Rice is processed into puffed rice and noodles, and sold to consumers.



Rice is roasted for 30 minutes.



Roasted rice is moved to the processing line.



Rice is expanded and exploded with heat to make puffed rice.



Rice is packed after weighing manually



Individual products are packed in large bags

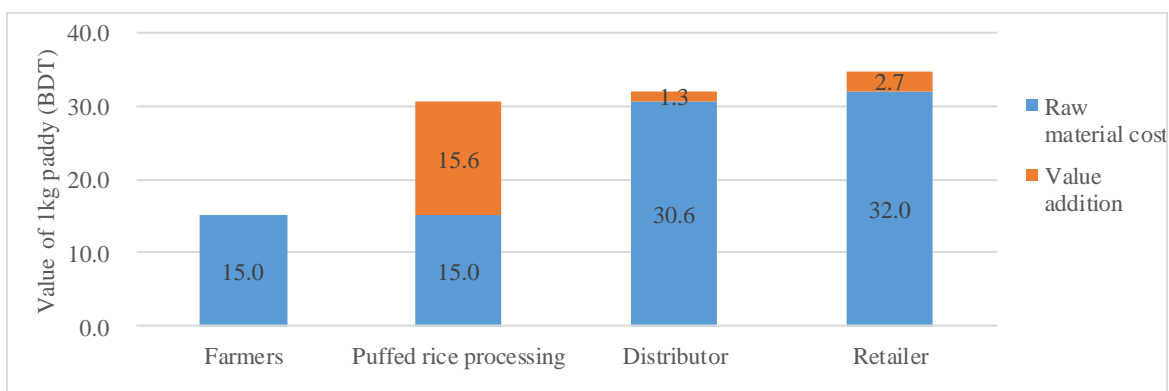


Rice is sold at domestic market as well as exported to Malaysia and Italy

Source: The Survey Team

Photo 7 A puffed rice manufacturing facility

Puffed rice can be processed at simple facilities. The changes in the value of 1kg paddy to puffed rice is summarized in the figure below.



Source: The Survey Team

Figure 25 Changes in the value of 1kg paddy to puffed rice

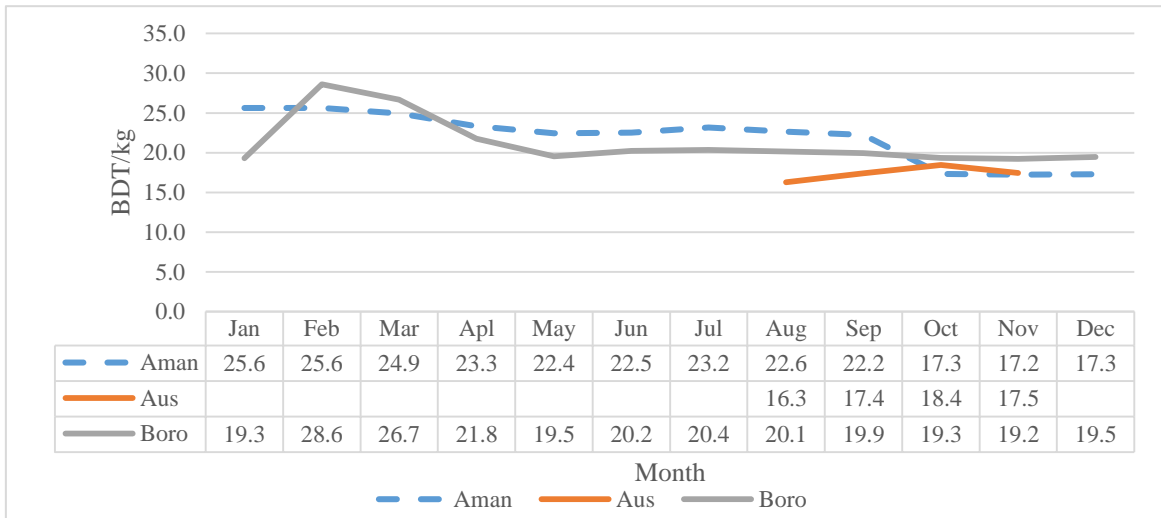
4) Retail

Rice is generally sold by weight in Bangladesh. About 13,000 MT of rice was packed and sold³¹, from a total of 36.27 million MT produced in 2017–18³². Even modern supermarket chains mainly sell rice by weight. However, since packed rice sales are expected to increase by 11.9%, rice is expected to gradually shift from being sold by weight to simply being sold packed at fixed weights.

The figure below shows wholesale price of paddy of the Aman, Aus and Boro seasons. Since paddy can be stored for a long time, seasonal fluctuations in wholesale prices are relatively small. On the other hand, the differences between the wholesale prices of general rice and aromatic rice are large.

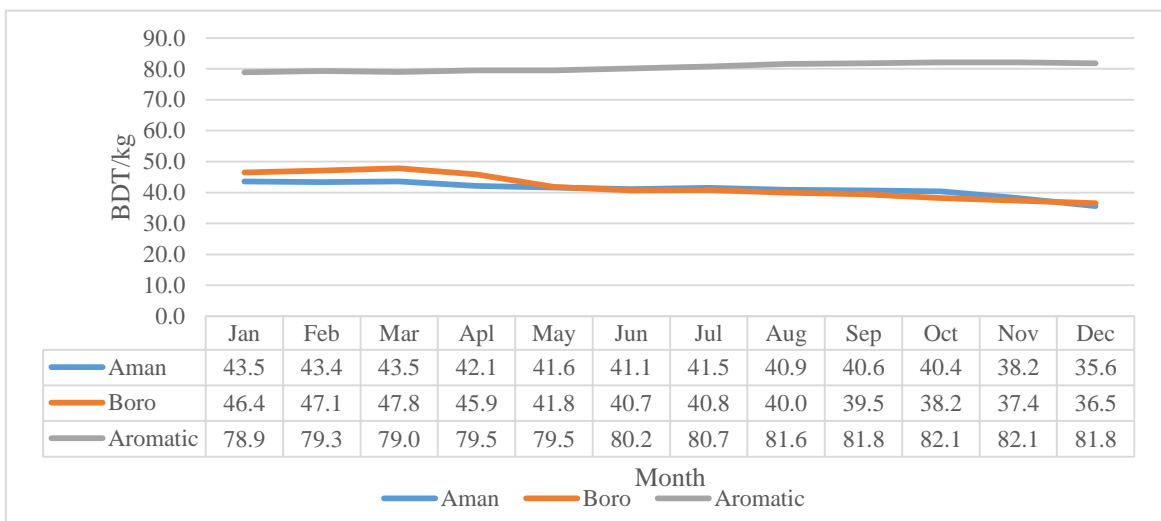
³¹ Euromonitor International (2019) Packaged Food in Bangladesh

³² BBS (2019) Yearbook of Agricultural Statistics 2018



Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Figure 26 Wholesale price of paddy (2017)



Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Figure 27 Wholesale price of rice (2017)

5) Issue of the value chain

a) Production

i) Productivity improvement

Although the yield has been increasing, the gap between the research level and farmers' fields is still an issue. According to a study the gap is caused by poor farm management, such as unbalanced applications of fertilizers, and poor weed and pest

management.

ii) Mechanization for harvesting

For rice cultivation, land preparation is mechanized, but rice planting and harvesting are not yet mechanized. In Bangladesh, multi-cropping is common; therefore, timely harvesting is necessary. Because of recent labor shortages, mechanization for harvesting is urgently needed.

b) Distribution

In Bangladesh, about 75% to 80% of paddy are milled by auto or semi-auto mills. Husking mills usually do not have functions that remove stone, discolored or broken rice, or other foreign matter. Rice mills can be more efficient if husking mills or semi-auto mills are replaced to auto mills. Using better mills can improve the yield rate and increase the value addition by removing stone, and broken rice and discolored rice. As mentioned later, production of rice bran oil requires upgrading of rice mills (from husking mills to auto or semi-auto mills).

c) Processing

Puffed rice and noodles are produced from rice, and those processed products add value to milled rice.

(2) Potato

1) Production

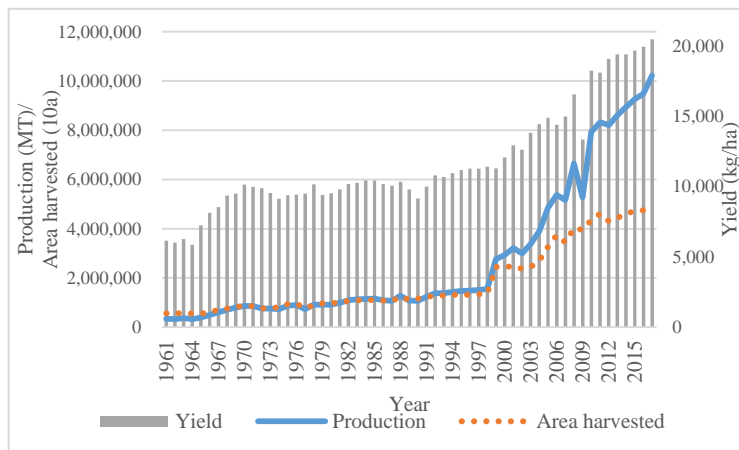
a) Production volume

As summarized in Table 28, 14.3% of the total agricultural production consists of potatoes. Therefore, it can be concluded that the potato is one of the most important crops in Bangladesh. The production volume of potatoes was about 343 thousand MT in 1961, 862 thousand MT in 1971, and more than 1 million MT in the 1980s. After 2000, the production volume of potatoes increased rapidly and reached over 10 million MT in 2017. Bangladesh became the seventh largest potato producing country, after China (99.21 million MT), India (48.61 million MT), Russia (29.59 million MT), Ukraine (22.21 million MT), U.S.A. (20.02 million MT), and Germany (11.72 million MT).

As the figure and table below show, the increase in potato production has been achieved by both the increase in the yield and increase in area harvested. On the other hand, 10 million MT of potato production in 2017 seemed to exceed domestic demand, so potato prices dropped³³ (as

³³ Daily Star (2017) Potato farmers distraught (<https://www.thedailystar.net/business/potato-farmers-distraught-1343416>)

a result, the potato production decreased from 10.2 million MT in 2017 to 9.48 million MT in 2018).



Source: FAOSTAT

Figure 28 Potato production, area harvested, and yield

Table 46 Potato production, area harvested, and yield

Year	Production (MT)	Area harvested (ha)	Yield (kg/ha)
1961	343,408	55,847	6,149
1966	493,800	60,700	8,135
1971	862,600	86,600	9,961
1976	903,025	95,932	9,413
1981	998,909	102,128	9,781
1986	1,102,790	108,410	10,172
1991	1,236,805	123,844	9,987
1996	1,491,560	132,300	11,274
2001	3,216,000	248,988	12,916
2006	5,368,400	373,200	14,385
2011	8,326,389	460,197	18,093
2016	9,474,099	475,488	19,925
2017	10,215,957	499,725	20,443

Source: FAOSTAT

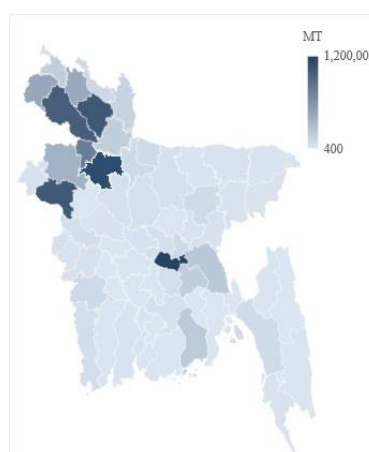
Potatoes are cultivated once a year in Bangladesh. Potatoes are sown from the middle of September to November, and is harvested from January to March³⁴.

Potatoes are cultivated nationwide, but production volumes are large in Northeast areas, such as the Rajshahi Division and Rangpur Division, in addition to the Munshiganj District, Dhaka Division (1.18 million MT).

Table 47 Major potato producing areas in Bangladesh

	District	Division	Production (MT)	Share (%)
1	Munshiganj	Dhaka	1,184,479	12.2%
2	Bogra	Rajshahi	1,134,920	11.6%
3	Rangpur	Rangpu	1,029,722	10.6%
4	Rajshahi	Rajshahi	1,021,886	10.5%
5	Dinajpur	Rangpur	979,600	10.1%
6	Joypurhat	Rajshahi	748,632	7.7%
7	Thakurgaon	Rangpur	445,918	4.6%
8	Nilphamar	Rangpur	433,573	4.4%
9	Naogaon	Rajshahi	373,450	3.8%
10	Comilla	Chattogram	214,160	2.2%
	Total		9,744,412	100.0%

Source: BBS (2019). Yearbook of Agricultural Statistics 2018



Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Figure 29 Potato production map

³⁴ BBS (2019) Yearbook of Agricultural Statistics 2018

b) Productivity

As mentioned above, the increase in potato production was achieved by increasing both the yield and the area harvested. As shown in the table below, the potato yield in Bangladesh is higher than that of China, the largest potato producing country, Russia, the third largest, and Ukraine, the fourth largest; however, it is about half of that of European countries and the U.S.A.

Table 48 Ten largest potato producing countries and their potato production volume and yield

	Country	Potato production (MT)	Yield (kg/ha)
1	China	99,205,580	17,201
2	India	48,605,000	22,306
3	Russian Federation	29,589,976	15,663
4	Ukraine	22,208,220	16,784
5	United States of America	20,017,350	48,233
6	Germany	11,720,000	46,785
7	Bangladesh	10,215,957	20,443
8	Poland	9,171,733	27,850
9	Netherlands	7,391,881	45,972
10	France	7,342,203	42,322

Source: FAOSTAT

For potato cultivation in Bangladesh, the use of high-yield varieties is common—about 90% of potato production is from high-yield varieties. Potato contract farmers that seem to have better farm management techniques than others said that they produced 30 MT per hectare, more than the others produced. Therefore, the potato yield in Bangladesh can be increased by improving farm management techniques.

Table 49 Potato production, area harvested, and yield of variety-wise (2017–18)

Variety	Area		Production		yield	
	(acre)	(%)	(MT)	(%)	(kg/acre)	(kg/ha)
Local	180,630	15.3%	873,606	9.0%	4,836	11,942
High yield variety	999,072	84.7%	8,870,805	91.0%	8,879	21,924
Total	1,179,702	100.0%	9,744,411	100.0%	8,260	20,395

Source: BBS (2019) Yearbook of Agricultural Statistics 2018

c) Cultivation

The potatoes for potato chips processing require low sugar content varieties so that they can be a good color and have a round shape; they can then be easily fried and cut to suitable circles from any direction. In Bangladesh, Lady Rosetta and Courage are used for potato chips.



Diamond
(Old variety, table purpose)



Asterix
(Variety from Europe, fit for
French fries)



Courage
(for potato chips)



Lady Rosetta
(for potato chips)

Source: The Survey Team

Photo 8 Major potato varieties in Bangladesh

The potato farmers that the Survey Team visited during the field study in the Dinajpur District performed the following activities for their potato production. The necessary labor and input for those activities are summarized below, and in the table.

- Land preparation: by hiring a tractor;
- Fertilizing: using organic and chemical fertilizers;
- Planting: by planting seed potato in their field;
- Pesticide: a company contracted with farmers provides spray services for agrochemicals on a cost basis;
- Fertilizing and pest control: by hiring laborers;
- Irrigation: by using a pump; and
- Harvesting: by hiring laborers.

Table 50 Production cost and profit of potato production (per acre) (BDT)

Activity	Month/ times	How to do it	Input	Cost of input (total)	Labor		Labor cost (total)	Production cost (total cost)
			Necessary input (seed, fertilizer, agro-chemical etc.)		Required man-day (hired labor)	Per day cost for labor		
Land preparation	Nov	Tractor		1,800				1,800
Fertilizing	Nov	Own	Organic fertilizer: 2,000 Potash: 1620 Phosphate: 1,600	7,020				7,020
Planting	Nov	Own	Seed: 16,500 Insect killer: 700 Urea: 400 Organic fertilizer: 1,200	18,800	2 days * 6 persons	500	6,000	24,800
Fertilizing	Nov-Feb	Own	Urea: 1500	1,500				1,500
Fertilizing and spaying	Nov-Feb	Own	Insect killer: 1,200 * 6 times	3,600	1 person * 6 times	500	3,000	6,600
Irrigation		Shallow pump	Shallow pump (with electricity)	1,600				1,600
Harvesting	Feb	Laborer					6,000	6,000
Total Cost								49,320
Production and Sales (10,000kg * BDT 10/kg)								100,000
Profit								50,680

Source: The Survey Team

d) Harvest

As potato harvesting is not yet mechanized in Bangladesh, harvesting activities depend on manual labor. In the case of contract farming for processing a variety, buyers purchase an agreed volume of potato at an agreed size that is fit for processing; the agreement is made between the company and the farmers before the cultivation season starts. The rest of the potatoes are usually sold as table purpose potatoes through conventional distribution channels. Sorting is also undertaken by laborers. Harvesting and sorting are expected to be mechanized in the future.

2) Distribution

Unlike other vegetables, the potato is stored in cold storage facilities after harvest, and is sold until the next harvest season. It is said that 90% of the total cold storage capacity (about 5.5 million MT) in Bangladesh is used for storing potatoes. It means that about half of the harvested potatoes are stored in cold storage facilities.

Cold storage facilities for potatoes are located in potato producing areas. According to the Bangladesh Cold Storage Association, about half of harvested potatoes in those cold storage facilities is owned by farmers and the other half is owned by middlemen or exporters. Users of cold storage facilities can keep the potatoes until the next harvest season for BDT 4 per kg to BDT 4.6 per kg. Both potato prices and farmers' incomes can be stabilized thanks to cold storage facilities.

< Cold Storage >

Potatoes are generally stored at 3 degree Celsius, but the potatoes for processing purposes need to be stored at 10 to 12 degree Celsius to avoid increasing their sugar content.

Some cold storage owners provide loans to their users, taking their stored potato as collateral. Some farmers purchase potatoes from other farmers by using money provided by cold storage owners so that they can work as small-scale middlemen. The premises of some cold storage facilities are used as a potato wholesale market where buyers come to buy potatoes from the users of the cold storage facilities. Cold storage facilities can contribute toward diversification of farmers' income and enable farmers to become small-scale middlemen.

If these kind of cold storage facilities can be used for onion, ginger, and garlic, it could contribute to the stabilization of the farm gate prices of those crops as well as the diversification of farmers' incomes. However, each crop has a suitable temperature and humidity for storage, and the volume of those crops is not as large as that of the potatoes. Multi-purpose cold storage facilities can store different kinds of crops at temperatures and humidity levels that are appropriate for each crop. However, the construction costs of a multi-purpose cold storage facility are higher than that of sole potato cold storage facilities, and the number of users of such multi-purpose cold storage facilities is still limited. Therefore, multi-purpose cold storage facilities are not widely established³⁵.



Potato cold storage

Potato transportation

Sorting before shipping

Source: The Survey Team

Photo 9 A cold storage for potatoes

³⁵ The construction cost of a multi-purpose cold storage facility, which has one third of the average potato cold storage capacity (10,000 MT), is estimated as being double the construction cost of a potato cold storage facility. A case for which a wholesaler established a multi-purpose cold storage facility is observed. However, evaluating the business feasibility of multi-purpose cold storage facilities owned by cold business operators is difficult because such estimation requires calculating the number of users of multi-purpose cold storage facilities, which is still uncertain.

3) Processing

Potato chips are made by slicing, frying, and flavoring potatoes, while potato clackers are made by formulating, frying, and flavoring potato starch or wheat. This section summarizes the process of making potato chips (not potato clackers).

The potatoes for processing potato chips require low sugar content and a round shape so that circular slices, instead of ellipse-shaped slices, can be obtained. Processing varieties of potatoes need to be procured for potato chips production, since potatoes generally produced in Bangladesh contain too high a sugar content for processing and have shapes that are sometimes elliptical. Some potato chips processing companies use contract farming, while others procure processing varieties of potatoes through wholesalers who use contract farming.

The major processing lines of potato chips is shown below.



Potato conveyer belt after washing



Peeling process



Peeled potato



Cutter (Slicer)



Sliced potato

Slice washer



Fryer

Vibrator to remove oil

Packing

Source: The Survey Team

Photo 10 A processing line of potato chips

The seasoning process of potato chips is shown below.



Mixing potato chips with seasoning

Storing for a while after the seasoning process

Packaging

Source: The Survey Team

Photo 11 Equipment for adding seasonings to potato chips

The major machineries and equipment for processing potato chips are the following:

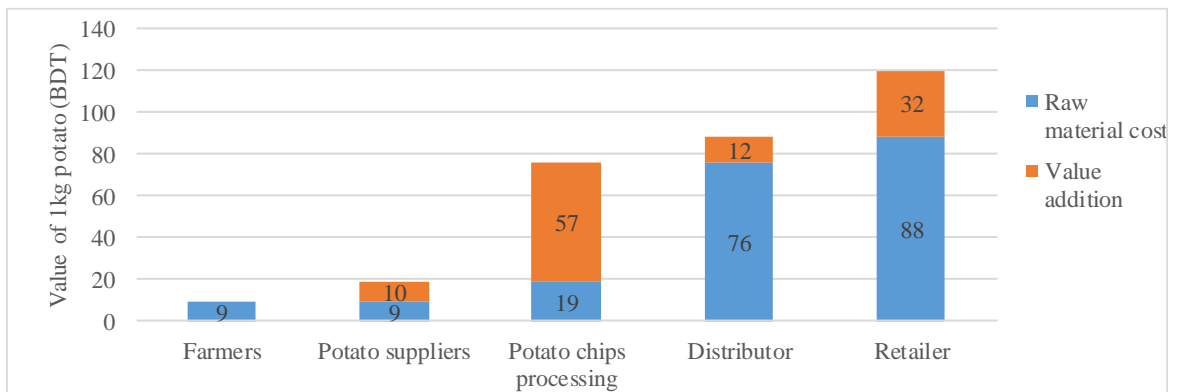
- a) Peeler;
- b) Cutter (Slicer);
- c) Slice washer;
- d) Blancher (Vibrator) (to remove water);
- e) Fryer;
- f) Spice mixer; and
- g) Weighing and packing.

It was pointed out by food processing companies that the quality of the weighing and packaging machineries of potato chips is low. If each package of potato chips does not have same

as or more than the weight described on its package, BSTI and the consumer protection authority may penalize the food processing companies. The packaging of potato chips is sealed by heat. If the temperature is not stable, the packaging cannot be sealed properly. It was said that one Chinese weighing and packaging machine costs about BDT 1 million while one Japanese weighing and packaging machine costs about USD 120,000 (about BDT 10 million assuming USD 1 is equivalent to BDT 85), which is 10 times the amount for the Chinese machine. However, the Japanese machine has a defect rate of less than 1%, while the defect rate of the Chinese machine is 5%. From a medium to long term viewpoint, the Japanese machine is more cost effective than the Chinese machine. However, because of lack of finance, among other things, many food processing companies purchase the Chinese machine.

Putting nitrogen into individual packages can delay the oxidation of the products, and reduce the quality in flavor and freshness. However, traditional small bakery making companies do not have such equipment. In addition to such nitrogen filling machines, nitrogen generators contribute to the quality control by keeping the necessary nitrogen at a stable level. Although nitrogen generators can stably produce nitrogen, few of the food processing companies visited by the Survey Team had nitrogen generators.

The change in the value of 1kg potato in the potato chips value chain is illustrated in the figure below. It can be observed that value addition at the processing stage is relatively large.



Note: During the potato chips processing, other ingredients, such as spices, are added

Source: The Survey Team

Figure 30 Change in value of 1kg potato (BDT)

< Export and Import >

Export and import values and volumes of major potato-processed products are summarized in the table below. Potatoes can be processed into flakes, starch, frozen potato, and

so on. However, not many potato-processed products are exported, but rather are imported. Potato starch can be widely processed into chips, noodles, and so on.

Table 51 Export and Import volume and value of potato processed products (2018)

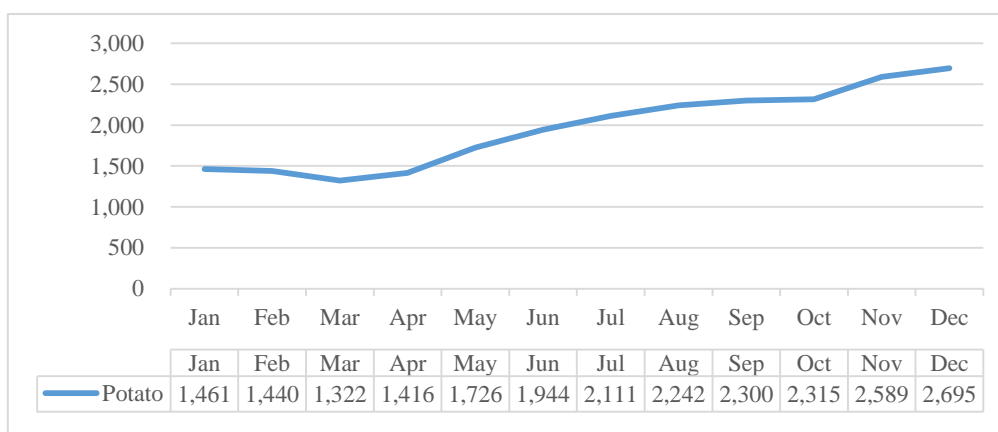
H.S. Code	Product label	Export		Import	
		(MT)	(1000 USD)	(MT)	(1000 USD)
'071010	Frozen potato	245	205	2	2
'10510	Potato powder and meal	250	255	-	-
'110520	Flakes, granules, and pellets of potatoes	1,203	1,513	1674	2594
'110813	Potato starch	80	66	1253	1028
'200410	Frozen potato (processed)*	31	52	1521	3297
'200520	Potatoes, prepared or preserved otherwise than by vinegar or acetic acid (excluding frozen)	73	200	N.A.	3010

Note: *: Potatoes, prepared or preserved otherwise than by vinegar or acetic acid, frozen

Source: International Trade Center website

4) Retail

Potatoes are sold by weight, like other vegetables. The figure below illustrates the change in wholesale prices of local variety potatoes in 2017. It shows that wholesale prices of potatoes dropped from January to March until the harvest season of potatoes, during which it gradually increased until the next harvest season.



Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Figure 31 Change in wholesale price of local variety potato (2017)

5) Issues on the value chain

a) Production

i) Productivity improvement

Similar with other agricultural crops, the potato yield can be improved in Bangladesh. One of companies that use potato contract farming said that the company monitors potato growth and provides pesticide spray services at the right time at an actual cost. The company also provides seed potatoes as well as other technical assistances to farmers. As a result, their contract farmers can produce 30 MT of potato per hectare, which is higher than average (about 20 MT per hectare) in Bangladesh. This indicates that it is difficult for farmers to identify appropriate pesticides, and spray it, at the right time. In order to increase productivity, the farm management of potato farmers needs to be improved.

b) Distribution

It is estimated that half of the potato proceeds in Bangladesh is stored in cold storage facilities, unlike other agricultural crops. Thanks to cold storage facilities, potato prices are more stable than those of onion and garlic. For other crops, including onion and garlic, multi-purpose cold storage facilities are needed.

c) Processing

There are various types of potato processed products. Although Bangladesh already fulfilled its domestic demand of potatoes, it does not produce many potato-processed products. The number of potato chip processing plants is increasing in Bangladesh, but Bombay Sweet, which owns the top brand of snacks, produces potato clacker. The Lay's brand owned by PepsiCo is also very popular in Bangladesh. However, Lay's is imported from India. Therefore, it can be said that there is still room to produce potato chips domestically. Bangladesh imports 1200 MT to 1600 MT of potato flakes, potato starch, and frozen potato. If Bangladesh can produce these kinds of potato-processed products, it can contribute toward the expansion of the food processing industry along with substitution of imported products.

On the other hand, food processing companies claim that the procurement of processing variety is difficult. It is said that frozen potatoes require specific varieties, but such varieties are not yet identified. Many food processing companies also claim that contract farming is difficult. Therefore, technical assistance or collaboration with farmers should be supported by the government or donors.

Processing technologies have room for improvement when compared to developed countries.

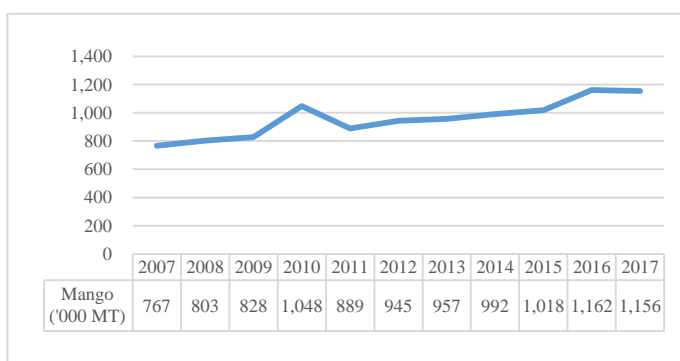
The Japanese weighing and packaging machine is expensive, but cost effective in the medium and long term compared to the Chinese weighing and packaging machine.

(3) Mango

1) Production

a) Production volume

As shown in Table 30, mango production in Bangladesh is 1,166 thousand MT, which is 23.6% of the total fruit production (4,948 thousand MT) in 2017–18. The mango production has been increasing. Mango production in 2017 was 1,156 thousand MT, which is 1.5 times of the figure in 2007 (767 thousand MT). Bangladesh is now the eighth largest mango producing country in the world.



Source: FAO (2017) Food Outlook Special Feature

Figure 32 Mango production in Bangladesh

Table 52 Mango production in the world

		Production (thousand MT)	Share (%)
1	India	18,458	39.2%
2	China	4,870	10.3%
3	Thailand	3,839	8.1%
4	Indonesia	2,239	4.8%
5	Mexico	1,582	3.4%
6	Pakistan	1,525	3.2%
7	Egypt	1,397	3.0%
8	Bangladesh	1,156	2.5%
9	Kenya	1,025	2.2%
10	Brazil	904	1.9%
	Total	47,133	100.0%

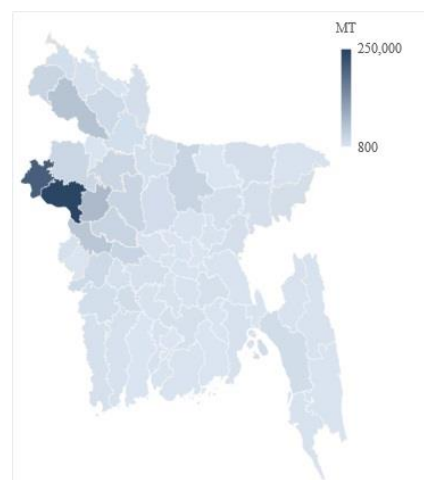
Source: FAO (2017) Food Outlook Special Feature

As shown in the table and figure below, mangoes are produced nationwide in Bangladesh, but 39.7% of mangoes was produced in the Rajshahi Division in 2017–18. In the Rajshahi Division, 242,299 MT (20.8% of total mango production in Bangladesh) and 203,521 MT (17.5%) of mangoes were produced in the Rajshahi District and Chapai Nawabganj District, respectively, in 2017–18.

Table 53 Major mango producing areas in Bangladesh

	District	Division	(MT)	Share (%)
1	Rajshahi	Rajshahi	242,299	20.8%
2	Nawabganj Chapai	Rajshahi	203,521	17.5%
3	Natore	Rajshahi	66,475	5.7%
4	Dinajpur	Rangpur	53,411	4.6%
5	Kushtia	Khulna	46,608	4.0%
6	Pabna	Rajshahi	33,625	2.9%
7	Rajbari	Dhaka	26,642	2.3%
8	Thakurgaon	Rangpur	26,165	2.2%
9	Mymensingh	Mymensingh	26,092	2.2%
10	Sirajganj	Rajshahi	26,092	2.2%
	Total		1,165,804	100.0%

Source: BBS (2019) Yearbook of Agricultural Statistics 2018



Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Figure 33 Mango producing area map

b) Productivity

In Bangladesh, the mango varieties Ashini (Ashina or Aswina), Fazli, Langra, Khirsapath, Amarapali, and BARI 4, improved by BARI, are cultivated. The other variety of mango is called, “Guti.” BARI roughly estimated the proportion of mango varieties cultivated in Bangladesh as follows: Ashini at 20%, Fazli at 15%, Langra at 10.5%, Khirsapath at 22–23%, Amarapali 17–18%, and Guti at 15%. The mango production volume per tree depends on the size of the tree. About 800 to 1,000 kg of mango can be harvested from a mango tree if the tree is large.

Mango orchards used to be owned by landlords, but small households have been increasingly involved in the micro-level orchard management, as reflected in the increase of its domestic consumption³⁶. About 40% of mango production in 2017–18 (1,165,804 MT) was produced in mango orchards, while about 60% was produced in other areas, as shown in the table below.

Table 54 Mango production inside and outside mango orchards

	Mango orchard area	Production inside of mango orchard	Production outside of mango orchard	Mango production (Total)
Mango production	109,584 acres	463,644 MT (38.8%)	702,160 MT (60.2%)	116,5804 MT (100.0%)

Source: BBS (2019) Yearbook of Agricultural Statistics 2018

³⁶ Katalyst (2016) Study on the Roles and Opportunities for Private Sector in Agro-food Processing Industry of Bangladesh

The table below shows the yields in major mango producing countries. As the table below shows, the mango yield in Bangladesh (6.13 MT per hectare) is lower than the world average (7.51 MT per hectare). However, based on the above table, the yield inside of the mango orchard in Bangladesh can be calculated to 4.23 MT per acre, which is equivalent to 10.44 MT per hectare. It means that the yield in the mango orchard in Bangladesh is higher than the world average, although it is still lower than that of Brazil (15.83 MT per hectare). This indicates that there is room to improve the yield of mango production.

Table 55 Production area, production, and yield in major mango producing countries (2012)

Country	Area (thousand ha)	Production (thousand MT)	Productivity (MT/ha)	% share in world total production
India	2312.30	15,026.70	6.50	40.48
China	464.34	4,351.29	9.35	11.72
Thailand	311.05	2,550.60	8.20	6.87
Pakistan	173.70	1,845.50	10.62	4.97
Mexico	174.97	1,632.65	9.33	4.40
Indonesia	131.67	1,287.29	9.78	3.47
Brazil	75.11	1,188.91	15.83	3.20
Bangladesh	170.80	1,047.85	6.13	2.82
Philippines	189.44	825.68	4.36	2.22
Nigeria	114.90	790.20	6.88	2.13
Other countries	827.04	6,578.07	7.95	17.72
World	4,946.31	37,124.74	7.51	100.00

Source: Agricultural and Processed Food Products Export Development Authority (APEDA), India website³⁷

c) Cultivation

Mangoes are mainly harvested from April to June, and the harvest time depends on variety. Farmers have the intention to cultivate different varieties to avoid an overlap of harvest time as well as to diversify the risk of pests and unexpected weather. The farmers visited during the field study perform the following activities for mango cultivation:

- Fertilizing: fertilizing Urea and DAP when needed;
- Spraying agrochemical: spraying insecticide, etc.;
- Irrigation: by watering the tree a few times per year;
- Weeding: by laborers when needed; and
- Harvesting: by laborers.

³⁷ <http://apeda.in/agriexchange/Market%20Profile/MOA/Product/MANGO.pdf>

Farmers cannot harvest for a few years after planting a mango seedling, but the harvest volume will increase year by year once mango fruits start to grow. The production costs of a mango farmer that was visited during the field study is summarized in the table below. As can be seen, farmers can make a profit through mango production.

Table 56 Production cost and profit of mango production (produce Guti in 1.67 acre) (BDT)

Activity	Month/ times	How to do it	Input	Cost of input (total)	Labor		Labor cost (total)	Production cost (total cost)
			Necessary input (seed, fertilizer, agro-chemical etc.)		Required man-day (hired labor)	Per day cost for labor		
Land preparation	7 days	Tractor	Fertilizer Agro-Chemical	7,140	7	400	2,800	9,940
Fertilizing	7-10 days	Labor	TSP, MOP, Urea	3,767				3,767
Spraying	3 times	Labor	Chemical Material	5,100	6	400	2,400	7500
Irrigation	1 time	Labor	Oil, Diesel	6,120	1	400	400	6,520
Harvesting	1 time	labor			16	400	6,400	6,400
Total Cost								34,127
Production and Sales (6000kg * BDT 20/kg)								120,000
Profit								85,873

Source: The Survey Team

The table below shows the internal rate of return (IRR) of mango production. The IRR of 10 years of mango production is estimated at 42%, so mango production can be recognized as a profitable business.

Table 57 Cash flow of mango production

Year	Outflow (BDT)	Inflow (BDT)	Net flow (BDT)
1	50,000	0	- 50,000
2	8,000	0	- 8,000
3	12,000	20,000	8,000
4	44,000	50,000	6,000
5	49,000	75,000	26,000
6	50,000	90,000	40,000
7	54,000	120,000	66,000
8	56,000	180,000	124,000
9	58,670	234,000	175,330
10	61,110	252,000	190,890
Total	442,780	1,021,000	578,220
Internal Rate of Return (IRR)		(42%)	
Net Present Value (NPV)		115,736	

Source: USAID (2014) Bangladesh Agriculture Value Chain Project

It is pointed out that mango yield is low because farmers do not properly apply fertilizer and agrochemicals. Some farmers claim that the agrochemicals available in the market are sometimes fake, so the farmers cannot get the expected results. However, one farmer said that

he could improve yields by properly applying agrochemicals based on suggestions from agrochemical companies or retailers³⁸. In addition to using agrochemicals, wrapping mango fruit with a paper bag is a way to protect mango fruit from insects. Some farmers already wrap their mango fruits with paper bags. According to these farmers, although wrapping mango fruits with paper bags create additional costs (the paper bags and laborers), the farmers can sell the mangoes at a price that is higher than those costs.



Mango fruits wrapped with paper bags

Paper bags produced by ACI

A mango fruit damaged by insects

Source: The Survey Team

Photo 12 Mango cultivation

d) Harvesting

Mango fruits on tall trees are harvested with long sticks appended with a net. Therefore, farmers can harvest mango fruits without damage. The mango fruits harvested are usually sold to middlemen, or transported by farmers to the market. Containers for the transportation mainly consist of bamboo baskets or plastic crates. Since these bamboo baskets or plastic crates are piled up on trucks, mango fruits in bamboo baskets get damaged. Plastic crates are recommended for fruit transportation. Plastic crates are manufactured in Bangladesh, but second-hand plastic crates come from India when Indian agricultural crops are imported; second-hand plastic crates are cheaper than newly manufactured plastic crates in Bangladesh.

³⁸ USAID had supported input suppliers by providing the necessary information to farmers as part of USAID's Agriculture Value Chain Project.



Stick with net for harvesting



Containers for transportation

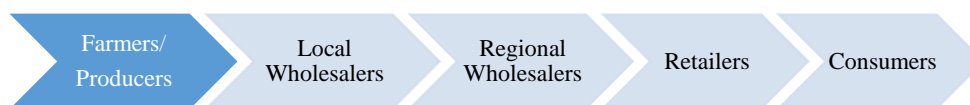
Source: The Survey Team

Photo 13 Mango harvesting

2) Distribution

a) Traditional mango distribution channel

Traditionally, mangoes are transported from farmers to consumers through a local wholesaler, a regional wholesaler, and retailer, as illustrated in the figure below.



Source: The Survey Team

Figure 34 General distribution channel of mango

Stockists who have storing and working spaces in the wholesale market mediate buying and selling transactions in the wholesale market. Farmers or middlemen who procure mangoes from farmers bring mangoes in bamboo baskets or plastic crates to the wholesale markets. The mango prices are mainly determined in units of 40kg. Traditionally, buyers pay only for 40kg of mangoes when purchasing 44kg or 47kg because they assume that 4kg or 7kg are damaged.

When a trading transaction is completed after negotiations between a buyer and seller, a stockist who mediates the trade receives 10% of the sales as a commission. Buyers sometimes visit wholesale markets in person, and sometimes order mangoes over the phone.

Stockists hire laborers to sort and package mangoes, and transport them to the buyer who covers the sorting and packaging expenses. The main buyers are wholesalers in Dhaka or Chattogram, who have a depo in wholesale markets within which they do their business. Stockists usually store mangoes for a few days, but there is no temperature control at their storage. Since mangoes are kept under high temperatures and humidity conditions, some mangoes start

becoming rotten. Sorting and packaging are manually done by laborers. Mangoes are wrapped with newspapers, one by one, and are placed in plastic crates.

The plastic crates that contain mangoes are piled up on a truck for transportation. Temperatures on the truck are not controlled so the quality of mangoes sometimes deteriorate under the hot and humid conditions.

About 100 stockists, and about 5,000 laborers are working in the Rajshahi mango wholesale market, which opens only during mango harvest season. The daily wage of laborers at the wholesale market is about BDT 700 to 800 per day.



Rajshahi mango wholesale market

Method of wrapping with newspaper and packaging mango into plastic crate

Method of mango transportation

Source: The Survey Team

Photo 14 Rajshahi mango wholesale market

b) New type of mango distribution channel

In conjunction with traditional mango distribution channels, which involve many stakeholders, new types of mango distribution channels, such as contract farming being used by large food processing companies and the direct purchasing by supermarket chains, have been established. Mango pulp processing companies usually procure mangoes through suppliers instead of directly from farmers. Processed mango pulp is either sold to juice processing companies or processed at juice processing plants owned by the same company or group.



Source: The Survey Team

Figure 35 New type of mango distribution channel studied

With support from FAO's Food Safety Programme, the Hortex Foundation³⁹ helped a private company export 155 MT of fresh mango to Walmart group's supermarkets in the United Kingdom in 2015. However, because of the lack of a traceability system, such as Global GAP, mango exports there was discontinued.

In addition, European countries and Japan have plant quarantine restrictions for mangoes, and other fruits imports, against the fruit fly, etc. which cause tremendous damage to fruit and vegetable production. Regarding fresh mangoes, the Plant Protection Station under the Ministry of Agriculture, Forestry and Fisheries of Japan bans imports of mangoes, and other fruits, from countries that fruit flies inhabit. In the case of Japan, if the Plant Protection Station confirms that a complete disinfection system, including proper disinfection facilities and systems that monitor and issue phytosanitary certificates in the exporting country, is established, the Plant Protection Station lifts the ban⁴⁰. Fruit flies can be disinfected by i) radiation treatment; ii) vapor heat treatment (VHT); or iii) hot water treatment, generally; countries that export mangoes to Japan mainly apply the VHT system⁴¹. The absence of such facilities and systems is an issue for Bangladesh to export fresh mango.

3) Processing

Only 6% of mangoes are processed, while the remainder are consumed in their fresh form in Bangladesh. It is estimated that about 84% of total processed mango are processed to mango juice, and the rest are processed to pickles or mango bars⁴². Major mango juice brands in Bangladesh are PRAN (PRAN Group), Danish/Garden Fresh (Partex Star Group), Shezan (Sajeeb Group), and Frutika (Akij Group). PepsiCo introduced the Tropicana brand to Bangladesh with their local bottling partner, named Transcom Beverages Ltd in 2019⁴³.

³⁹ The Horticulture Export Development Foundation, in short, Hortex Foundation, was established at the patronage of the Ministry of Agriculture, the Government of Bangladesh, as a non profit organization to promote high value agro-products for export and domestic markets.

⁴⁰ https://www.maff.go.jp/pps/j/information/language_top.html
https://www.maff.go.jp/pps/j/law/houki/shorei/E_AnnexedTable1-2_from_20200129.html

⁴¹ https://www.jetro.go.jp/ext_images/jfile/report/07000134/pakistan_mango.pdf

⁴² Katalyst (2016) Study on the Roles and Opportunities for Private Sector in Agro-food Processing Industry of Bangladesh

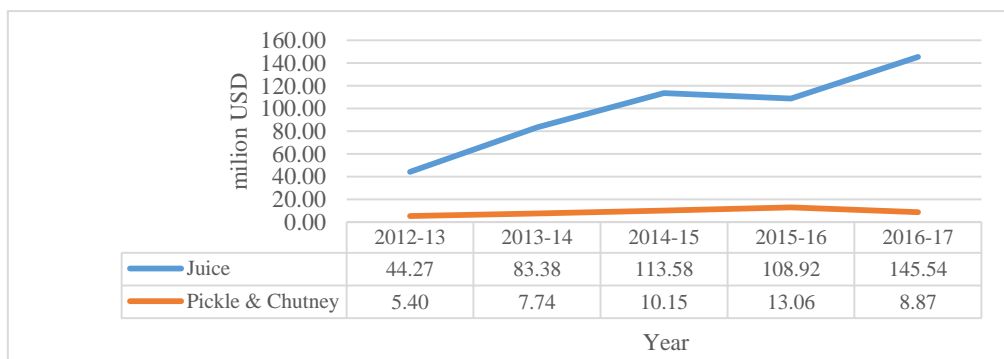
⁴³ The Daily Sun (2019) Transcom brings Tropicana Frutz



Source: Websites of each company

Photo 15 Mango juice products

In addition to mango juice, PRAN Group and Akij Group produce mango pickles and mango bars. There is no individual market data on mango juice and mango pickles. According to the market data on juice and pickles/chutney from BAPA members, the juice market has been growing at a faster rate than the pickles/chutney market, which increased slightly (see figure below).



Source: BAPA

Figure 36 Market size of juice and pickles/chutney among BAPA members

a) Mango pulp

Mangoes are generally processed to mango pulp near the mango-producing area, and mango pulp is processed to mango juice near the consumption area. Some mango juice processing companies have their own mango pulp processing plant, while others purchase mango pulp from other companies to produce mango juice. The major process at a mango pulp processing plant are shown below.



Raw material (fresh mango)

Washing mango

Checking mango quality visually



Removing stem

Washing mango (2nd time)

Pulp extraction (a few times)



Pasteurization

Filling

Storing

Source: The Survey Team

Photo 16 A mango pulp processing plant

The major equipment required for mango pulp processing are the following:

- (a) Mango washing machine;
- (b) Sorting conveyer;
- (c) Mango crusher;
- (d) Homogenizer;
- (e) Pasteurizer;
- (f) Mixer;

- (g) Reserve tank;
- (h) Storage tank; and
- (i) Weighing and filling machine.

The majority of mango pulp processing plants procure mangoes through suppliers instead of directly from farmers. However, PRAN established a procurement network by assigning hub leaders to procure mangoes directly from farmers. Procurement volumes from each hub leader are determined in advance so that the mango pulp processing plant does not procure more than a certain volume of mangoes a day.

In general, mango pulp processing facilities can also be used for tomato and guava processing. Some mango pulp processing plants visited during the field study processed tomatoes. However, guavas are not processed at three of the mango pulp processing plants visited by the Survey Team. They explained that they do not process guava because there is no demand for guava processed products in Bangladesh.

The level of processing technology used, and food safety applied, by those mango processing plants differ from plant to plant in Bangladesh. The most modern processing plant has not yet reached the same level of the processing plants in developed countries such as Japan. Aseptic processing in mango pulp processing plants was not yet fully operational in Bangladesh, so the mango pulp is still stored in cold storage facilities. Considering some mango aseptic plants have been operational in India as of 2014⁴⁴, it can be said that the mango processing industry in Bangladesh is more than five years behind India. In addition, it is said that about 30% of mango pulp is still imported in Bangladesh. If aseptic mango pulp can be produced in Bangladesh, storage and transportation can be easier, thereby allowing the substitution to domestic production from importing mango pulp. Issues of food safety is summarized in Section 3.1.5.

Guti and Ashini are sold at relatively cheap prices in Bangladesh because Gutti has various types of characteristics and Ashini is not too sweet. Therefore, mango pulp processing companies purchase and process Gutti and Ashini at low cost. Currently, mango juice is diluted with water and includes artificial flavoring in Bangladesh; it is not 100% fresh juice. Neighboring countries, such as India and Pakistan, produce single variety mango processing products, such as the Alfonso variety or Chousa variety. Bangladesh's mango pulp seems to be less competitive because of the unspecified quality and lack of differentiation compared with other countries' products.

Procurement prices, including a case of PRAN, are determined based on the market price. Mango pulp processing plants request suppliers or hub leaders to transport mangoes in plastic

⁴⁴ JICA (2015) Data Collection and Confirmation Study for Agricultural Value Chains in the Republic of India

crates. These requests from mango pulp processing plants can reduce post-harvest losses.

b) Mango juice

Mango juice is pasteurized and filled in Tetra packs (paper box) or plastic bottles after the mango pulp is mixed with water and artificial flavoring. Juice processing plants are increasingly also assembling the plastic bottles required for packaging the drinks by using blowing machines to inflate the raw material of the plastic bottles. The mango juice in Tetra packs as well as plastic bottles can be stored at ambient temperatures.



Raw material of mango pulp

After pasteurization, mango juice is mixed and filled

Filling machine of Tetra packs



Raw material of plastic bottles

Blowing machine of plastic bottles

PET bottle filling line

Source: The Survey Team

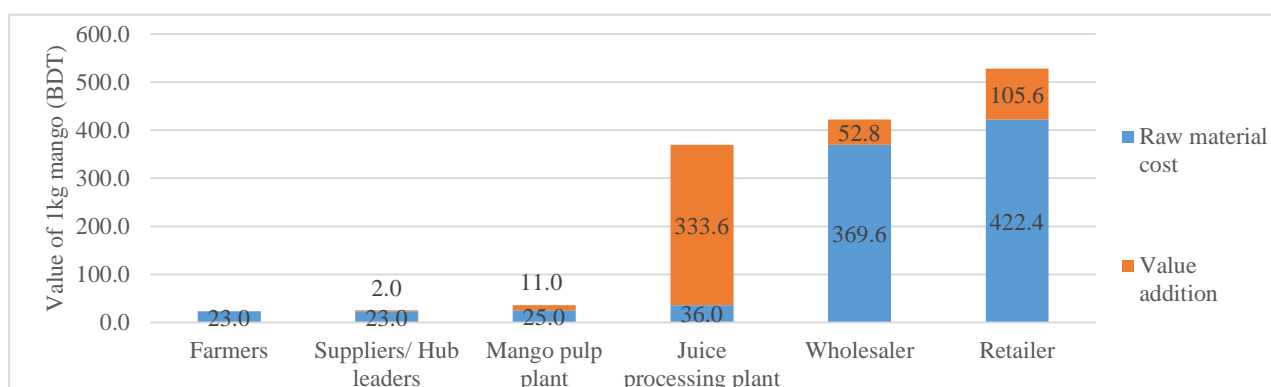
Photo 17 A mango juice processing line

The major machineries for mango juice processing are the following:

- (a) Plastic bottle blower;
- (b) Mixing tank;
- (c) Mixer;
- (d) Homogenizer;

- (e) Pasteurizer; and
- (f) Weighing and filling machine.

The changes in the value of 1kg mango to mango juice is summarized in the figure below for the Ashini and Guti varieties, as of July 2019. As depicted in the figure below, the value of mangoes can be increased by producing mango juice.

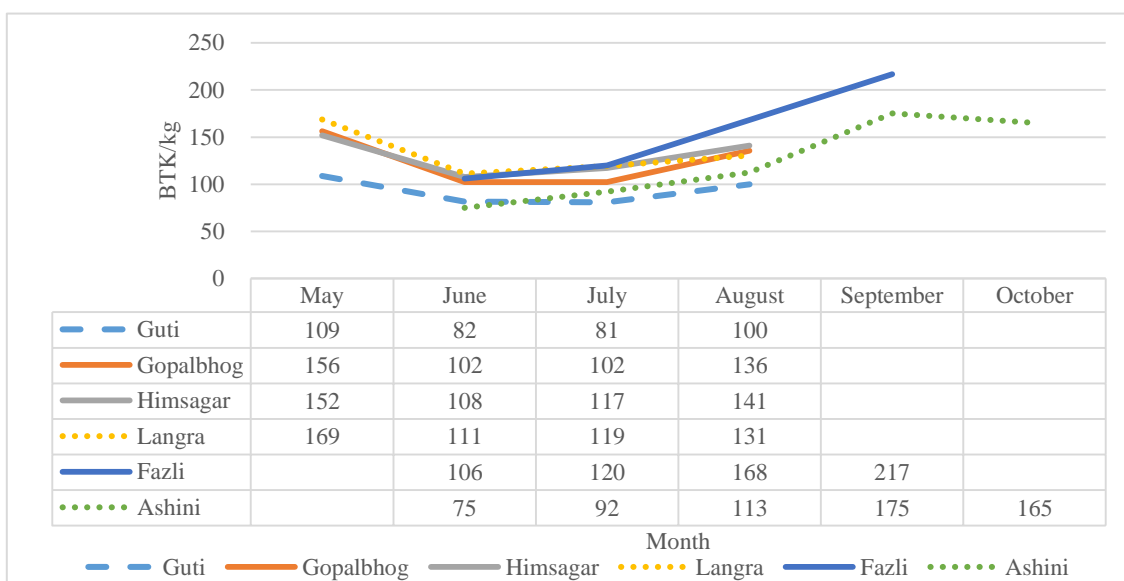


Note: During the juice processing, other ingredients such as sugar and flavors are added
 Source: The Survey Team

Figure 37 Change in values of 1kg mango (mango juice) (BDT)

4) Retail

Mangoes are transported from a wholesale market to retail shops near consumers. Mangoes are generally sold by weight in Bangladesh. Mango prices differ from variety to variety. As shown in the figure below, the wholesale price of Langra in May was BDT 169 per kg, while the wholesale price of Guti was BDT 109 per kg, which is two third that of Langra’s price. The prices go down in June and July during the mango harvest season.



Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Figure 38 Change in mango wholesale prices (2017)

5) Issues in value chain

Issues in the mango value chain vary, as summarized below. Major issues in the value addition of mangoes are: i) the lack of a traceability system; ii) large post-harvest losses; iii) the lack of proper facilities for plant quarantines in the fresh mango export market; and iv) low levels of processing technology, facilities, and management.

a) Production

i) Low yield

The mango yields in Bangladesh can be increased by applying inputs, such as fertilizers and agrochemicals properly. One of solutions can be technical support from food processing companies though contract farming. However, since only a few large companies use contact farming, the impact though contract farming is still limited.

Input suppliers, such as fertilizer or agrochemical suppliers, can provide technical assistant to farmers by instructing them on how to use their products. For example, ACI and Syngenta provide technical assistant to farmers. ACI sells paper bags in which to wrap mango fruit at BDT 4 per bag. If farmers wrap small mango fruit in the paper bag, the mango gets better color and avoids damage from insects, so the farmers can sell the mango for BDT 50 per kg more. The mango farmers visited by the Survey Team shared that they could increase their yield by following the instructions from those input suppliers. Input suppliers were provided support to

promote their products to farmers as part of the Agriculture Value Chain Project, supported by USAID. The importance of marketing to farmers was emphasized by the USAID project.

ii) Lack of a traceability system

This is not yet an important issue in Bangladesh. However, the lack of a traceability system is an issue for the export market since international buyers sometimes request Global GAP or other relevant certificates.

iii) Needs of variety improvement

BARI developed a highbred variety, named BARI 4, by crossing a variety from Florida, USA (S896) with Ashini, of which the harvest time is later than other mango varieties. BARI 4 has the sweet taste inherited from the Florida variety and the later harvest time inherited from Ashini. Thanks to these kinds of improvements, farmers can cultivate a range of varieties to diversify risks. Moreover, consumers can enjoy mangoes for a longer period. Since fruits need several years to harvest after planting, a variety improvement of fruits generally takes longer time than that of vegetables.

b) Distribution

i) Large post-harvest losses

Farmers and middlemen are still using bamboo baskets in addition to plastic crates for mango transportation. At mango wholesale markets in Rajshahi, buyers pay only for 40kg of mangoes when purchasing 44kg or 47kg because they assume that 4kg or 7kg are damaged.

Mango prices through the new type of mango distribution channels are based on the market price. Mango pulp processing plants request suppliers and hub leaders to transport mangoes in plastic crates. Such requests can reduce post-harvest losses during transportation.

Since mangoes are usually transported by trucks without temperature controls, the deterioration of quality experienced during transportation is an issue.

ii) Lack of proper facilities for plant quarantine (for export to Japan and European countries)

European countries and Japan have their own plant quarantine restrictions for fruit imports against fruit flies, etc. which cause tremendous damage to fruit and vegetable productions. Regarding fresh mangoes, the Plant Protection Station under the Ministry of Agriculture, Forestry and Fisheries of Japan bans imports of mangoes, and other fruits, from countries that the fruit fly inhabits. If the Plant Protection Station confirms that complete disinfection systems, including proper disinfection facilities and systems that monitor and issue phytosanitary certificates, in the exporting country is established, the Plant Protection Station lifts the ban. The absence of such facilities and systems is an obstacle that Bangladesh must overcome when it intends to export

fresh mangoes to Japan or European countries.

c) Processing

i) Poor processing technology, facilities, and management

The level of processing technology used, and food safety measures applied, by those mango processing plants differ from plant to plant. The most modern mango processing plant in Bangladesh has not yet reached the same level of the processing plants in developed countries such as Japan. There are few aseptic plants for mango processing in Bangladesh. Since the newly established mango pulp processing aseptic plant has not yet produced aseptic mango pulp properly, mango pulp is stored in cold storage facilities. Considering the fact that mango aseptic plants were fully operational in India in 2014, it can be said that the mango processing industry in Bangladesh is more than five years behind that in India.

It was sometimes reported that processing products, including mango juice, do not meet the standards and regulations of BSTI or BFSA⁴⁵. Although there are some complaints about public monitoring and testing systems, poor processing technology and management can be one of the reasons for the violations of these standards and regulations.

ii) Branding and product development

India and Pakistan, neighboring mango processing countries, promote the Alfonso variety and Chousa variety, respectively, as their brand, but Bangladesh has not yet established its own mango brand.

Other mango producing countries export different mango processed products. For example, Brazil and Thailand export frozen mangoes, and Thailand and the Philippines export dry mangoes. Bangladesh exports mango bars in addition to mango juice, but the export amounts of those processed products are relatively small. Therefore, more product development is needed in Bangladesh.

iii) Issues on food safety

The issues on food safety are detailed in Section 3.1.5.

(4) Tomato

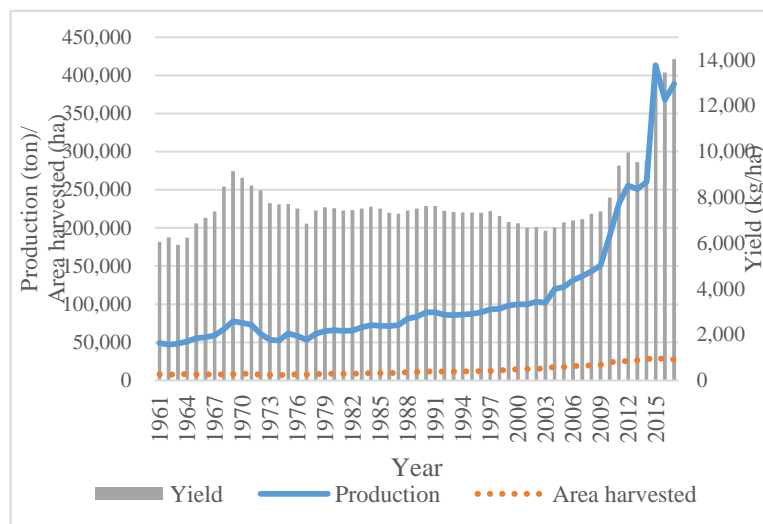
1) Production

a) Production volume

The tomato production volume in Bangladesh almost quadrupled from about 100,000 MT

⁴⁵ Dhaka Tribune (2017) Only 5% mango in mango juices

in 2000 to 388,725 MT in 2017, as the yield of tomato increased.



Source: FAOSTAT

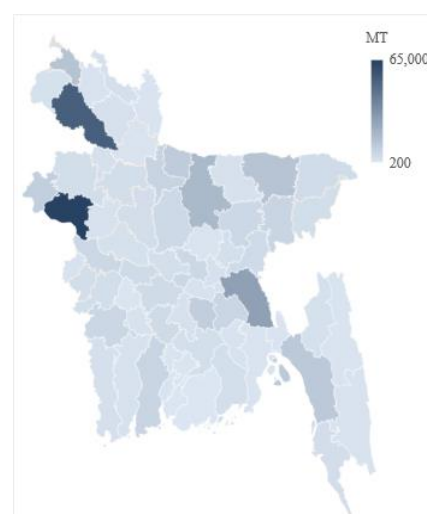
Figure 39 Tomato production, area harvested, and yield

Tomatoes are produced nationwide in Bangladesh, but production volumes in the Rajshahi District, Rajshahi Division (64,403 MT), the Dinajpur District, Rangpur Division (52,503 MT), and the Comilla District, Chattogram Division (27,045 MT) are particularly large, and the total of those three districts account for 37.3 % (about one-third) of tomato production in Bangladesh.

Table 59 Major tomato producing area (2017–18)

	District	Division	(MT)	Share (%)
1	Rajshahi	Rajshahi	64,403	16.7%
2	Dinajpur	Rangpur	52,503	13.6%
3	Comilla	Chattogram	27,045	7.0%
4	Mymensingh	Mymensingh	17,505	4.5%
5	Sunamganj	Sylhet	13,454	3.5%
6	Panchagarh	Rangpur	13,358	3.5%
7	Chattogram	Chattogram	11,445	3.0%
8	Sherpur	Mymensingh	10,267	2.7%
9	Shariatpur	Dhaka	9,608	2.5%
10	Nawabganj	Rajshahi	9,353	2.4%
	Total		385,036	100.0%

Source: BBS (2019) Yearbook of Agricultural Statistics 2018



Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Figure 40 Tomato production map

Table 58 Tomato production, area harvested, and yield in Bangladesh

Year	Production (MT)	Area harvested (ha)	Yield (kg/ha)
1961	48,905	8,071	6,059
1966	56,759	7,987	7,106
1971	73,151	8,581	8,525
1976	58,214	7,752	7,510
1981	64,971	8,753	7,423
1986	71,185	9,705	7,335
1991	89,335	11,711	7,628
1996	89,265	12,183	7,327
2001	100,000	14,985	6,673
2006	131,280	18,769	6,995
2011	232,459	24,772	9,384
2016	368,121	27,342	13,464
2017	388,725	27,666	14,051

Source: FAOSTAT

b) Productivity

As mentioned above, tomato production in Bangladesh increased because of increasing yield. However, considering the tomato yields in other major tomato producing countries, such as the U.S.A. and Spain, which together record a yield of about 68 MT per hectare, and India, which produced more than 25 MT per hectare, the tomato yield in Bangladesh is relatively low.

Table 60 Tomato production and the yield of the top ten countries of tomato production and Bangladesh (2017)

	Country	Production (MT)	Yield (kg/ha)
1	China	59,514,773	57,868
2	India	20,708,000	25,982
3	Turkey	12,750,000	68,156
4	U.S.A.	10,910,990	86,547
5	Egypt	7,297,108	39,996
6	Iran	6,177,290	40,181
7	Italy	6,015,868	60,310
8	Spain	5,163,466	84,853
9	Mexico	4,243,058	45,628
10	Brazil	4,230,150	68,745
	Bangladesh	388,725	14,051

Source: FAOSTAT

c) Cultivation

Tomatoes are traditionally⁴⁶ planted from mid-August to late November, and are harvested from December to mid-January. During the non-harvest seasons, Bangladesh imports tomatoes from India or other countries. However, thanks to variety improvement and the improvement of cultivation techniques, tomatoes can be harvested in the Summer. New varieties are developed by private seed companies or government institutes, such as BARI. Though the cultivation of Summer tomatoes requires some cultivation techniques, profitability is high. Therefore, farmers started cultivating Summer tomatoes⁴⁷. According to BARI, improved variety can produce 50 MT per hectare if farmers can cultivate tomatoes properly. It is pointed out that major issues regarding Summer tomato cultivation are pest management, timely seed supply, expensive input costs, and the lack of finance provided to farmers.

In addition, price instability can affect profitability. It was reported in April 2018 that

⁴⁶ BBS (2019) Yearbook of Agricultural Statistics 2018

⁴⁷ Bangladesh Journal of Agricultural Research (2018) Adoption and profitability of summer tomato cultivation in Jashore District

tomato prices dropped from BDT 4 to 5 per kg, resulting in farmers making losses. As a result, they lost the motivation to produce Summer tomatoes.

The tomato farmers visited during the field study in the Sherpur District performed the following activities for tomato production. The necessary laborers and other inputs for tomato cultivation are summarized in the table below:

- Land preparation: by hiring tractor;
- Planting: by hiring laborers;
- Fertilizing: by hiring laborers;
- Spaying for pest: spraying insecticide, etc.;
- Irrigation: by using a pump;
- Harvesting: by hiring laborers;

Table 61 Production cost and price of tomato cultivation (BDT per acre)

Activity	Month/ times	How to do it	Input	Cost of input (total)	Labor		Labor cost (total)	Production cost (total cost)
			Necessary input (seed, fertilizer, agro-chemical etc.)		Required man-day (hired labor)	Per day cost for labor		
Land preparation	Sep	Tractor		5,000				5,000
Seed and planting	Sep		Seed	3,000	9	500	4,500	7,500
Fertilizing		Laborer	TSP: 600, MOP: 110, Urea: 420, DAP: 1406, Cow dung: 900	3,661	4	500	2,000	5,661
Spraying	(10times)	Laborer	Syngenta 3,600*2times Others: 2,800	10,000	21	500	10,500	20,500
Irrigation	(7times)	Pump	Pomp (oil, diesel)	4,000				4,000
Harvesting	(18times)	Laborer			11 * 18	200	39,600	39,600
Total Cost								82,261
Production and Sales (36,000kg * BDT 10/kg)								360,000
Profit								277,739

Source: The Survey Team

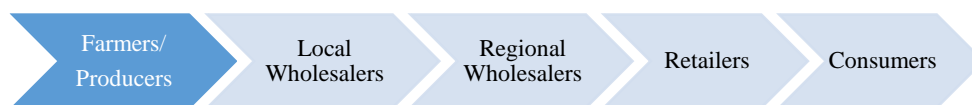
d) Harvesting

Harvesting is not yet mechanized, and still depends on physical labor. During the harvest season, matured tomatoes are harvested and sold.

2) Distribution

a) Traditional distribution channel

The traditional tomato distribution channel is similar to the traditional mango distribution channel: Tomatoes are transported from farmers to consumers sequentially through a local wholesaler, a regional wholesaler, and a retailer, as illustrated in the figure below.

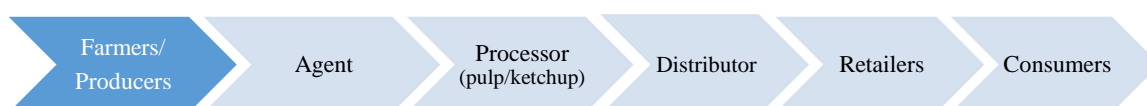


Source: The Survey Team

Figure 41 Tomato distribution channel in general

b) New type of tomato distribution channel

Similar to the mango distribution channel, large food processing companies have started using contract farming in the tomato market. A food processing company that uses tomato contract farming said that they do so because they want to procure a specific variety and size of tomatoes, and that the rate of receiving damaged tomatoes is high when procured through the traditional tomato distribution channel. The new type of tomato distribution channel is illustrated in the figure below.



Source: The Survey Team

Figure 42 New type of tomato distribution channel

< Export (fresh tomato) >

Fresh tomatoes are exported, but the import volume is larger than the export volume, as shown in the table below. Tomatoes are imported from neighboring countries, such as India, during the non-harvest seasons in Bangladesh.

Table 62 Domestic production, export and import volume of tomatoes (2018)

H.S. Code	Product label	Domestic production (MT)	Export		Import	
			(MT)	Export/ domestic production (%)	(MT)	Import/ domestic production (%)
'070200	Tomato	388,725	120	0.03	1294	0.33

Source: International Trade Center website

3) Processing

It is estimated that 5% of tomato production is processed into tomato juice or ketchup in

Bangladesh⁴⁸. PRAN Group, Hashem Group (Sajeeb) and Ahmed Foods produce tomato source and ketchup in Bangladesh.



Sajeeb (Hashem)



PRAN



Ahmed Foods

Source: Websites of each company

Photo 18 Tomato processed products

To produce tomato juice or tomato ketchup, firstly tomato pulp needs to be produced, much like mango pulp. Since the necessary facilities for tomato pulp processing is similar to those of mango pulp processing, major parts of the processing line can be used for both tomato pulp processing and mango pulp processing. The major harvest times of tomatoes and mangoes do not overlap. Considering that tomato pulp and mango pulp are produced for only a few months during its major harvest time, it is desirable from the viewpoint of the machine occupancy rate to use the facility for both tomato pulp processing and mango pulp processing.

Like mango pulp processing, tomato pulps are processed near tomato producing areas, while tomato ketchup is generally processed near consumption areas. The issues of tomato pulp processing are similar to those of mango pulp processing, such as the lack of aseptic processing line and issues on food safety.

⁴⁸ Katalyst (2016), Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh



Tomato pulp stored in a cold storage facility

Tomato ketchup processing

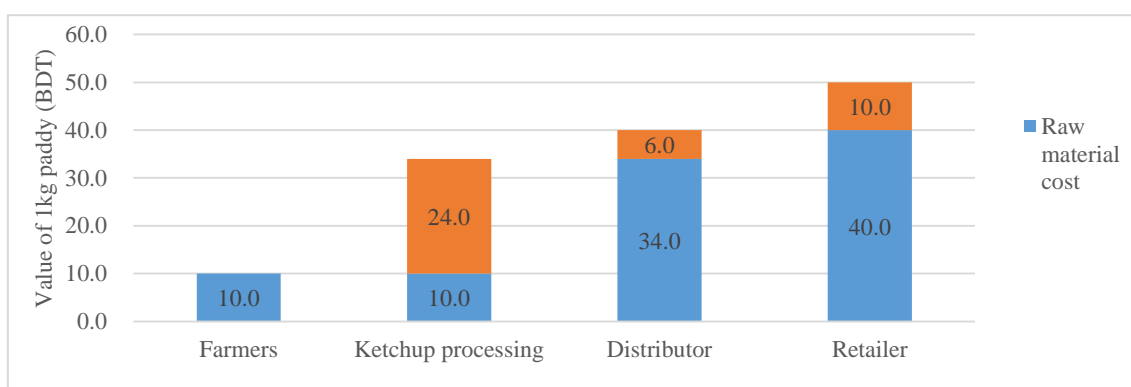
Tomato ketchup filling machine

Source: The Survey Team

Photo 19 A tomato ketchup processing line

The processing of tomato ketchup is not fully automated in Bangladesh because the production volume is not large enough to warrant it. Tomato ketchup is produced by mixing and cooking raw materials manually. Therefore, qualities of tomato ketchup may vary because food processing plants have to cook tomato ketchup manually as adjusting cooking duration or others based on change in raw materials. In addition, the contamination of foreign matters is one of the prominent concerns because ketchup is cooked in an open area.

The changes in the value of 1kg of tomato to tomato ketchup is illustrated in the figure below. As shown in the below figure, the value of 1kg of tomato can be increased by producing tomato ketchup.



Note: During ketchup processing, other ingredients such as spice and sugar are added

Figure 43 Change in values of 1kg tomato (tomato ketchup) (BDT)

< Export and Import (processed products) >

The table below summarizes export and import volumes, and the values of major tomato processed products. Tomato sauce and ketchup are domestically produced, and not yet exported, but 1200 MT of tomato paste is imported.

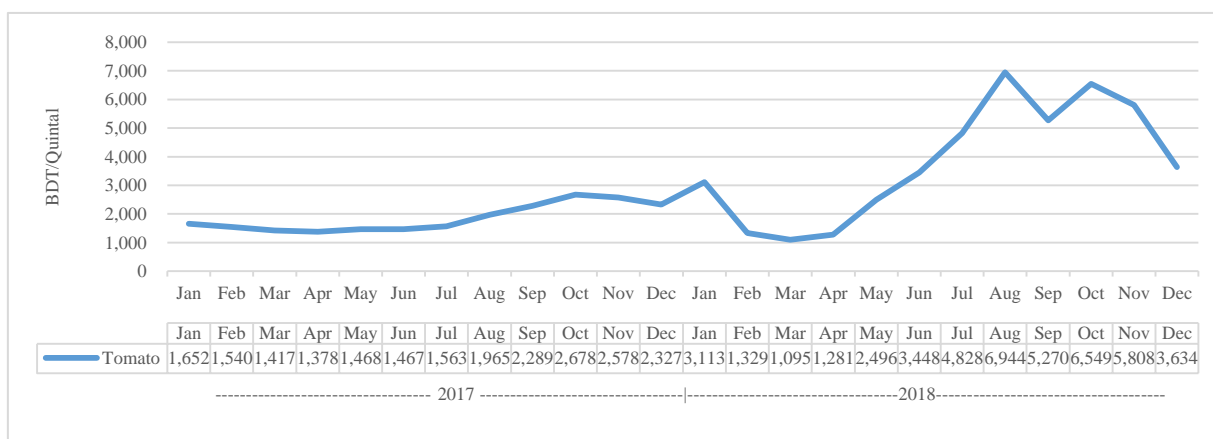
Table 63 Export and import volume and value of tomato processed products (2018)

H.S. Code	Product label	Export		Import	
		MT	1000 USD	MT	1000 USD
200210	Tomato processed whole/pieces	1	2	29	27
200210	Tomato processed paste	-	-	1,200	1,049
200950	Tomato juice	-	-	33	21
210320	Tomato ketchup or others	113	51	339	401

Source: International Trade Center website

4) Retail

Tomatoes are transported from the wholesale market to retail shops near consumers. Tomatoes are generally sold by weight in Bangladesh. Tomato prices fluctuate from season to season. As the figure below shows, the fluctuations in tomato price from 2017 to 2018 were quite large.



Source: BBS (2019) Yearbook of Agricultural Statistics 2018

Figure 44 Change in tomato wholesale price (from 2017 to 2018)

5) Issues in the value chain

The issues in the tomato value chain are similar to those found in the mango value chain.

a) Production

Tomato yield in Bangladesh is very low, and about half of that in India. On the other hand, a BARI study confirmed that farmers that cultivate an improved variety of tomato produced 50 MT per hectare of tomato. This indicates that the yield can be improved by using improved varieties and applying proper farm management. However, it is reported that farmers were discouraged from cultivating tomatoes because of the price drop.

b) Distribution

Post-harvest losses of tomatoes are also high. Tomatoes are generally transported by vehicles that do not have temperature control. The major tomato harvest season is Winter, when the temperature is relatively low. However, in the case of Summer tomatoes, the quality of tomatoes under the high temperatures can degrade.

The selling prices of tomatoes in new type of tomato distribution channel are based on the market price.

c) Processing

i) Poor processing technology, facilities, and management

The level of processing technology used and food safety applied by tomato processing plants are poor, similar to those in mango pulp processing plants. The most modern processing plant in Bangladesh has not yet reached the same level of the processing plants in developed countries such as Japan.

Tomatoes can be processed by the same facilities of mango pulp processing. However, the volume of processed tomato pulp is smaller than the volume of processed mango pulp. Some pulp processing plants process a volume of tomato pulp that is 10% of the volume of mango pulp processed. Those pulp processing plants said that they processed tomato pulp for their own purposes, and not for sale. Since tomato pulp and paste are still imported, there is a possibility that domestically produced pulp can be substituted for imported pulp.

d) Retail

Prices of tomatoes fluctuate greatly because of an imbalance of demand and supply. Farmers sometimes cannot produce enough profit at the low prices, and food processing companies and consumers sometimes suffer as a result of the high prices.

3.1.5. Current situation and issues of food processing on food safety

Food safety management is one of the most important issues for food processing companies in Bangladesh. Among eleven food processing plants visited by the Survey Team, five plants have ISO22000 certificates, four plants have only HACCP, and two plants have neither

ISO22000 nor HACCP.

Food processing plants that have ISO22000 or HACCP certificates follow ISO22000 or HACCP guidelines, respectively, and all plants follow the standards (code) of BSTI for hygiene management.

However, as ISO22000 and HACCP regulate only basic principles, food processing companies in developed countries normally employ more strict internal rules on food safety management. If food processing companies in Bangladesh wish to export their products to developed countries, such as Japan, they may be required to adopt a more strict food safety management system in addition to the ISO 22000 and HACCP certificates.

Issues on food safety management identified during the field study, the recommendations to food processing companies in Bangladesh, and the capacity development needs required to meet food safety standards are summarized in this section.

(1) Current situation and issues of food processing on food safety

1) Insufficient hygienic design and hygiene management at plants

a) Plant design

It was confirmed through the field survey that there are many issues relating to food safety management at food processing plants, even those that have HACCP and ISO22000 certificates. For example, an entrance of a processing room is open to outside, and a processing line is not always properly closed. In order to improve food safety of processed products, food processing plants need to be designed from the viewpoint of hygiene.

Few processing plants have proper door systems at the entrance of the processing and filling rooms. In order to avoid insects or foreign matter in the processing and filling rooms, processing plants need to have double doors, auto-close doors, air curtains, or air screens at the entrance.

In addition, it is also necessary to incorporate the following measures in the processing lines from the hygiene point of view:

- Filling rooms are separated from processing rooms;
- Filling rooms have a higher pressure than outside;
- The temperature and humidity in the filling rooms are controlled;
- High risk warning signs are displayed at filling rooms;
- Washing and sterilizing hands with alcohol before entering the processing and filling rooms are strictly necessary; and
- Air shower facilities are introduced at the entrance of the processing and filling rooms.



Open entrance at a processing plant



A filling machine in a processing room

Source: The Survey Team

Photo 20 Examples that need to improve from hygienic viewpoints (1)

The standards (code) for hygienic designs of facilities are described in “the Code of Hygienic Conditions for Food Processing Unit” issued by BSTI, which is similar to the Codex standard in principle. However, it regulates only principles, and the details of hygiene designs are not specified. According to one major food processing machinery manufacturer in Bangladesh, there is no detailed rule or regulation on hygiene design for food processing machineries. Therefore, it is very important for food processing companies to have sufficient knowledge of hygienic design in order to select hygienic machineries, and keep their plants hygienic.

b) Countermeasures against contamination of foreign matters

Large food processing companies generally have metal detectors in their processing lines to prevent the contamination of foreign matters, while many small or medium companies do not. It would not be very difficult for such small and medium companies to introduce metal detectors at their food processing plants because the cost of a metal detector is relatively low.

Some food processing plants do not require workers or visitors to change their clothes or shoes before entering to processing rooms. The most difficult foreign matters to detect are hair and dust. As countermeasures against contamination of such foreign matters in processed products, workers are expected to change their clothes and shoes, wear caps or hair nets, and use adhesive rollers to remove hair and dust on their clothes before entering the processing and filling rooms.

c) Improvement of processing facility and management

The Survey Team observed insufficient maintenance and management of processing facilities, such as rusty trestles, water residues in processing lines, damaged floors, and improper temperature control.

Trestles at a processing plant have to be clean and hygienic, and, therefore, processing plants should use trestles made of stainless steel.

Residue water in a processing machine that had not been operated for a while was noted. Since microbes grow in water residues, the inside of a processing machine should be kept clean and dry. The water residue in processing machines means that the food processing plant is not kept hygienic, and that the maintenance of the plant is not properly carried out from the food safety viewpoint.

In addition, cracks were found on the floors of some processing plants. There is a risk that water remains in the cracks, and microbes could form there. In addition, workers may stumble over the cracks. Therefore, such plants would have to repair those cracks and take preventative measures on such floor degradation.

In some food processing plants, drainage structures of floors were not appropriate for draining water. For example, floors of the processing and filling rooms were not sufficiently inclined. Because the floors cannot be kept dry, the risk of a microbe outbreak in such processing plants is very high.

It was also observed that the temperatures of processed products were not controlled well. For example, a mango pulp processing plant filled pulp into containers at 45 degrees Celsius. Since the cooling time of the pulp in a cold storage facility is relatively long, the quality of the pulp could deteriorate during the cooling process.



Corroded trestle



Water residues in a processing machine due to inappropriate maintenance

Source: The Survey Team

Photo 21 Examples that need to improve from hygienic viewpoints (2)

2) Lack of laboratories and testing equipment

Several food processing plants have technicians responsible for quality control and laboratories, and testing equipment is installed. Food processing plants that have a HACCP certificate normally keep testing records, too. However, in some plants, laboratory equipment was outdated.

3) Insufficient safety management of raw materials and lack of traceability system

Although rules on agrochemical residues are provided by the Food Safety (Contaminants, Toxins and Harmful Residues) Regulation, food processing companies rarely test agrochemical residues of raw materials, such as vegetables and fruits.

In order to avoid the risk of food safety and food-related litigation, it would be essential for food processing companies to establish raw material traceability systems. Although contract farming is one way to establish raw material traceability, only large progressive food processing companies have employed contract farming. Since most food processing companies procure raw materials from their suppliers, who mix raw materials from different sources, they do not know the sources of the raw materials.

Traceability is also an issue after shipping processed products from plants. For example, some food processing companies worry about hygiene management of their products, including temperature control during transportation, storage, and distribution at retail shops. This suggests that the majority of food processing companies in Bangladesh do not have a proper system to identify the causes of food related incidents.

Moreover, complaint management systems are not properly established in food

processing companies. Theoretically, managers in charge of laboratory and quality controls should identify the causes of complaints and take the necessary actions. All information, including the complaints from their customers and the actions taken, needs to be kept in order to prevent recurrence. However, many food processing companies do not properly record this information.

4) Lack of knowledge on food safety

In some countries, food processing companies are obligated to introduce HACCP or Food Safety Management Systems (FSMS), but it is not yet a requirement in Bangladesh. As a result, many small or medium food processing companies do not even have basic knowledge of food safety management, including HACCP.

The table below shows the proportion of BAPA member companies that have certifications. It indicates that only 22% of them have HACCP certificates. In general, smaller companies do not have HACCP or ISO22000 certificates.

However, it should be noted that food processing companies need to have the basic knowledge on food safety management, regardless of whether or not they are a small-sized company that does not have HACCP certifications.

Table 64 Certification acquired by BAPA member countries (reposted)

Size of company	Total	BSTI	ISO9001	ISO22000	HACCP
Cottage	24	100.0%	4.2%	0.0%	0.0%
Micro	80	100.0%	7.5%	3.8%	3.8%
Small	73	100.0%	27.4%	8.2%	8.2%
Medium	66	100.0%	71.2%	37.9%	43.9%
Large	24	100.0%	100.0%	100.0%	95.8%
Total	267	100.0%	36.7%	21.7%	22.8%

Source: Data provided by JICA

According to BAPA, based on scientific evidence, many food processing companies have not set expiration dates. In Japan, such expiration dates are determined based on microbiological tests (e.g. general viable cell counts, coliform bacteria, and food poisoning bacteria), physicochemical tests (e.g. pH and acid value), and organographic tests (e.g. odor, appearance, and color). Such tests first determine the period for which the quality and characteristics of the packed products can be sufficiently maintained. Then the shelf life is specified by multiplying the period by a safety factor (between 0.7 and 0.8).

Although some large companies in Bangladesh use similar procedures, many small and medium enterprises do not have sufficient knowledge on how to set expiration dates.

Similarly, even large companies do not have deep knowledge about international trends

on food safety, including Codex, Global Food Safety Initiative (GFSI), FSSC22000, and European Hygienic Engineering and Design Group (EHEDG). Such knowledge about GFSI, FSSC22000 or EHEDG are essential for food processing companies that are willing to export their products to developed countries because international buyers often request the companies to be FSMS certified by GFSI. However, it seems that none of the government organizations, industries, or private companies in Bangladesh have initiated actions for GFSI.

In general, managers or owners of food processing companies seem not to regard food safety as a priority issue. This might result in insufficient food safety management at operational levels.

In addition, in Bangladesh, food processing plants, which do not have hygiene engineers in many cases, are generally designed and established by engineering companies on a turn-key basis. Therefore, food processing companies are not able to incorporate hygiene considerations into their processing plants.

5) Good practice

As mentioned above, food processing companies in Bangladesh have many issues. However, the Survey Team also observed good practices in Bangladesh, as summarized below. Visiting a food processing plant that has proper facilities and management on food safety helps other food processing companies understand how food safety management can be improved. However, since food processing companies do not open their processing plants to their competitors, such plant visits may not be permissible. Therefore, awards for hygiene design and management, introduced by the public sector to promote food safety, are recommended.

The good practices of one of food processing companies are summarized below.

- The entrances to processing and filling rooms at a plant are well-designed for workers or visitors, and allow them to take necessary steps, such as preparing their outfits and washing their hands before entering the processing and filling rooms. The doors of the elevator in the plant is made from stainless steel, which can be used as a mirror to check outfits while waiting for the elevator;
- The plant has many innovative designs, such as a shoe box made from stainless steel that has a sloped top to avoid dust accumulation. The plant also has a stepover at an entrance of the plant; and
- All processing lines in the plant have metal detectors.



Shoe box made from stainless steel



Stepover at entrance



Opening room of milk powder

Source: The Survey Team

Photo 22 Good examples from hygienic viewpoints (1)

Other good practices observed in other food processing plants are summarized below:

- While many mango and tomato processing plants use only filters to remove solid matters, one of the plants uses a separator to remove unnecessary solid parts, avoiding pulp getting stuck in the processing line. The mango and tomato processing plant has a degassing device to avoid a quality degradation caused by oxidation. The plant uses an evaporator instead of a kiln to process tomato pulp into concentrated tomato paste in batches. It can thus produce the same quality tomato paste with less energy;
- Floors of a processing room, which are designed from a hygiene viewpoint, are inclined toward the drains;
- In order to avoid a degradation of processed food quality caused by oxidation, the packages of the processed products are filled with nitrogen. In addition, a food processing plant has a nitrogen generator that can stably supply nitrogen for better quality;
- A food processing plant displays a poster that shows how workers or visitors should prepare their outfits before entering the processing or filling rooms;
- Some food processing plants have Standard Operation Procedures (SOPs) developed by themselves; and
- A food processing plant has a laboratory which is located where people in the laboratory can observe activities, including hygiene management, at their processing room through a large window.



Floor inclined to drains



Display showing outfits of visitors and workers at the entrance

Source: The Survey Team

Photo 23 Good examples from hygienic viewpoints (2)

(2) Recommendations on facilities and equipment for food safety and quality improvement

Recommendations for food safety and quality improvement, which are based on the observations during the field visit, are summarized in the table below.

Table 65 Recommendations for food safety and quality improvement

Products	Recommendations on facilities and equipment
General	<ul style="list-style-type: none"> • Metal detectors to reduce contamination risk of foreign matters (strongly recommended) • Degassing devices for final products to retain quality • Materials of food processing devises that are corrosion resistant, such as stainless steel • Auto-filling machines to improve food safety rather than manual filling • Air controlling devises and facilities (such as temperature and humidity control equipment, pressurized filling room, and high efficiency particulate air filters and vent to remove dusts and germs) to reduce germs in filling room • Air curtains, vinyl curtains, UV light, and installation of doors at entrance of processing and filing rooms to avoid insects and foreign matters entering • Weight checkers • Leakage detectors • Checking devices of printed dates on packages after printing
Mango pulp	<ul style="list-style-type: none"> • Aseptic lines • Separators to remove solid matters (in case of a filter, pulp may be stuck so that risks of microbes increase. Therefore, a separator is better from food safety viewpoint) • Homogenizers to crash fivers to improve quality by homogenizing pulp

	<ul style="list-style-type: none"> • Continuous cooling devices (by reducing the temperature of pulp to below 10 degrees Celsius using a continuous cooling device, the quality of the pulp is maintained, and the risk of microbes is reduced)
Tomato pulp	<ul style="list-style-type: none"> • Extruders to avoid pulp stuck • Blenders after a crushing machine and before an extruder to homogenize pulp for better quality (some of plants have already been introduced) • Continuous condensing device or batch condensing device (concentrated pulp has a longer shelf life, and higher transportation efficiency) • Homogenizer (same as a blender for unifying quality) or emulsifier (a homogenizer is better than an emulsifier)

Source: The Survey Team

(3) Capacity development needs for food safety

1) Hygienic design and management

As mentioned above, it is very important for food processing companies to have sufficient knowledge of hygienic design in order to select appropriate hygienic machineries and keep their plants hygienic. Food processing companies need to enhance their knowledge and capacities on following matters:

- Designs of plant floors, doors, entrance systems, and filling rooms;
- Introduction of metal detectors;
- Selection of machineries from a hygienic viewpoint, optimization of machinery layout, and appropriate materials of trestles;
- Renovation of processing lines at existing production lines; and
- Production conditions, production methods, management policies, and basic principles of temperature control, and cleaning and sterilization methods.

2) Quality assurance and quality control at laboratories

Food processing companies are required to comply with regulations of BSTI and BFSA. However, as mentioned above, some food processing plants do not have adequate equipment to test necessary items regulated by BSTI and BFSA.

In addition to installments of necessary equipment, capacity developments of technicians at laboratories need to be enhanced through the provision of knowledge on regulations of BSTI and BFSA, analysis methods, and necessary testing equipment.

3) Traceability systems and linkage with farmers

As mentioned above, food processing companies need to develop traceability systems so that they can reduce the risks of agrochemical residues, and be able to identify causes of potential food-related incidents.

For this purpose, food processing companies need to identify producers of raw materials, and confirm if the producers properly manage agrochemicals. However, farmers in Bangladesh hardly keep farm management records, including the application of agrochemicals. Except for some large companies, it is difficult for food processing companies to provide training to farmers. On the other hand, some donors' projects help farmers keep farm management records and obtain Global GAP or HACCP certificates. It would be useful to food processing companies if the Project could provide linkages between food processing companies and those farmers who maintain farm management records.

In addition, it would be useful to food processing companies if the Project could provide training on basic knowledge on how to establish traceability systems before and after processing products and how to handle complaints from their customers.

4) Basic and advanced knowledge on food safety

As mentioned above, small and medium food processing companies do not have basic food safety knowledge, and food processing companies, including large companies who are willing to export their products to developed countries, do not have enough knowledge on international movements on food safety, such as GFSI, FSSC22000, and EHEDG. Therefore, such knowledge needs to be provided to both small and medium food processing companies as well as export-oriented large food processing companies.

First of all, decision makers, such as managing directors or plant heads, need to understand the risks and importance of food safety. Therefore, the main targets of those training programs could be the management of food processing companies or food processing plants.

3.2. Current Situation and Issues on Major Processed Foods

Based on the detailed study on the food value chain, this section reviews the current situation and issues regarding major processed foods, such as fruits, vegetables, spices, serials, and edible oils, and proposes a target area to be covered by the Project.

3.2.1. Fruits

(1) Production

About 4,948 thousand MT of fruits were produced in Bangladesh in 2017–18. About 62% of the fruit production consisted of mangoes (1,176 thousand MT, 23% of the total fruits production), jackfruit (1,076 MT, 21.7%) and bananas (about 810 MT, 16.4%).

Fruits produced in Bangladesh are roughly classified as permanent fruits or temporary fruits. Permanent fruits grow on trees. In general, it takes several years to harvest after planting. However, once it starts bearing fruits, it continues bearing fruits for decades. Bananas, watermelons, and pineapples are categorized as temporary fruits, which are harvested within relatively short periods.

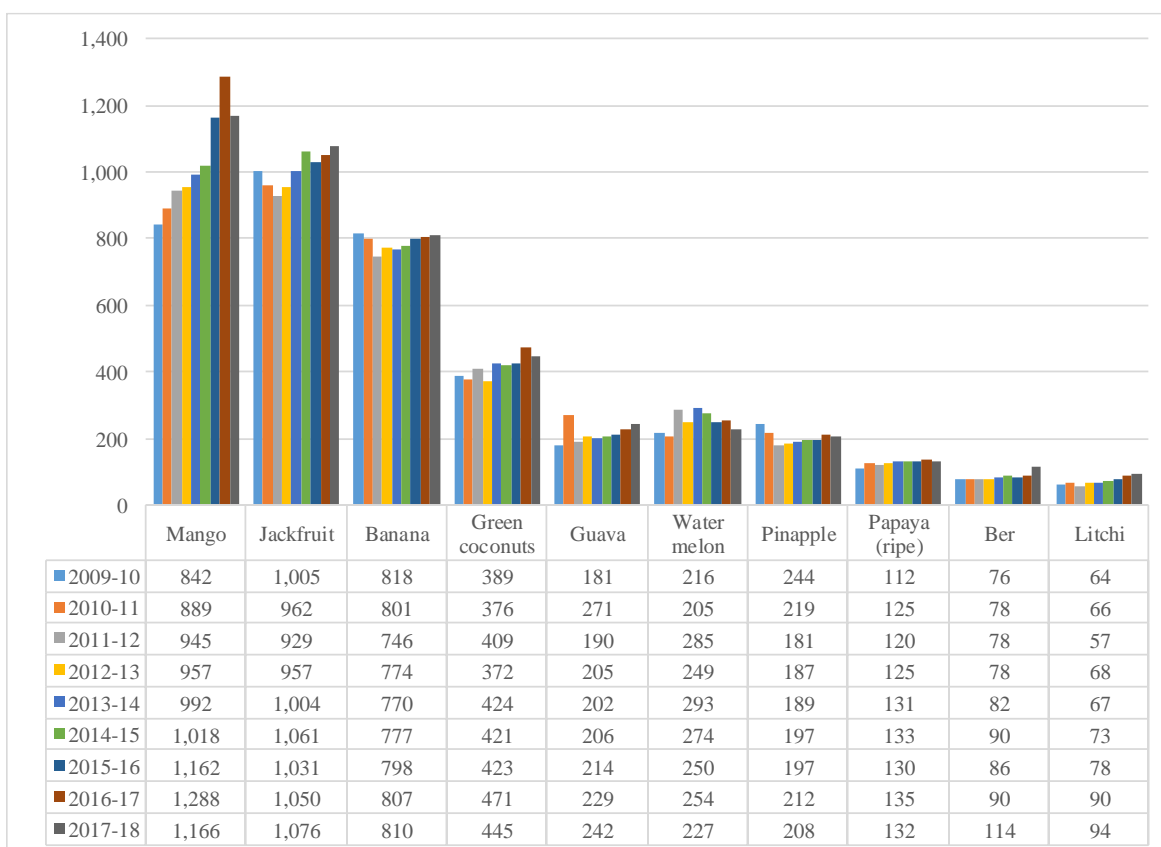
Table 66 Major fruit production (2017–18)

		Permanent or temporary	Production (thousand MT)	%
1	Mango	Permanent	1,166	23.6%
2	Jack Fruit	Permanent	1,076	21.7%
3	Banana	Temporary	810	16.4%
4	Green Coconut	Permanent	445	9.0%
5	Guava	Permanent	242	4.9%
6	Watermelon	Temporary	227	4.6%
7	Pineapple	Temporary	208	4.2%
8	Papaya (ripe)	Permanent	132	2.7%
9	Ber	Permanent	114	2.3%
10	Litchi	Permanent	94	1.9%
	Others	-	434	8.8%
	Total		4,948	100.0%

Note: Crops of which production exceeds 1 million ton is highlighted

Source: BBS (2019) Yearbook of Agricultural Statistics 2018

The figure below shows the changes in major fruits productions. Production volumes of most fruits, especially mangoes, have increased.



Source: BBS Yearbook of Agricultural Statistics 2012, 2015, and 2018

Figure 45 Change in major fruit production (thousand MT)

The mango yield in Bangladesh is 6.13 MT per hectare, which is lower than the world average (7.51MT per hectare). Therefore, the mango yield has room for improvement. One of reasons why the mango yield in Bangladesh is low can be attributed to how farmers use fertilizers and agrochemicals. Chemical fertilizers are sufficiently supplied because the government controls the production, import and sales of chemical fertilizers well. However, the combination of chemical fertilizers is an issue. The farmers visited during the field study mentioned that they could have improved the mango yield if they improved the way they used fertilizers. It implies that the mango yield can improve by the improvement of farm management, including fertilizing.

In addition, biopesticides, such as pheromone traps, are effective against fruit flies, which are considered parasites in fruits. The Government of Bangladesh has pointed out the importance of integrated pest management (IPM), and encourages the usage of biopesticides. However, biopesticides are not widely used in Bangladesh. According to Ispahani Agro limited, a leading manufacturer of biopesticides in Bangladesh, they started selling biopesticides in 2009, but it took a relatively long time for farmers to understand the concept of biopesticides and start using them.

Biopesticides can be pheromone traps for pests, natural enemy insects, fungi that are effective against pests, and fungi that contribute to soil improvement. In the case of worms or insects, the handling of these biopesticides is not easy.

It is expected that the market for biopesticide in Bangladesh becomes about five times bigger over the next five years, and, thus, facilities and equipment for R&D, and regional laboratories to manage biopesticide, such as worms and insects at regional level, are needed.

Regarding cultivation techniques, DAE, which has 26,000 employees⁴⁹, is responsible for supporting farmers. However, since one field staff has to support more than 500 households⁵⁰ for various crops, the field staff cannot provide adequate technical support to farmers. Therefore, extension activities for biopesticide by biopesticide companies or technical assistance by food processing companies through contract farming are expected to provide further technical support to farmers.

(2) Distribution

Because fruit production is seasonal, the prices drop during harvest seasons and high post-harvest losses are observed. The major reasons for high post-harvest losses can be explained by the lack of proper packaging during distribution and the lack of proper storage or cold facilities. In addition, one of the reasons for high post-harvest losses would be the lack of ripening chambers. In developed countries, such as Japan, green bananas and mangoes are transported to near consumption areas, and are sold after they are ripened in ripening chambers. Damages during transportation can be reduced by transporting green fruits. In addition, ripeness of fruits can be unified by ripening fruit in ripening chambers.

In Bangladesh, bananas are ripened by the traditional way (ripened with smoke by burning dried banana leaves), yet bananas are sometimes ripened by calcium carbide, which is prohibited in Bangladesh. Because mangoes are ripened naturally, ripeness differs from mango to mango. That is one of reasons why post-harvest losses are large⁵¹. It is expected that establishments of proper ripening chambers, such as ripening chambers with ethylene gas, can contribute to the reduction of post-harvest losses, the provision of unified ripened fruits, and the avoidance of health problems caused by calcium carbide.

In addition, an establishment of VHT facility is also recommended in order to increase the volume of fruits export to developed countries, such as European countries and Japan. It is

⁴⁹ Information provided by DAE in September 2019

⁵⁰ Farm holdings are about 14.87 million according to the BBS (2019) Statistical Year Book Bangladesh 2018

⁵¹ An Interview with BARI

said that there is no proper VHT facility in Bangladesh. Therefore, it would be helpful if these kinds of facilities can be provided by public sector first.

Table 67 Post-harvest losses of fruits at each stage in Bangladesh (%)

	Farmer	Bepari	Wholesaler	Retailer	Total	Excluding loss at farmer level
Fruit						
Mango	4.4	8.1	8.1	6.8	27.4	23.0
Banana	7.7	5.1	8.6	3.2	24.6	16.9
Jackfruit	16.1	11.4	9.2	6.8	43.5	27.4
Papaya	6.1	13.7	12.2	7.9	39.9	33.8
Litchi	8.5	5.1	6.1	5.1	24.8	16.3
Pineapple	10.4	11.6	14.1	7.0	43.1	32.7
Orange	5.2	5.7	4.0	8.7	23.6	18.4

Source: USAID (2010) Post-harvest Handling Guide

Domestic production volumes, and export and import volumes of major fruits are shown in the table below. Although domestic production volumes of mangoes, banana and pineapples are large in Bangladesh, low volumes are exported. One of the reasons why the export volumes are small is the lack of necessary facilities and systems for the plant quarantines that are obligated by Japan and European countries. In addition, as mentioned above, mangoes were exported to the United Kingdom with the FAO's support, but it was discontinued because of the lack of GAP certificate.

Table 68 Domestic production volumes as well as export and import volumes of major fruits (fresh and dry) (2018)

H.S. Code	Product label	Domestic production (MT)	Export		Import	
			(MT)	Ratio to production volume	(MT)	Ratio to production volume
080450	Guavas, mangoes, and mangosteens	1,166,000	242	0.02%	338	0.03%
081090	Jackfruit, etc.*	1,076,000	1,332	0.12%	6,095	0.57%
080390	Bananas	810,000	0	0.00%	0	0.00%
080430	Pineapples	208,000	0	0.00%	0	0.00%

Note: * Including jackfruit, tamarinds, cashew apples, jackfruit, lychees, sapodilla plums, passion fruit, and carambola
Source: International Trade Center website

Regarding mango transportation, more mangoes are now transported in plastic crates, but bamboo baskets are still commonly used. In general, bananas are stacked and transported on trucks, without any crates or baskets, resulting in the fruits at the bottom being easily crushed by

the weight of the fruits on top. This could be one reason for high post-harvest losses. Plastic crates are manufactured in Bangladesh, but their prices are relatively high. Accordingly, measures such as food processing companies or wholesalers mandating the use of plastic crates, along with ensuring affordable prices of such crates, are needed.

(3) Processing and retail

i) Type and quantity of processed products

Fruits are processed into fruit pulp, fruit juice, flesh (canned or frozen), dry fruit, jam, and pickles, to name a few. However, the type as well as quantity of processed fruits in Bangladesh is limited. Although mangoes are recognized as the most processed fruits in Bangladesh, only 6% of mangoes from the total harvest, are estimated to be processed (84% of processed mango is processed into mango juice, while 16% is processed into pickles and mango bars⁵²). The production of canned fruits started recently, but the production volumes remain small. Although BARI and others have developed dry fruits, these have yet to be commercialized at large scale.

ii) Juice

According to BAPA, the juice market in Bangladesh is expected to grow further. Several food processing companies started mango juice production in Bangladesh. The size of the mango processed food market is estimated to be USD 15.6 million⁵³ with a CAGR of 8.2%⁵⁴.

Although a large volume of pineapple is produced in Bangladesh, industry stakeholders said that pineapple juice is not popular among consumers in Bangladesh because the consumers prefer sweet drinks.

Industry stakeholders stated that 30% of mango pulp is still imported into Bangladesh. Therefore, the establishment of advanced processing lines, such as aseptic lines, can help to substitute domestically produced mango pulp for imported mango pulps in order to reduce the storage costs of pulps and improve food safety.

iii) Food safety

Regarding food safety, the food processing industry in Bangladesh has many issues, such

⁵² Katalyst (2016) Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

⁵³ Katalyst (2016) Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

⁵⁴ <https://www.thepages.com.bd/2017/07/25/juice-beverage-industry-potential-emerging-sector/>

as: 1) poor hygienic design and hygiene management at plant; 2) the lack of laboratory and testing equipment; 3) poor food safety management of raw materials; and 4) a lack of knowledge on food safety and food safety management, as mentioned in Section 3.1.5.

iv) Export and import of processed food

The table below shows export and import values of fruits processed foods. “Others” of “fruit and vegetable juice” would be mango juice.

The main export destinations are India, Saudi Arabia, and Bhutan⁵⁵. The fruit juice market in India, which is a major export destination, is expected to grow by 13.5% per year for the next five years, and the exports from Bangladesh are also expected to increase. On the other hand, items such as jam, jelly, marmalade, and puree, which are mainly made from fruits, are imported more than exported.

Table 69 Export and import values of fruit processed products (2018)

H.S. Code	Product	Balance (thousand USD)	Export (thousand USD)	Import (thousand USD)
'2009	Fruit and vegetable juice	8,506	11,726	3,220
	(detail)			
	Orange	-330	195	525
	Citrus	140	287	147
	Pineapple	30	38	8
	Apple	-1,169	176	1,345
	Others (including vegetable juice)	8,274	8,704	430
'2001	Vegetables, fruit, nuts, and other edible parts of plants (including pickles)	1,243	1,370	127
'2006	Vegetables, fruit, nuts, fruit-peel, etc. (preserved by sugar)	-449	80	529
'2007	Jams, fruit jellies, marmalades, fruit, or nut purée, etc.	-619	117	736

Source: International Trade Center website

(4) Issues and countermeasures of food value chain

Based on the above analysis, the issues and countermeasures of the fruits food value chain are summarized in the table below.

Table 70 Issues and countermeasures of the fruits food value chain

	Current situation and issues	Possible countermeasures
Production	<ul style="list-style-type: none"> The yields are low because fertilizers are not properly applied and the 	<ul style="list-style-type: none"> Provision of loans for production facilities for biopesticides

⁵⁵ Katalyst (2016) Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

	usage of biopesticides is limited.	<ul style="list-style-type: none"> • Seminars on the promotion of contract farming and cultivation techniques
Distribution	<ul style="list-style-type: none"> • Post-harvest losses are large because of the lack of cold storage facilities. • Ripening is ununified because of the lack of proper ripening chambers. • VHT facilities are not established so that necessary treatments for export cannot be done properly. • Post-harvest losses are large because the proper boxes, such as plastic crates, are not used. 	<ul style="list-style-type: none"> • Provision of loans for multi-purpose cold storage facilities, and refrigerated, freezing, and insulated vehicles • Seminars on promotion of multi-purpose cold storage facilities • Establishment of ripening chambers and VHT facilities by the public sector • Seminars on the introduction of plastic crates
Processing and retail	<ul style="list-style-type: none"> • Although fruits production, including mango production, is large, aseptic lines are not yet well-established so the quality of mango pulp is degraded, and the storage cost of mango pulp is high. Mango pulp is still imported. • General knowledge on food safety is lacking, and appropriate equipment and inspection equipment have not been introduced. • Types and volumes of processed products, other than juice and pickles, are limited, and processed products, such as jams, and products preserved by sugar are imported. 	<ul style="list-style-type: none"> • Provision of loans for fruit processing facilities (especially aseptic lines and equipment for food safety) • Seminars on aseptic lines, diversification of processed products (other than juice) • Seminars on the improvement of food safety

Source: The Survey Team

As described above, fruits have room for further processing, and demand for processed products is expected to increase in both the export and domestic markets. Therefore, the expansion

of processing equipment and facilities is essential. Import substitution and export promotion are expected to be achieved by upgrading processing equipment and facilities.

In addition, it is expected that issues regarding production, distribution and processing are solved by financial and technical support. Therefore, it can be said that fruit processing is an appropriate target of the Project.

Providing loans for equipment or facilities such as refrigerating/freezing facilities, refrigerating, freezing and insulated vans, and equipment that produces or develops biopesticides can also solve such issues.

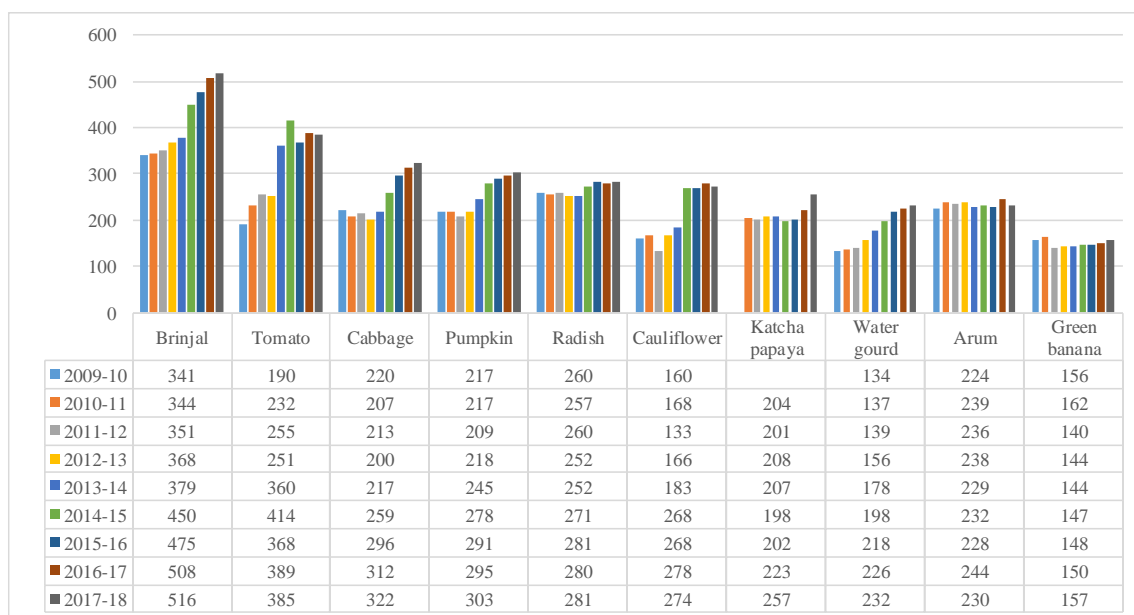
3.2.2. Vegetable

This section reviews the current situation and issues on vegetables, including potatoes. Although potatoes are not classed as a vegetable in Bangladesh, potatoes have many similarities with other vegetables.

(1) Production

As mentioned above, the vegetable production in Bangladesh was 4,074 thousand MT in 2017–18. The production of brinjal was 516 thousand MT, which is 12.7% of the total vegetable production, followed by tomatoes (385 thousand MT, 9.5%), and cabbages (322 thousand MT, 7.9%).

Based on the changes in the production volumes of major vegetables from 2009–10 to 2016–17, the volumes have either been the same or have increased. The volumes of brinjal, tomatoes, and cabbages have increased; tomato production, in particular, more than doubled from 2009–10 to 2016–17.



Source: BBS Yearbook of Agricultural Statistics 2012, 2015, 2018

Figure 46 Change in productions of major vegetables (thousand MT)

The yields of major vegetables in Bangladesh are not always high compared to those of other countries, so there is room for improvement (see Section 3.1.4). This can be explained by the fact that low quality seeds are used, and that farm management, such as the usage of organic fertilizers, is inadequate.

Although balanced usage of both organic fertilizers and chemical fertilizers can increase a yield, it was pointed out that farmers do not use enough organic fertilizers. Nevertheless, the market size of organic fertilizers is expected to grow by 20% per year, though capital investments for the expansion of organic fertilizer production are needed.

As mentioned later, the volumes and types of processed vegetables in Bangladesh are limited. One of the reasons for this is that the production of processing varieties is limited. In general, food processing companies procure raw materials at the market. However, farmers produce table purpose varieties because they are not sure if they will find buyers for the processed varieties. Contract farming therefore benefits farmers in many ways, such as by stabilizing farmers' income through securing buyers, providing farming techniques, advance payment, and providing necessary inputs with a guaranteed quality. In order to promote stable production of processing varieties, the promotion of contract farming is thus important.

Furthermore, since the production and development of vegetable seeds are mainly contributed by private companies, it is essential for such companies to focus on the continuous

improvement of processing varieties. In addition to developing new processing varieties and high yield varieties, it is also important to develop varieties that have different harvest times. Since fruits and vegetables productions are highly seasonal, developing varieties that have different harvest times can contribute to the stable supply of agricultural products in general, and raw materials for food processing plants in particular.

(2) Distribution

Similar to fruits, because vegetable harvests are seasonal, prices drop during harvest seasons; post-harvest losses are relatively large. The major reasons for high post-harvest losses include the lack of proper packaging during transportation and the lack of proper warehouses or cold storage facilities.

The table below summarizes post-harvest losses of vegetables in Bangladesh, showing that, on average, 31.7% of vegetables are wasted in Bangladesh.

Table 71 Post-harvest losses of vegetables at each stage in Bangladesh (%)

	Farmer	Bepari	Wholesaler	Retailer	Total	Excluding loss at farmer level
Vegetable						
Tomato	6.9	9.1	8.0	8.9	32.9	26.0
Cauliflower	4.2	9.2	10.3	10.7	34.4	30.2
Okra	9.4	9.8	4.9	8.3	32.4	23.0
Brinjal	6.9	7.4	8.4	6.6	29.3	22.4
Cucumber	7.2	4.5	10.7	4.7	27.1	19.9
Red amaranth	5.5	9.2	7.8	6.1	28.6	23.1
Average	7.6	8.5	8.6	7.0	31.7	24.1

Source: USAID (2010) Post-harvest Handling Guide

In Bangladesh, refrigerated storage facilities and refrigerated vans are not usually used in the value chain of vegetables. In Japan, farmers or agriculture cooperatives usually pre-cool vegetables before shipping in the summer, and pack a bunch of vegetables in film bags to reduce the oxygen levels and retain freshness. In order to reduce post-harvest losses, vegetables are transported in paper boxes in Japan. However, considering the current situation of Bangladesh, it may not be ready to apply the same kinds of measures applied in Japan, although there is large room for improvement.

Similar to fruits, vegetables are generally stacked and transported on trucks without any crates or baskets. The vegetables at the bottom are crushed by weight of those on top, which is one of the reasons for the high post-harvest losses. Plastic crates are manufactured in Bangladesh,

but the price is relatively high, BDT 450. Food processing companies or wholesalers enforcing the use of plastic crates, and affordable plastic crates are needed.

The domestic productions as well as export and import volumes of major vegetables are shown in the table below. Although the domestic production volume of potatoes (25,260 MT) is relatively large in Bangladesh, the ratio of the export volume to the production volume is not as large, and is only 0.26%.

The import of carrots is relatively large, at 6,774 MT. The import volume of carrots is one-third of the domestic production. Since carrots can be produced in Bangladesh, it could be possible to substitute imported carrots with domestically produced carrots by increasing the yield and adjusting the harvest times of the new varieties. It can be expected to contribute to the diversification of farmers' income and the stability of the domestic market.

Table 72 Domestic production and trade volumes of major vegetables (fresh and chilled) (2018)

H.S. Code	Product label	Domestic production (MT)	Export		Import	
			(MT)	Ratio to production volume	(MT)	Ratio to production volume
'070110	Potatoes (seed potato)	9,725,000	164	0.00%	4,330	0.04%
'070190	Potatoes (excluding seed potato)		25,260	0.26%	29	0.00%
'070200	Tomatoes	385,000	120	0.03%	1,294	0.34%
'070390	Leeks and others	-	1,862	-	9	-
'070410	Cauliflowers and broccoli	274,000	1,060	0.39%	23	0.01%
'070490	Cabbages, kohlrabi, kale, and similar edible brassicas (excluding cauliflowers, ...)	322,000	671	0.21%	22	0.01%
'070511	Cabbage lettuce	-	912	-	9	-
'070519	Lettuce (excluding cabbage lettuce)	-	1,016	-	21	-
'070610	Carrots and turnips	19,000	75	0.39%	6,774	35.65%
'070700	Cucumbers and gherkins	65,000	461	0.71%	1	0.00%
'070930	Eggplants	525,000	3,662	0.70%	-	0.00%
'070960	Capsicum or Pimenta	-	4,047	-	2,402	-
'070993	Pumpkins, squash and gourds "Cucurbita spp."	303,000	2,809	0.93%	-	0.00%
'070999	Vegetables n.e.s.	-	7,857	0.00%	279	0.04%

Source: International Trade Center website

(3) Processing and retail

i) Type and quantity of processed products

Although potatoes and tomatoes seem to have much room for processing, vegetables are not processed in the same manner mentioned in Section 3.1.4. Vegetables produced in Bangladesh are mostly sold at the market without processing.

Table 73 Ratio of processed volumes to production volumes (potato and tomato)

	Ratio of processed volume to production volume *1	Processed products*1	
Potato	2%	Chips and crackers	60%
		Flakes	24%
		Starch	16%
Tomato	5%	Juice and ketchup	100%

Source: Katalyst (2016) Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

Although no information on processing ratios of other major vegetables, such as brinjal and cabbages, have been obtained, it is assumed that the processing ratios of those vegetables are extremely low, or almost zero.

The reasons of the low processing ratios of potatoes and tomatoes are: i) productions of processing varieties are limited because contract farming is difficult to practice; ii) ketchup and snacks are imported because the production of intermediate products, such as tomato pulp and potato flakes and starch are limited; and iii) the production capacities of processed products are limited.

In addition, the domestic demand for frozen food, except frozen samosa, is limited.

ii) Market trend of packed foods

The table below shows market sizes and average growth rates over the next five years of packed food products made from vegetables. The market for potato chips (including those made from flakes and starch) is the largest at USD 80.5 million, with an annual growth rate of 8.5% over the next five years. Ketchup, tomato paste and puree made from tomato, pickles made from vegetables, and green mango are expected to grow at an annual growth rate of 5% or more.

Although frozen vegetables are expected to grow at an annual growth rate of 5.9%, the market size itself is limited to USD 3.1 million. Frozen vegetables, which are popular in developed countries, are sold only in some supermarkets in Bangladesh. Frozen samosas are produced and sold in Bangladesh. Cut vegetables are hardly sold. Although the domestic demand for such frozen and chilled vegetables is not large, industry stakeholders are expecting that demand will increase in the near future due to changes in lifestyle in Bangladesh.

Table 74 Market sizes and growth rates for the next five years of vegetable processing products
(million USD)

	Item	2018	CAGR (%)	
1	Sauce, dressings, and condiments	Ketchup	20.6	6.1%
2		Pickled Products	14.2	5.4%
3		Tomato Pastes and Purées	0.3	5.9%
4	Processed fruit and vegetable	Frozen Processed Vegetables	3.1	7.7%
5		Shelf Stable Vegetables	0.2	8.4%
6	Snacks	Potato Chips	80.5	8.5%
		Other Savory Snacks ⁵⁶	40.7	7.3%

Source: Euromonitor International (2019) Packaged Food in Bangladesh

iii) Export and import of processed products

Frozen vegetables are the main export products of vegetable products, and a certain amount of frozen vegetables that are generally consumed in Bangladesh are exported for

⁵⁶ It includes a traditional snack, named Chanachur.

Bangladeshi residents in the Middle East and European countries (i.e. the ethnic markets).

Statistics indicate that 245 MT of frozen potatoes and 1,212 MT (USD 2.3 million) of other frozen vegetables were exported in 2018.

Table 75 Domestic productions, export and import volumes of major vegetables processed products (frozen) (2018)

H.S. Code	Product label	Domestic production (MT)	Export		Import	
			(MT)	Ratio to production volume	(MT)	Ratio to production volume
'071010	Potatoes (frozen)	9,725,000	245	0.00%	2	0.00%
'071080	Other vegetables (frozen)	-	1,212	-	82	-

Source: International Trade Center website

According to the Bangladesh Fruits Vegetables and Allied Products Exporters Association, the export of fresh and frozen vegetables to general mass retailers in Europe have been increasing. When exporting chilled and frozen vegetables, in addition to multi-purpose cold storage facilities and freezing, refrigerated, and insulated vehicles, and instant rapid freezing machines are required to ensure the quality of vegetables. However, such facilities are not widely established in Bangladesh.

iv) Weighing and packing machines

Processed products, such as potato chips, are weighed and packaged into small packages. However, a food processing company complained that weighing and packaging machines, such as those made in China and commonly used in Bangladesh, cannot weigh potato chips correctly. In addition, packaging materials are sealed with heat, but the sealing is not properly done because the temperature needed for sealing is unstable.

If the content of an individual package is less than the weight indicated on the package, the food processing company that sells the product can be penalized by BSTI or the consumer rights authority. On the other hand, if the content of an individual package always exceeds the weight indicated on the package, the company risks not making a profit. As mentioned earlier, the defective rate of inexpensive weighing and packaging machines may be 5%, while higher quality machines, such as those made in Japan, can have a defective rate of less than 1%. Using high quality machines is more cost effective than using such low quality, often cheap, machines. However, the cheap machines can be purchased at about BDT 1 million, while the high quality machines, such as those manufactured in Japan, cost about USD 120 thousand (about BDT 10

million, assuming USD 1 is equal to BDT 85), which is ten times more expensive than the cheap machine. Therefore, many food processing companies tend to purchase inexpensive weighing and packaging machines.

Putting nitrogen into individual packages of processed products, such as potato chips, can hinder the oxidation of processed products and, thus, retain quality. A nitrogen generator can stably supply nitrogen, but only a few processing plants have introduced such a device. It is assumed that the shelf life of the processed food without a nitrogen generator is shorter.

v) Food safety

As mentioned in Section 3.1.5, the food processing industry in Bangladesh has many issues, such as: 1) poor hygienic design and hygiene management at plant; 2) the lack of laboratory and testing equipment; 3) poor food safety management of raw materials; and 4) the lack of knowledge on food safety and food safety management.

(4) Issues and countermeasures of food value chain

Based on the above, the issues and countermeasures of the vegetable food value chain are summarized in the table below.

Table 76 Issues and countermeasures of vegetable food value chain

	Current situation and issues	Possible countermeasures
Production	<ul style="list-style-type: none"> • Productions have increased, but yields are lower than in other countries. • Quality seeds are supplied by private companies, but still low-quality seeds produced by farmers are used. • Contract farming is still limited so that farmers do not produce enough processing varieties. 	<ul style="list-style-type: none"> • Provision of loans to seed companies for the continuous variety development and seed supply • Seminars on the promotion of contract farming and introduction of processing varieties • Provision of loans for the expansion of organic fertilizer production and biopesticide production
Distribution	<ul style="list-style-type: none"> • Cold storage facilities for vegetables are limited. • Post-harvest losses are large because proper boxes, such as plastic crates, are not used. 	<ul style="list-style-type: none"> • Provision of loans to multi-purpose cold storage facilities, and refrigerated, freezing, and insulated vehicles • Seminars on the promotion of multi-purpose cold storage facilities

		<ul style="list-style-type: none"> • Seminars on distribution with plastic crates
Processing and retail	<ul style="list-style-type: none"> • Vegetable productions are large and have large room to be processed. Demand for vegetable processed products is expected to grow. However, intermediate products are still imported, and the production capacity of processed products is still limited. • Cheap but low-quality equipment for weighing and packaging is used in food processing plants, resulting in high reject rates. • Few factories introduced nitrogen filling and nitrogen generation equipment to control deterioration, and the shelf life of products is shorter than if nitrogen were not used. • General knowledge on food safety is lacking, and appropriate equipment and inspection equipment have not been introduced. 	<ul style="list-style-type: none"> • Provision of loans for vegetable processing facilities (especially quality weighing and packing machines and equipment, and facilities that can improve food safety) • Seminars on the improvement of processing technologies for vegetable processed products • Seminars on the improvement of food safety

Source: The Survey Team

As described above, vegetables have a lot of room for further processing, and demand for processed products is expected to increase in both the export and domestic markets. Therefore, the expansion and upgrade of processing equipment and facilities are required to achieve import substitution and export promotion.

In addition, it is expected that issues regarding production, distribution and processing are solved through financial and technical support. Therefore, it can be said that vegetable processing is an appropriate target for the Project.

Providing loans for equipment or facilities that produce or develop seeds, refrigerating and freezing facilities, and refrigerating, freezing and insulated vans can solve the aforementioned issues.

3.2.3. Spices

(1) Production

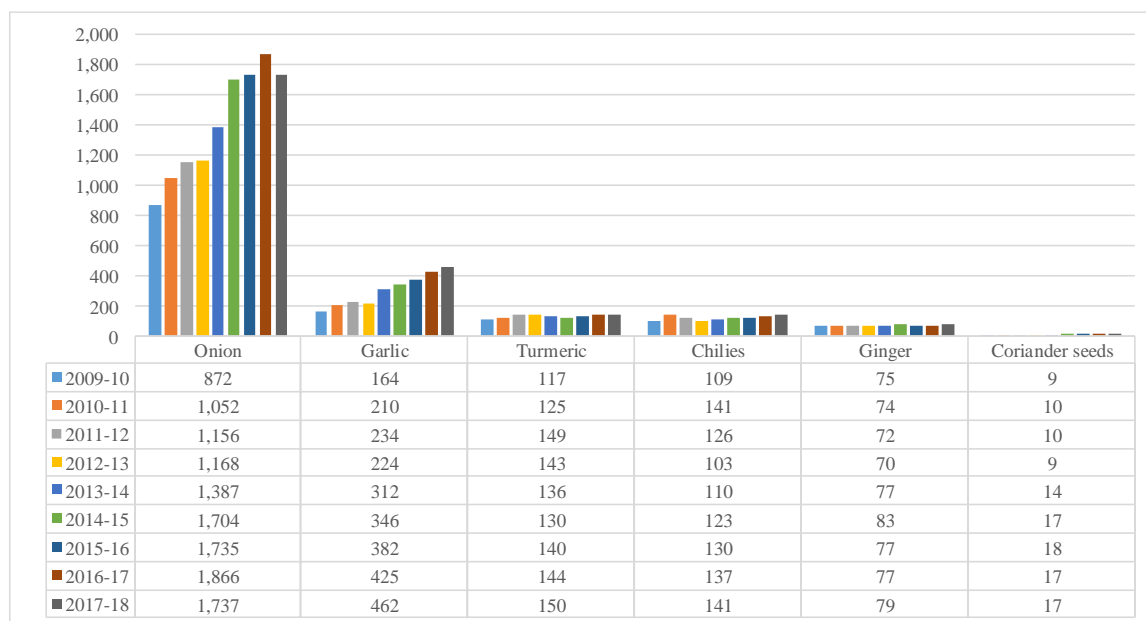
Onion, garlic, and ginger are classified as spices in Bangladesh. Among these spices, onion production is relatively large, and has increased sharply since 2009–10. However, only 66 MT of onions were exported in 2018, while 262 thousand MT (equivalent to USD 57.3 million) were imported. It means that the import volume accounts for 15% of domestic production.

Although the garlic production increased to 462,000 MT in 2017–18, about 65,000 MT, which accounts for 14% of the domestic production, were imported in 2018.

The domestic production for ginger has not changed much. While 79 thousand MT of ginger were produced in Bangladesh, 85 thousand MT were imported in 2018. It means that the imported volume exceeds the production volume.

In Bangladesh, the major spices other than onion, garlic and ginger are chile, turmeric, coriander, and cumin. Cumin is not produced domestically; almost 100% of cumin is imported.

According to spice industry stakeholders, 80% of the spices are domestically produced, and 20% (e.g. cumin, cinnamon, saffron, nutmeg, and so on) are imported.



Source: BBS Yearbook of Agricultural Statistics 2012, 2015, 2018

Figure 47 Changes in major spice productions (thousand MT)

Table 77 Domestic productions, export and import volumes of major spices (2018)

H.S. Code	Product label	Domestic production (MT)	Export		Import	
			(MT)	Ratio to production volume	(MT)	Ratio to production volume
'070310	Onions and shallots	1,737,000	66	0.00%	262,562	15.12%
'070320	Garlic	462,000	1	0.00%	65,056	14.08%
-	Turmeric	150,000	1,738	1.16%	3,595	2.40%
'070960	Chilies*	141,000	4,047	2.87%	2,402	1.70%
-	Ginger	79,000	48	0.06%	84,688	107.20%
-	Coriander	17,000	580	3.41%	1,844	10.85%
-	Cardamoms	-	1	-	4,883	-
-	Cumin	-	320	-	29,438	-

Note: * Including Capsicum and Pimenta

Source: International Trade Center website

The onion varieties with high yield and long preservability have been improved by private companies. Such onion seeds are more expensive than seeds collected by farmers themselves, but the yield is higher and farmers can earn more.

The onion varieties have high preservability, and can be stored at room temperature for a long duration. Therefore, it is expected that such varieties can improve farmers' income, decrease the import of onions, stabilize onion prices in the domestic market, and consistently supply raw materials to food processing companies.

Since the demand for such quality seeds has been increasing, seed companies need to expand their seed producing, processing, and storage capacities. In addition, since seed companies need to continue R&D for seed development, they have to continue investing in the equipment and materials required for R&D.

(2) Distribution

Similar to vegetables, onion, garlic, ginger, and green chili are traditionally transported from farmers to consumers through local wholesalers, regional wholesalers, and retailers.

Onions, garlic, and ginger can be stored for a relatively long period. However, under the hot and humid environment of Bangladesh, germination or decay can begin in a few months after storage. Although onions can be stored for eight to nine months if stored properly in cold storage facilities, most cold storage facilities in Bangladesh are used for potatoes, so the number of cold storage facilities that are suitable for onion is limited.

Onions are imported from India and other countries. However, in the fall of 2019, the Indian government banned exporting onions due to its low harvest. The price of onions in

Bangladesh rose from BDT 20 per kg to BDT 200 per kg, causing disruption in the domestic market. Therefore, multi-purpose cold storage facilities that can store onions, garlic, and ginger are required.



Onion retail market

Garlic retail market

Dry chili is stored in plastic bags

Source: The Survey Team

Photo 24 A spice market at rural area

(3) Processing and retail

Chili, turmeric, coriander (seeds), and cumin (seeds) are dried and transported as whole spices or powdered spices. The major processing process of spice include cleaning, grinding, processing, and packaging.

In India, where spice production volumes are relatively large, some companies extract turmeric oleoresin from the chili and curcumin for added value. However, such extraction is not yet done in Bangladesh.

Square Food and Beverages Ltd. (Square Group), PRAN Foods Ltd. (PRAN Group), Ahmed Food Products Ltd. (Ahmed), and ACI Foods Ltd. (ACI Group) produce packed spices, for which Square Groups has the top share⁵⁷. Farmers or middlemen dry, clean, and remove foreign matters. Processing plants clean spices and remove foreign matters again, then grind, pack and ship the packed spices.

According to industry stakeholders, in Bangladesh, packed spices have about a 30% share of the spice market, while the spices that are sold by weight have about a 70% share of the spice market.

About 12% of chili and 100% of turmeric are processed into dried spices, and about 93%

⁵⁷ Interviews with industry people and the Katalyst (2016), Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

of them are processed at traditional facilities⁵⁸ .

Table 78 Ratios of processed volumes to production volumes of chili and turmeric

	Ratios	Processed products	
Chili	12%	Chili powder	95%
		Additives for sauces and snacks	5%
Turmeric	100%		100%

Source: Katalyst (2016) Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

The market size of spices in Bangladesh was USD 78 million in 2018, and is expected to grow at an annual rate of 5.9% over the next five years⁵⁹ .

Powdered spices are exported to the Middle East as well as the United Kingdom and U.S.A. The export value of powdered spices in 2018 was USD 3.4 million⁶⁰ . Spice consumption is projected to increase by about 0.2% in the United Kingdom over the next five years, by 1.9% in U.S.A., and 4.3% in the Middle East⁶¹ . Therefore, exports from Bangladesh are also expected to increase.

In Bangladesh, the majority of spices are still processed at traditional facilities. Although spices, such as chili, have a risk of mold venom, such as aflatoxin, traditional facilities do not have the appropriate testing equipment. Large food processing companies have laboratories, but they rely on outside organizations, such as BSTI, or private external organizations for advanced analysis. However, BSTI takes a relatively long time to analyze samples. Since private external inspection organizations cannot analyze all items in Bangladesh, some samples are sent overseas for analysis, meaning that time and funding are required.

Furthermore, it is assumed that traditional spice processing facilities do not have enough measures, such as metal detectors, for removing foreign matters. Considering food safety, modern processing facilities need to be established to replace traditional processing facilities.

In addition to laboratories owned by food processing companies, strengthening such testing laboratories owned by BSTI or private inspection organizations is also needed. Strengthening the capabilities of food processing companies so they can control the intrusion of foreign matters and mold venom can not only improve food safety, but also promote exports.

⁵⁸ Katalyst (2016) Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

⁵⁹ Euromonitor International (2019) Packaged Food in Bangladesh

⁶⁰ Source: Export Data of Export Promotion Bureau of Bangladesh

⁶¹ Source: Euromonitor International

(4) Issues and countermeasures of food value chain

Based on the above analysis, the issues in the spice value chain and the possible countermeasures are summarized in the table below.

Table 79 Issues and countermeasures of spices food value chain

	Current situation and issues	Possible countermeasures
Production	<ul style="list-style-type: none"> • Production has increased, but some (15% of onions) need to be imported. • Quality seeds are supplied by private companies, but the low-quality seeds produced by farmers are still used. 	<ul style="list-style-type: none"> • Provision of loans to seed companies for the continuous variety development and seed supply • Seminars on the introduction of new varieties
Distribution	<ul style="list-style-type: none"> • Cold storage facilities for spices (including onions) are limited. 	<ul style="list-style-type: none"> • Provision of loans for multi-purpose cold storage facilities, and refrigerated, freezing, and insulated vehicles • Seminars on the promotion of multi-purpose cold storage facilities
Processing and retail	<ul style="list-style-type: none"> • Domestic spice production is large, and has large room in which to process. Demand for processed spices is expected to expand. • For food safety, appropriate equipment and inspection equipment, such as metal detectors, have not been well-introduced. 	<ul style="list-style-type: none"> • Provision of loans for spices processing facilities and equipment, and facilities that can improve food safety • Provision of loans for equipment at laboratories to test for hazardous substances

Source: The Survey Team

As described above, the demand for spice processed products is expected to increase in both the export and domestic markets. Therefore, the expansion and upgrade of processing equipment and facilities are required to achieve import substitution and export promotion.

In addition, it is expected that issues on production, distribution and processing are solved through financial and technical support. Therefore, it can be said that spice processing is an appropriate target for the Project.

Providing loans for the equipment or facilities that produce or develop seeds, refrigeration

and freezing facilities, and refrigeration, freezing, and insulated vans can solve the aforementioned issues.

3.2.4. Cereals

(1) Production

The paddy and wheat productions are shown in the figure and table below. As the figure below indicates, the increase in paddy production has been achieved by increases in yield. Paddy production in Bangladesh more than tripled from 14.43 million MT in 1961 to 48.89 MT in 2017, allowing Bangladesh to become self-sufficient in the production of rice.

However, the production of wheat halved in 2017 after peaking in 1999 (1,908 thousand MT) due to diseases and unstable weather. Production has increased slightly in recent years, but has not yet reached the peak levels in 1999.

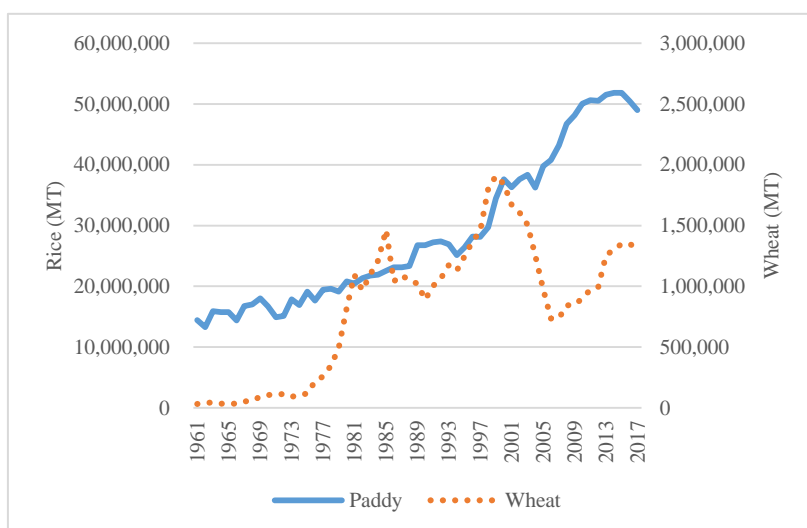


Table 80 Production of paddy and wheat

Year	Paddy (MT)	Wheat (MT)
1961	14,426,184	32,512
1966	14,363,000	35,600
1971	14,896,689	111,800
1976	17,628,320	218,174
1981	20,445,872	1,092,513
1986	23,110,032	1,041,825
1991	27,242,000	1,004,290
1996	28,182,000	1,369,130
2001	36,269,000	1,673,000
2006	40,773,000	735,000
2011	50,627,000	972,085
2016	50,452,866	1,348,186
2017	48,980,000	1,311,473

Source: FAOSTAT

Source: FAOSTAT

Figure 48 Change in production of paddy and wheat (MT)

(2) Distribution

The paddy is milled at a miller, and rice is usually sold by weight. As mentioned in Section 3.1.4, the value addition of milling rice is relatively small. Rice is processed into puffed rice and noodles, but there are few varieties of processed rice products.

Wheat is crushed by roller machines into powdered flour at a miller, and flour is usually also sold by weight. It is assumed that the value addition of milled wheat is relatively small, like milled rice.

The Bangladesh Auto Rice Mill Owner’s Association estimated that about 10% –15% of automatic and semi-automatic rice mills, and many husk rice mills, are not currently operating due to competition, or other reasons. Therefore, it is assumed that rice mills have already been established throughout Bangladesh.

Domestic productions as well as export and import volumes of major cereals are shown in the table below. The import volume of rice exceeds the export volume of rice. However, the volume of rice imports is only 5.5% of the domestic production.

Wheat is the seventh largest agriculture crop in Bangladesh. However, import volumes of wheat is four times larger than local production volumes, meaning that more than 80% of the domestic demand depends on imports.

Table 81 Domestic productions, export and import volumes of rice and wheat (2018)

H.S. Code	Product label	Domestic production (MT)	Export		Import	
			(MT)	Ratio to production volume	(MT)	Ratio to production volume
'1001	Wheat and meslin	1,098,000	-	-	4,839,307	440.7%
'1006	Rice	36,279,000	8381	0.0%	2,008,548*	5.5%

* Data in 2017

Source: International Trade Center website

(3) Processing and retail

The paddy is milled at a miller, and rice is usually sold by weight. As mentioned in Section 3.1.4, the value addition of milled rice is relatively small. Rice is processed into puffed rice and noodles, but there are few varieties of processed rice products.

Wheat flour is processed into bread, biscuits, savory snacks, pasta, and noodles. The current market sizes of these flour-based products and the CAGRs for the next five years are shown in the table below. The markets for bread and biscuits are worth USD 351.5 million and USD 301.5 million, respectively, and are expected to grow at 3.3% annually. The market for noodles is estimated to be worth USD 94.6 million, and is expected to grow at 12.8% annually. The noodle market is also recognized as a growing market.

Table 82 Market sizes and growth rates for the next five years – rice and wheat processed products
(million USD)

Item	Market size (million USD)	CAGR
Puffed snacks	46	7.0%
Bread	351.5	1.8%
Biscuit	301.5	7.0%
Salty snacks	249.5	6.9%
Noodles	94.6	12.8%

Source: Euromonitor International (2019) Packaged Food in Bangladesh

The export and import values of flour-based products are shown in the table below, and show that Bangladesh imports food preparations for flour, groats, meal, starch or malt extract, and exports pasta, bread, pastry, cakes, and biscuits.

Therefore, it can be said that Bangladesh imports and processes wheat and other raw materials to produce pasta and bread, and so on. To fulfil the domestic demand, then Bangladesh exports the remaining processed products.

Table 83 Export and import values of wheat processed products (2018)

H.S. Code	Product	Balance (thousand USD)	Export (thousand USD)	Import (thousand USD)
'190190	Food preparations of flour, groats, meal, starch, or malt extract	-57,613	481	58,094
'1902	Pasta, etc.	4,734	6,176	1,442
'1905	Bread, pastry, cakes, biscuits, and other bakers' wares	29,917	34,449	4,532

Source: International Trade Center website

Olympic, Al-Amin Bread & Biscuits Ltd. and PRAN Foods Ltd. are major biscuit processing companies, and Nestle, which owns the Maggi brand, is one of the major noodles processing companies in Bangladesh. The major noodle product is instant noodles. Pasta is also sold in Bangladesh, but the market size is relatively small.

Although bread and biscuits are exported, there are issues with regard to food safety that need to be addressed, such as implementing measures against foreign matters. Many biscuit production lines are not automated, and many of them have no metal detectors.

In addition, similar to the potato chips processing line, the weighing and packaging machines are not always accurate. In this regard, the weighing and packaging machines in bread and biscuit processing lines need to be improved.

(4) Issues and countermeasures of food value chain

Based on the above analysis, the issues and countermeasures for the cereals food value chain are summarized in the table below.

Table 84 Issues and countermeasures of cereals food value chain

	Current situation and issues	Possible countermeasures
Production	<ul style="list-style-type: none"> • Although rice is mostly produced domestically, more than 80% of wheat is imported. 	
Distribution	<ul style="list-style-type: none"> • Almost all rice is distributed as rice, and value addition of milled rice is low. • Enough rice mills have been established. 	
Processing and retail	<ul style="list-style-type: none"> • Demand for cereals processing products is expected to expand. • For food safety, appropriate equipment and inspection equipment, such as metal detectors, have not been well-introduced. • Inexpensive, but low-quality, equipment for weighing and packaging is used in food processing plants, resulting in a high rejection rate. 	<ul style="list-style-type: none"> • Provision of loans for cereal processing facilities and equipment, and facilities that can improve food safety • Seminars on the improvement of food safety

Source: The Survey Team

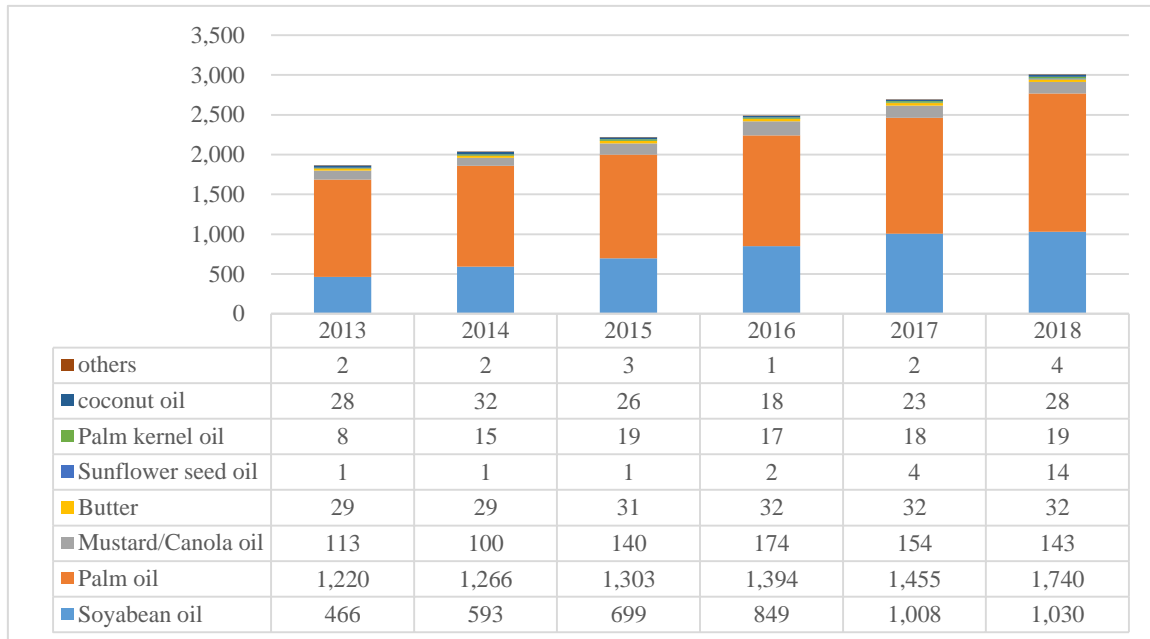
As described above, the demand for cereal processed products is expected to increase in both the export and domestic markets. Therefore, the expansion and upgrade of processing equipment and facilities are required to import substitution and export promotion.

Although, rice mills seem to be fully established, and the value addition of rice milling is relatively small. Therefore, it can be said that the cereals processing, excluding rice and wheat mills, are appropriate targets for the Project.

3.2.5. Edible oil

The annual consumption of edible oils in Bangladesh is estimated to be at 3,010 thousand MT, and has been increasing at an annual rate of 8%–12% in recent years. The consumption of palm oil and soybean oil are the largest, accounting for 92% of total consumption.

Table 85 Change in consumption volumes of edible oil in Bangladesh (thousand MT)



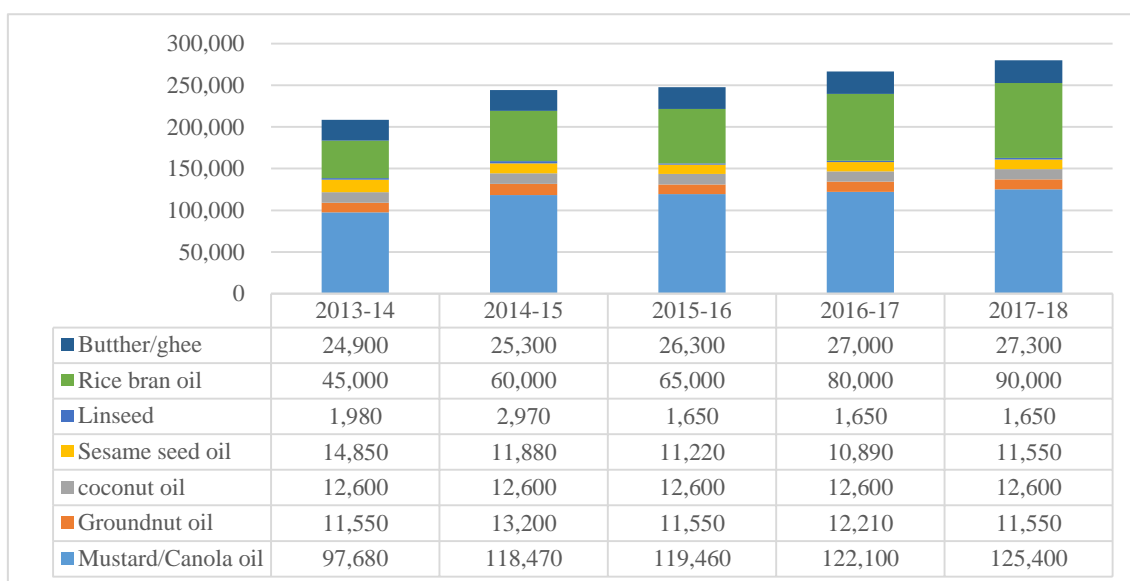
Source: Malaysian Palm Oil Council Bangladesh website⁶²

However, the domestic production is limited to 280 thousand MT. Both the production and domestic consumption have been increasing steadily. As a result, the import volumes accounted for 91% of domestic consumption in 2018.

Mustard oil is the largest of the edible oils produced in Bangladesh with a production of 125,400 MT, followed by rice bran oil (90,000 MT) and ghee (butter oil) (27,300 MT).

⁶² <http://mpoc.org.bd/2019/01/oils-and-fats-market-scenarios-of-the-country/>

Table 86 Changes in edible oil productions in Bangladesh (MT)



Source: Malaysian Palm Oil Council Bangladesh website

Edible oils are mainly extracted from raw materials, refined, and then produced. In order to satisfy domestic consumption, edible oils rely on imports. Edible oil processing companies mainly import edible oils in three ways: i) import raw material, such as seeds (“seed” in the below table); ii) import crude oil and refine it (“crude oil” in the below table); and iii) import edible oils before refining, then process it into the final products, or import the final products (“others” in the table below). As shown in the table below, import forms are different for the different edible oils.

Table 87 Major import aims of major edible oils (2018)

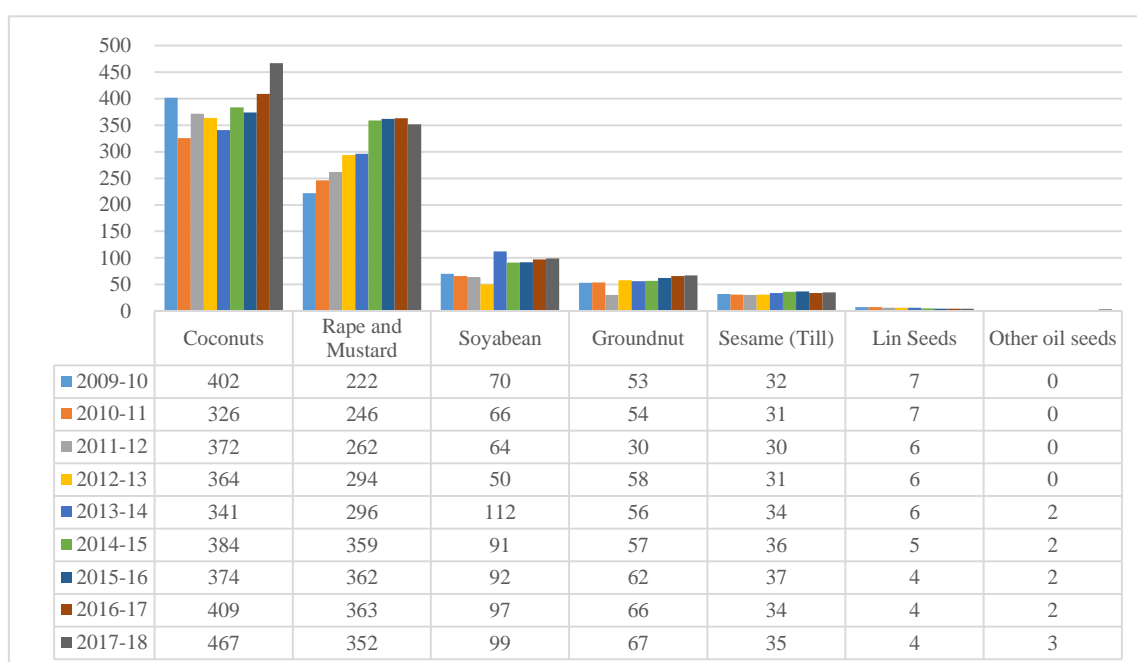
Edible oil	Type	Import volume (MT)	Import value (thousand USD)	Major aims for being imported
Soybean	Seed	1,339,748	493,012	To import seed or crude oil, then extract and refine
	Crude oil	950,349	652,107	
	Others	384	560	
Rapeseed oil/ Mustard oil	Seed	99,451	59,180	To import seed, then extract and refine
	Crude oil	10	29	
	Others	164	210	
Sunflower	Seed	28,123	10,382	To import seed, then extract and mainly refine
	Crude oil	186	215	
	Others	2,754	3,384	
Palm	Seed	0	0	To import others (final products or products before refining), then refine
	Crude oil	13,941	6,624	
	Others	1,715,189	1,028,799	

Source: International Trade Center website

(1) Production and distribution

< Raw material >

The figure below shows the production trends for raw materials of edible oils. The production of coconut, rapeseed (rape and mustard), soybeans and peanuts has been increasing. However, as mentioned above, there is a significant shortage of raw materials, making it difficult to meet domestic demand for edible oils.



Source: BBS Yearbook of Agricultural Statistics 2012, 2015, 2018

Figure 49 Changes in productions of raw materials of edible oils (thousand MT)

1) Soybean

Regarding soybean, Bangladesh produced 99,000 MT in 2017–18, and imported 1,339,748 MT in 2018. It means that the import volumes accounted for 93.1% of the total domestic demand (1,438,748 MT).

2) Rapeseed and mustard

Most raw materials for mustard oil are produced domestically. Bangladesh imported 99,451 MT in 2018, while Bangladesh produced 352 thousand MT in 2017–18. Thus, 78% of total domestic demand (451,451 MT) are produced in Bangladesh.

However, it is said that there is a problem in the quality of mustard. Specifically, a content ratio of erucic acid to free fat acid (FFA) in the mustards produced in Bangladesh (i.e. in the Indian Continent) is higher than that outlined in the WHO regulation. Therefore, it is necessary to mix domestic mustard with foreign mustards, which has a lower content ratio of erucic acid. Researches on the variety or cultivation techniques of mustard is required to reduce the content ratio of erucic acid in mustard.

3) Rice bran

Rice bran is raw material of rice bran oil, and are produced during a process of rice milling. It is estimated that rice is 67% of paddy weight, rice husk is 24%, rice bran is 7%, and dust or broken rice is 2%. Rice production in 2017–18 was 36, 280 thousand MT, so about 3,790 thousand MT of rice bran was produced in Bangladesh.

Table 88 Rice, husk, and rice bran produced by paddy (2017–18)

	Paddy	Rice	Husk	Rice bran	Dust, or broken rice
Production (thousand MT)	54,148	36,279	12,995	3,790	1,083
Ratio	100%	67%	24%	7%	2%

Source: Bangladesh Tariff Commission (2015) Bangladesh Journal of Tariff and Trade

Although rice bran is partially processed into rice bran oil, most of them are used as fertilizer or feed for animals in Bangladesh. If rice bran oil is produced using all the rice bran produced in Bangladesh, 783,772 MT of rice bran oil could be produced, as shown in the table below. However, the domestic production of rice bran oil is estimated at 90,000 MT, as shown in Table 86. It means that only 11.5% of rice bran produced in Bangladesh was used for rice bran oil. Therefore, there is room for expansion in rice bran oil production.

However, rice bran cannot be produced well when the rice is not milled at semi-auto mills or auto mills. Furthermore, since a quality of rice bran deteriorates within a few days, it is necessary to process the rice bran as soon as it is produced. For rice bran oil production, it is necessary to shift from husking mills to semi-auto or auto mills, and establish distribution networks from rice mills to rice bran oil processing plants.

Table 89 Volume of rice bran oil in case all rice bran is used for rice bran oil (2017-18)

	Rice bran	Crude rice bran oil	Rice bran oil
Ratio	100.00%	22.00%	20.68%*
MT	3,790,000	833,800	783,772

Note: * 94% of crude rice bran oil

Source: Bangladesh Tariff Commission (2015) Bangladesh Journal of Tariff and Trade

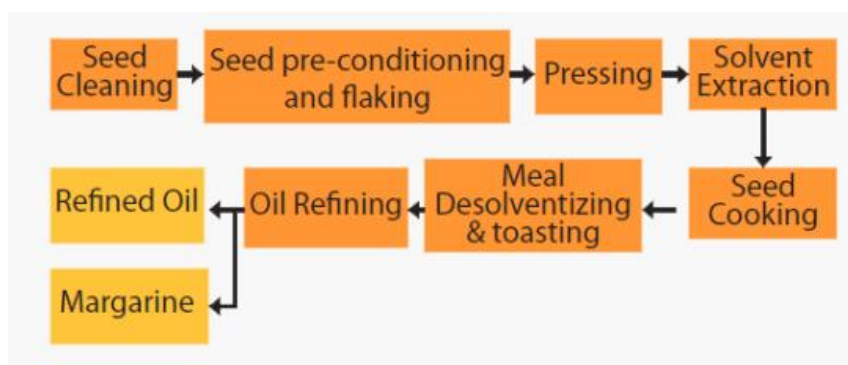
4) Sesame

Approximately 35 thousand MT sesame was produced for edible oil purpose in 2017–18. Small volumes of sesame is already exported to Japan so the potential of value addition is high.

(2) Processing and retail

Large food processing companies, such as City Group and Meghna Group, have edible oil processing lines that produce 1,000 MT per day, although mustard oil is generally processed at small, traditional oil extraction units.

In the traditional method, oil is extracted by squeezing, and sold without refining. However, in the processing lines of the large companies, soybeans, rice bran, and mustard with low oil content are extracted more efficiently with solvents.



Source: BIDA (website) Edible oil processing⁶³

Figure 50 Mustard oil processing

⁶³ <http://www.boomingbangladesh.com/agro-business/#1503828572339-bcbc7c36-4b78>

Edible oils are mainly produced by: i) extracting crude oil from raw materials; or ii) refining crude oil. In the case of soybean oil, both raw materials and crude oil are imported. However, the number of food processing companies that have crude oil extraction lines is limited in Bangladesh.

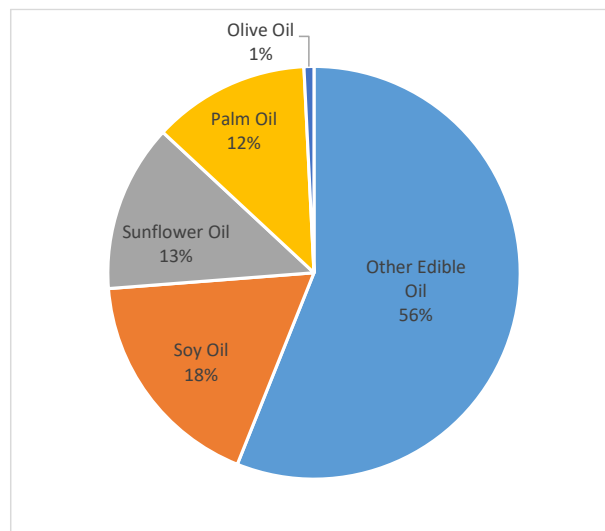
According to industry stakeholders, 30% of edible oils produced by large food processing companies are packed and sold, while 70% are distributed and sold in bulk. About 10% are sold in bulk to food processing companies or other business, while 60% are transported



Source: The Survey Team
Photo 25 Vessels for edible oil transportation (500 – 600 MT)

by vessels or tankers, and sold to consumers by weight (e.g. 1kg or 2kg) through wholesalers and retailers. Selling edible oils in bulk has high risk, such as contamination of foreign matters during refilling from tankers to other containers, and quality degradation because of unsealed containers. Although sales of packed edible oils have been increasing, bulk sales still have a large portion because of its relatively low price. According to industry stakeholders, palm oil, soybean oil, and mustard oil are successfully sold because of their relatively low price compared to rice bran oil and sunflower oil.

The breakdown of the packed edible oils market is shown in the figure below. “Other edible oils” in the figure below includes mustard oil and rice bran oil.



Source: The Survey Team based on Euromonitor International

Figure 51 Breakdown of the packed edible oils market

The size of the packed edible oils market is USD 1,575.7 million, and is estimated to grow at 7.3% annually for next five years.

Table 90 Market size and growth rate for next five years – edible oils (million USD)

Item	2018	CAGR (%)
Other edible oils	883.4	7.50%
Soybean oil	279.1	7.10%
Sunflower oil	207.0	6.60%
Palm oil	193.9	7.50%
Olive oil	12.3	5.90%

Source: Euromonitor International (2019) Packaged Food in Bangladesh

As mentioned above, 91% of the edible oils consumed in Bangladesh are imported, and the domestic demand is expected to increase in the future. Therefore, it is desirable to produce edible oils using domestic raw materials in order to reduce foreign currency outflows, and promote domestic agriculture and food processing industries.

The establishment of extracting processing lines of soybean and sunflower, which are mainly imported, may also contribute to the reduction of crude oil costs. However, it cannot be expected that soybean and sunflower production will increase dramatically in the near future. Therefore, processing lines for extracting oil from mustard, rice bran, and sesame are needed, and can be produced in Bangladesh.

For reference, retail prices of one liter of edible oil at the Shwapno online shop, a major supermarket chain, are shown in the table below.

Table 91 Retail price of major edible oils (BDT per kg)

Type	Price
Soybean	102
Rice bran oil	135
Mustard oil	235
Sunflower oil	240
Olive oil	960

Source: Shwapno website

(3) Issues and countermeasures of food value chain

Based on the above, the issues and countermeasures for the edible oils food value chain are summarized in the table below.

Table 92 Issues and countermeasures of edible oil food value chain

	Current situation and issues	Possible countermeasures
Production	<ul style="list-style-type: none"> • Soybean produced in Bangladesh is cheaper than imported soybean, and its quality is the same. Though, production volume is limited. • Mustard produced in Bangladesh contains more erucic acid than permitted by the WTO regulation, so research, variety improvement and extension activities may be needed. 	<ul style="list-style-type: none"> • Provision of loans to seed companies for the continuous variety development and seed supply
Distribution	<ul style="list-style-type: none"> • Regarding rice bran, which is a raw material of rice bran oil, the quality of the rice bran is rapidly degrading, so the promotion of auto and semi-auto rice mills and the development of distribution networks of rice bran are needed 	<ul style="list-style-type: none"> • Seminars on the promotion of rice bran oil production, including the development of the distribution network of rice bran
Processing and retail	<ul style="list-style-type: none"> • Demand for edible oils is expected to grow. Traditional oil extracting facilities have much room for improvement in production efficiency. • Because edible oils are sold in bulk by weight, there is high risk of contamination of foreign matters and quality deterioration. • Although rice bran oil, and others, have room to use domestic raw materials, most edible oils are imported. 	<ul style="list-style-type: none"> • Provision of loans for edible oil processing facilities, which use raw materials produced in Bangladesh (mustard oil, rice bran oil, and sesame oil) • Seminars on the safety of edible oils (e.g. packed edible oils)

Source: The Survey Team

As described above, the demand for edible oils is expected to increase in domestic markets. Therefore, the expansion of processing equipment and facilities that can use the raw materials produced in Bangladesh are required.

In addition, it is expected that issues regarding production, distribution and processing are solved through financial and technical support. Therefore, it can be said that edible oil processing is an appropriate target for the Project.

Providing loans for equipment or facilities that produce or develop seeds can also solve the aforementioned issues.

3.3. Summary of Issues on Food Value Chain

Based on the survey results analyzed above, the issues and their countermeasures are summarized in this section.

3.3.1. Production

The issues and their countermeasures for the production of major processed products are summarized in the table below.

Table 93 Issues and countermeasures for production

	Issues	Its countermeasures
Fruits	<ul style="list-style-type: none"> The yields are low because fertilizers are not properly applied and the usage of biopesticides is limited. 	<ul style="list-style-type: none"> Provision of loans for the production facilities of biopesticides Seminars on the promotion of contract farming and cultivation techniques
Vegetables	<ul style="list-style-type: none"> Productions have increased, but yields are lower than in other countries. Quality seeds are supplied by private companies, but low-quality seeds produced by farmers are still being used. Contract farming is still limited so that farmers do not produce enough processing varieties. 	<ul style="list-style-type: none"> Provision of loans to seed companies for the continuous variety development and seed supply Seminars on the promotion of contract farming and the introduction of processing varieties Provision of loans for the expansion of organic fertilizer and biopesticide production
Spices	<ul style="list-style-type: none"> Production has increased, but some (15% of onions) need to be imported. Quality seeds are supplied by private companies, but low-quality seeds produced by farmers are still being used. 	<ul style="list-style-type: none"> Provision of loans to seed companies for the continuous variety development and seed supply Seminars on the introduction of new varieties

Cereals	<ul style="list-style-type: none"> Although rice is mostly produced domestically, more than 80% of wheat is imported. 	
Edible oil	<ul style="list-style-type: none"> Soybean produced in Bangladesh is cheaper than imported soybean, and its quality is same. Though, production volume is limited. Mustard produced in Bangladesh contains more erucic acid than permitted by the WTO regulation, so research, variety improvement and extension activities may be needed. 	<ul style="list-style-type: none"> Provision of loans to seed companies for the continuous variety development and seed supply

Source: The Survey Team

Based on the above, the key issues for production can be summarized below:

- Yield is low (because organic fertilizers and biopesticides are not properly used);
- Low quality seeds are used;
- Continuous variety improvements are required; and
- Contract farming is limited.

Based on the above table, businesses that need financing and capacity development are summarized below. As described in Section 2.3, various donors provide technical assistance for agriculture production. Therefore, agriculture production is excluded from below.

< Equipment and facilities with financing needs >

- Seed development and seed production; and
- The production of organic fertilizers and biopesticides.

< Capacity development needs >

- The usage of processing varieties; and
- The promotion of contract farming and improvement of farm management techniques.

3.3.2. Distribution

The issues and their countermeasures for the distribution of major processed products are summarized in the table below.

Table 94 Issues and their countermeasures for distribution

	Issues	Its countermeasures
Fruits	<ul style="list-style-type: none"> • Post-harvest losses are large because of the lack of cold storage facilities. • Ripening is ununified because of the lack of proper ripening chambers. • VHT facilities are not established so that necessary treatments for exporting cannot be done properly. • Post-harvest losses are large because proper boxes, such as plastic crates, are not used. 	<ul style="list-style-type: none"> • Provision of loans for multi-purpose cold storage facilities, and refrigerated, freezing, and insulated vehicles • Seminars on the promotion of multi-purpose cold storage facilities • Establishment of ripening chambers and VHT facilities by the public sector • Seminars on the introduction of plastic crates
Vegetables	<ul style="list-style-type: none"> • Cold storage facilities for vegetables are limited. • Post-harvest losses are large because proper boxes, such as plastic crates, are not used. 	<ul style="list-style-type: none"> • Provision of loans for multi-purpose cold storage facilities, and refrigerated, freezing and insulated vehicles • Seminars on the promotion of multi-purpose cold storage facilities • Seminars on distribution with plastic crates
Spices	<ul style="list-style-type: none"> • Cold storage facilities for spices (including onions) are limited. 	<ul style="list-style-type: none"> • Provision of loans for multi-purpose cold storage facilities, and refrigerated, freezing and insulated vehicles • Seminars on promotion of multi-purpose cold storage facilities
Cereals	<ul style="list-style-type: none"> • Almost all rice is distributed as polished rice, and value addition of milling rice is low. • Sufficient number of rice mills have been established. 	
Edible oil	<ul style="list-style-type: none"> • Regarding rice bran, which is a raw material of rice bran oil, the quality of the rice bran is rapidly degrading so the promotion of auto and semi-auto rice mills, and the development of the distribution networks of rice bran are needed 	<ul style="list-style-type: none"> • Seminars on the promotion of rice bran oil production, including the development of the distribution network of rice bran

Source: The Survey Team

Based on the above, the key issues for distribution can be summarized below:

- Since cold storage facilities for fruits, vegetables, and spices are limited, post-harvest losses

are relatively large;

- Refrigerated, freezing and insulated vehicles as well as plastic crates are not used, so the risk of food loss during transportation is large;
- Ripening chambers and VHT facilities have not been established; and
- The distribution network of rice bran for rice bran oil has not been established.

Based on the above table, businesses that need financing and capacity development are summarized below.

< Equipment and facilities with financing needs >

- Cold storage facilities for fruits, vegetables, and spices;
- Refrigerated, freezing and insulated vans; and
- Plastic crates for fruits and vegetables transportation.

< Capacity development needs >

- The promotion of multipurpose cold storage facilities;
- The promotion of plastic crates for transportation; and
- The promotion of rice bran oil production, including the destitution network of rice bran.

* Ripening chambers and VTH facility are expected to be provided by the public sector.

3.3.3. Processing and Retail

The issues and their countermeasures for the processing and retail business of major processed products are summarized in the table below.

Table 95 Issues and countermeasures for processing and retail

	Issues	Its countermeasures
Fruits	<ul style="list-style-type: none"> • Although fruit production, including mango production, is large, aseptic lines are not yet well-established, so the quality of mango pulp is degraded, and the storage cost of mango pulp is high. Mango pulp is still imported. • General knowledge on food safety is lacking, and the appropriate equipment and inspection equipment have not been introduced. 	<ul style="list-style-type: none"> • Provision of loans for fruits processing facilities (especially aseptic lines and equipment for food safety) • Seminars on aseptic lines, and the diversification of processed products (other than juice) • Seminars on the improvement of food safety

	<ul style="list-style-type: none"> • Types and volumes of processed products, other than juice and pickles, are limited, and processed products, such as jam, and products preserved by sugar are imported. 	
Vegetables	<ul style="list-style-type: none"> • Vegetable productions are large and have large room in which to be processed. Demand for vegetable processed products is expected to grow. However, intermediate products are still imported, and the production capacity of processed products is still limited. • Cheap, but low-quality, equipment for weighing and packaging is used in food processing plants, resulting in high rejection rates. • Few factories introduced nitrogen filling and nitrogen generation equipment to control deterioration, so the shelf life of products is shorter than if nitrogen were used. • General knowledge on food safety is lacking, and appropriate equipment and inspection equipment have not been introduced. 	<ul style="list-style-type: none"> • Provision of loans for vegetables processing facilities (especially quality weighing and packing machines, and equipment and facilities that can improve food safety) • Seminars on the improvement of processing technologies for vegetable processed products • Seminars on the improvement of food safety
Spices	<ul style="list-style-type: none"> • Domestic spices production is large, and has large room in which to process. Demand for processed spices is expected to expand. • For food safety, appropriate equipment and inspection equipment, such as metal detectors, have not been well-introduced. 	<ul style="list-style-type: none"> • Provision of loans for spice processing facilities, and equipment and facilities which contribute for food safety • Provision of loans for equipment at laboratories to test hazardous substances
Cereals	<ul style="list-style-type: none"> • Demand for cereal processing products is expected to expand. • For food safety, appropriate equipment and inspection equipment, such as metal detectors, have not been well-introduced. • Cheap, but low-quality, equipment for weighing and packaging is used in food processing plants, resulting in a 	<ul style="list-style-type: none"> • Provision of loans for cereal processing facilities, and equipment and facilities that can improve food safety • Seminars on the improvement of food safety

	high rejection rate.	
Edible oils	<ul style="list-style-type: none"> • Demand for edible oils is expected to grow. Traditional oil extracting facilities have much room for improvement in production efficiency. • Because edible oils are sold in bulk by weight, there is high risk of contamination of foreign matters and quality deterioration. • Although rice bran oil, and others, have room to use domestic raw materials, most edible oils are imported. 	<ul style="list-style-type: none"> • Provision of loans for edible oil processing facilities that use raw materials produced in Bangladesh (mustard oil, rice bran oil, and sesame oil) • Seminars on the safety of edible oils (e.g. packed edible oil)

Source: The Survey Team

Based on the above, the key issues for the processing and retail business can be summarized below:

- Since the demands of processed products are expected to increase, the expansions of processing facilities are needed;
- The quality of intermediate products, such as mango pulp, is low due to lack of aseptic and similar processing lines. Because of this, such intermediate products are imported in spite of the relatively large domestic production of raw materials;
- The variety of processed products is limited;
- Due to poor performance of weighing and packaging machines, the proportion of defects of final products is relatively high; and
- Food processing companies do not have sufficient knowledge of food safety management, and have not introduced the necessary equipment and facilities for said food safety management.

Based on the table above, the industries' financing needs and capacity development needs are summarized below:

< Equipment and facilities with financing needs >

- Fruits processing facilities;
- Vegetable processing facilities;
- Spices processing facilities;
- Cereal (rice, wheat, and pulses) processing facilities (excluding rice mills and flour mills);

and

- Edible oil processing facilities (mustard oil, rice bran oil, and sesame oil)

< Capacity development needs >

- The improvement of processing technologies of intermediate products;
- The promotion of diversification of processed products; and
- The improvement in knowledge on food safety.

In conclusion, the following business are proposed targets for TSL (see Chapter 5 for the detail)

- Fruits processing industries;
- Vegetables processing industries;
- Spices processing industries;
- Rice, wheat, and bean processing industries (excluding rice mill and wheat mill);
- Edible oil processing industries (mustard oil, rice bran oil, and sesame oil)
- Seed producing industries;
- Organic fertilizers producers and biological pesticide producers;
- Logistic industries, wholesalers, and transport industries (only vehicles and warehouses with freezing and refrigerating capabilities, or humidity or temperature controlling equipment are eligible); and
- Retail industries (freezing and refrigerating, or humidity and temperature controlling equipment, and vehicles and warehouses with freezing and refrigerating capabilities, or humidity or temperature controlling equipment are eligible).

4. Review of Financial Sector and Agribusiness and Food Processing Industries in Bangladesh

4.1. Key Issues in Banking and Financial Sector in Bangladesh

(1) Domestic Financial Institutions and their Performances

The financial sector in Bangladesh comprises state-owned commercial banks (SCBs), state-owned development financial institutions (DFIs), private commercial banks (PCBs), foreign commercial banks (FCBs), and non-bank financial institutions (NBFIs). There exist 57 banks and 34 NBFIs as of the end of 2017 as shown in the table below.

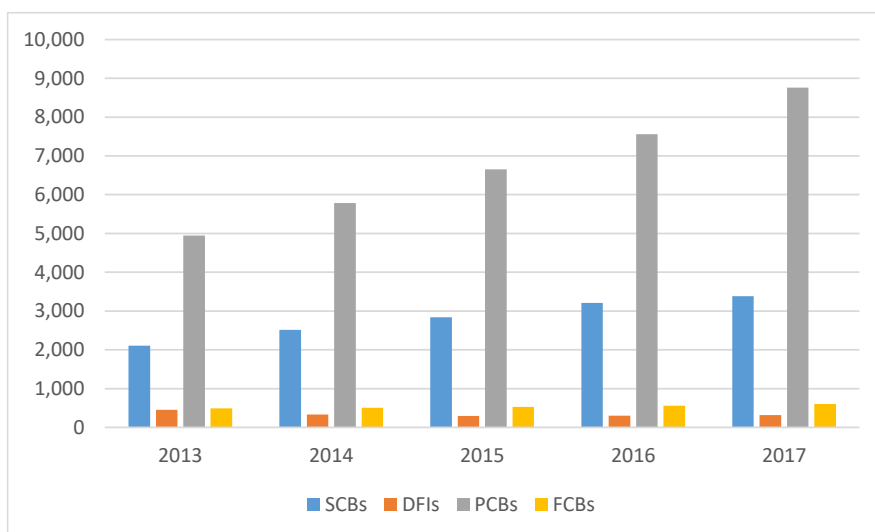
The PCBs and SCBs provide most of the loans to the non-financial sector, but the ratio of the non-performing loans to the total loans (NPL ratio) of SCBs is remarkably high and recorded 28.2% as of June 2018. The NPL ratio of the sector as a whole exceeded 10%.

Table 96 Domestic Financial Institutions and their Performances (as of the end of 2017)

	Number	Total assets (billion BDT)	Share in industry total loans	NPL ratio (as of June 2018)
State-owned commercial banks (SCBs)	6	3,379.5	25.9%	28.2%
Development financial institutions (DFIs)	2	317.6	2.4%	21.7%
Private commercial banks (PCBs)	40	8,758.3	67.1%	6.0%
Foreign commercial banks (FCBs)	9	603.9	4.6%	6.7%
Total	57	13,059.3	100.0%	10.4%
Non-bank financial institutions (NBFIs)	34	841.1		

Source: Bangladesh Bank Annual Report 2017-2018

The total loan balance of the banks has increased by 12% to 14% per annum in the last five years, and PCBs have grown fastest.

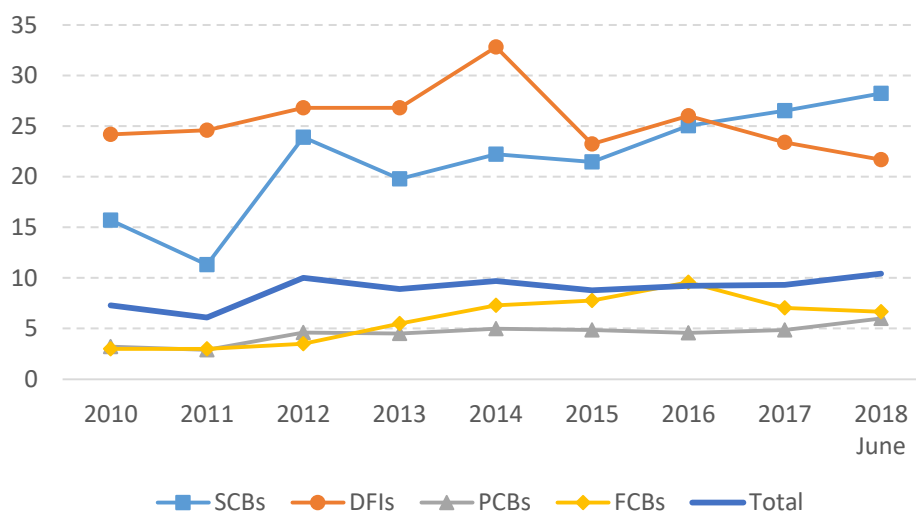


Source: Bangladesh Bank Annual Report 2017-2018

Figure 52 Trends of Total Loan Balance by Type of Banks (in billion BDT)

(2) Regulatory Action on NPLs and Liquidity Crisis in the Financial Market

The most significant indicator to evaluate the asset quality in the loan portfolio of banks is the NPL ratio. At the end of December 2017, the NPL ratio of the banking sector stood at 9.31%. The figure below shows that PCBs had the lowest and SCBs had the highest NPL ratio. PCBs' NPL ratio was 4.87%, while those of SCBs, FCBs and DFIs were 26.52%, 7.04% and 23.39% respectively.



Source: Bangladesh Bank Annual Report 2017-2018

Figure 53 NPL Ratio by Type of Banks (%)

The NPL ratio shows a growing tendency in recent years mainly because of increase in total classified loans, defaulted outstanding and non-recovery of loans. As of the end of June 2018, the NPL ratio of the banking sector stood at 10.41% since the NPLs in SCBs and DFIs remained high. Poor assessment and inadequate monitoring and supervision of the loans disbursed by the SCBs and DFIs eventually resulted in such poor quality assets.

Due to the accumulated burden of the NPLs, banks continuously failed to maintain the required level of provision against their NPLs in the recent years. Although banks maintained 103.0% in 2011, the provision maintenance ratio showed declining trend and it stood at 84.7% in 2017.

The shortfall in provision these days can be mostly attributable to some SCBs which face the difficulties of increase in classified loans, poor quality and inadequacy of collaterals, low profit and provision transfer for write-offs. On the other hand, the DFIs, PCBs, and FCBs could keep adequate provisions, and their provision maintenance ratios remains more than 100% from 2015 till June 2018.

The table below shows a comparative position of loan loss provisions of four categories of banks as of the end of 2015, 2016, 2017, and June 2018.

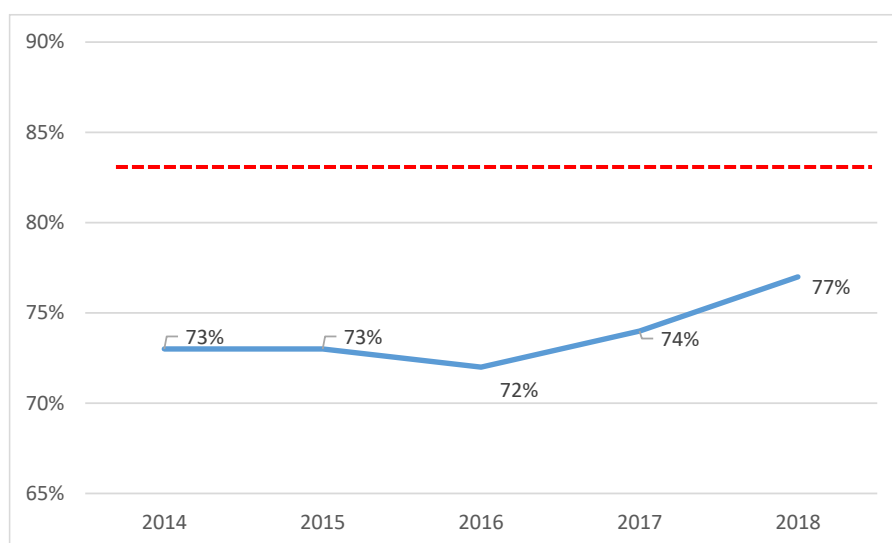
Table 97 Comparative Position of Provision Adequacy by Type of Banks

(Unit: million BDT unless otherwise noted)

		SCBs	DFIs	PCBs	FCBs
2015	Required provision	140.4	26.4	126.0	16.1
	Provision maintained	94.7	28.4	126.6	16.5
	Provision maintenance ratio (%)	67.5	107.6	100.5	102.5
2016	Required provision	174.0	27.8	144.2	16.0
	Provision maintained	113.2	28.4	149.4	16.4
	Provision maintenance ratio (%)	65.1	102.2	103.6	102.5
2017	Required provision	216.9	26.1	184.3	15.6
	Provision maintained	134.3	26.2	198.2	16.5
	Provision maintenance ratio (%)	61.9	100.4	107.5	105.8
2018 June	Required provision	252.9	25.0	234.6	16.2
	Provision maintained	162.0	27.9	242.0	16.9
	Provision maintenance ratio (%)	64.1	111.6	103.2	104.3

Source: Bangladesh Bank Annual Report 2017-2018

On January 2018, the Department of Off-Site Supervision of Bangladesh Bank issued a directive to the conventional banks to bring down their advance-deposit ratio (ADR) to highest 83.50% down from 85%, by June 30, 2018. ADR is defined as a limit that would not allow a bank to provide loans over a certain percentage from its deposit. It was reported that some banks were not complying with this limit and resulted in making non-performing loans and losing their capacity to continue lending.



Source: Bangladesh Bank Annual Report 2017-2018

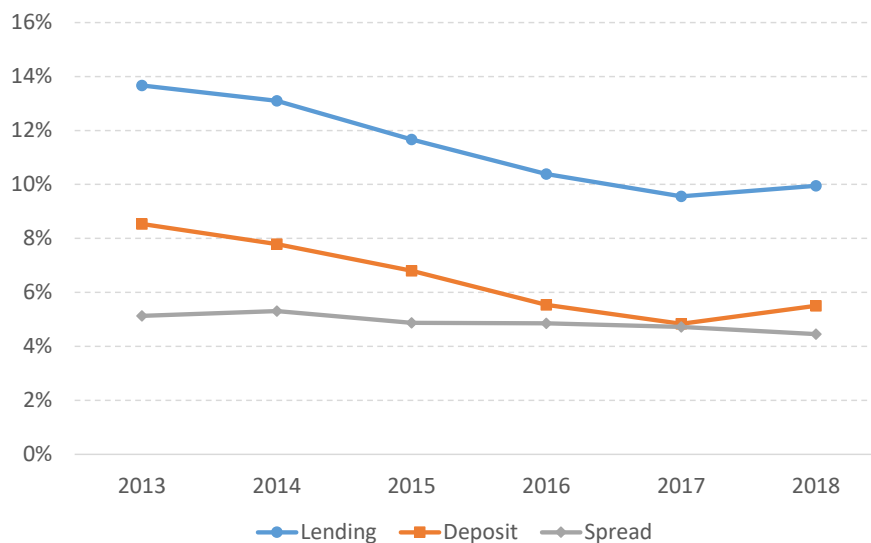
Figure 54 Trends of Advance Deposit Ratio (ADR)

Since then banks had tried to reduce their existing loans and increase deposits in order to comply with the new regulation, and the average ADR of private banks came down within the regulatory limit in September 2018, according to the Bangladesh Bank's data. However, other banks, particularly state-owned banks, defied the Bangladesh Bank's directive, so Bangladesh Bank urged these banks on June 2018 and again on January 2019 to immediately act to bring down their ADRs. It was, however, reported on March 2019 that at least 20 banks failed to adjust their ADR as directed by Bangladesh Bank. Bangladesh Bank again requested banks to adjust their ADRs within September 30, 2019, complying with the Bangladesh Bank's new regulation. It seems that some banks still has to adjust the balance of the loan amount and deposit and the banking sector as a whole cannot reach their full potential to provide loans to industries including the agribusiness and food processing industries.

Besides, the banking industry of Bangladesh has faced a liquidity crisis in the recent years, and it has started after two incidents occurred. First, the Farmers Bank failed to make a payment which amounts to BDT 5.08 billion and the government withdrew BDT 5.00 billion from private banks and deposited to state-owned commercial banks. It was also intensified by the government’s policy of limiting liquidity of Taka in order to maintain its foreign exchange rate against US dollar.

Liquidity crunch in banks has intensified further due to the adjustment of their ADR in line with the Bangladesh Bank’s directive issued on January 2018 stated in the previous section, while deposits grow slowly and the amount of non-performing loans still remains huge. Banks recently had to increase financing from the central bank to cope with the liquidity shortage while inter-bank loan transactions have also rose.

Liquidity crunch in banks undermines the confidence of customers and the growth of banking transactions and business activities, which further exacerbates the negative impacts on the economy. This may also lead to an increase in the interest rate.



Source: Bangladesh Bank Annual Report 2017-2018

Figure 55 Trends in Weighted Average Interest Rates of Deposit and Lending (as of the end of June each year)

Since the interest rates on lending of many banks still remain high, the government and Bangladesh Bank repeatedly request banks to bring down the interest rates to single digit. Prime Minister Sheikh Hasina on June 29, 2019 required the authorities concerned to take effective

measures to bring down the interest rate of bank loan to single digit to boost the development of the economy in her speech at the general discussion on the proposed budget for the fiscal year 2019-2020 in the parliament. Finance Minister AHM Mustafa Kamal also focused attention on the government's stance on reducing lending interest rate to single digit immediately with a view to minimizing risks of producing a new NPL at a briefing at his secretariat office in the evening of July 22, 2019. He thinks high interest rate creates a non-performing loan and does not benefit both banks and clients.

Banks, however, have great difficulty in cutting their interest rates because the funding cost including the interest rate on deposit still remains high due to, for example, the high yield government bond. So the low-cost funding including TSL is sorely needed by banks in Bangladesh.

4.2. Review of Operational and Financial Highlights of Potential PFIs

In order to examine whether domestic private financial institutions can properly perform as participating financial institutions (PFIs) of the Project, this section analyzes their operational and financial performances. Since such an analysis requires firsthand information rather than published such as financial statements, the Survey Team firstly analyzes their published data and documents and shortlisted several financial institutions which have strong financial soundness and seem to be consistent with the objective of the Project, and then conducts a few interviews with the shortlisted financial institutions to obtain detailed information.

Besides, this section inspects the performances of BIFFL which is a candidate of the implementing agency of the Project and might directly provide sub-loans to end-borrowers, although it is a state-owned NBFIL.

4.2.1. Selection of Potential PFIs

Financial institutions which are investigated in detail through interviews are shortlisted as described below.

(1) Banks

- Firstly nominated are six banks which utilize the Refinance Scheme of Agro-based Product Processing Industries of Bangladesh Bank more extensively than the others.
- In addition, other six banks are nominated because their lending interest rates are lower than the others according to the web site of Bangladesh Bank.
- Then, banks of which Advance Deposit Ratio exceeds 83.5% or Non-Performing Loan Ratio

exceeds 10% are excluded from them. In the end, banks selected for interviews are Dutch Bangla Bank, BRAC Bank, Eastern Bank, and South Bangladesh Agriculture and Commerce Bank (SBAC Bank). These banks fulfill the Capital Adequacy Ratio guidelines of Bangladesh Bank which requires banks to keep the Capital Adequacy Ratio more than 10%.

- Furthermore, Dhaka Bank whose Managing Director and CEO is appointed as Chairman of the Association of Bankers Bangladesh is also interviewed.

(2) Non-Bank Financial Institution (NBFI)

- Firstly nominated are two NBFIs which utilize the Bangladesh Bank's Refinance Scheme of Agro-based Product Processing Industries more extensively than the others.
- In addition, other three NBFIs including BIFFL are nominated because their lending interest rates are lower than the other NBFIs according to the web site of Bangladesh Bank.
- As a result of these, five NBFIs are nominated (IDLC satisfied both criteria.), but National Housing Finance and Investment is excluded from them because it mainly focuses on mortgages. In the end, NBFIs selected for interviews of the Survey are IDLC Finance, IPDC Finance, United Finance, and BIFFL.

4.2.2. Analysis of Operational and Financial Capacities of Potential PFIs

This sub-section analyzes the organization, operational and financial management, loan processing, and credit risk management of five PCBs, three private NBFIs, and one state-owned NBFI shortlisted in the previous sub-section, and examines whether they can smoothly operate sub-loans of the Project. First, data on the organization, funding and asset management, profitability, soundness of management, credit ratings, and lending policy of the shortlisted financial institutions are summarized in the tables in the following pages. Then each financial institution is reviewed in terms of the loan processing such as business promotion, credit analysis, and monitoring and the credit policy on SMEs and agribusiness / food processing industries, referring to interviews with officers. Besides, issues on collateral conditions, which often become a major obstacle in the access to the formal financial services in the developing countries, are surveyed in Section 4.3.

Table 98 Key Operating and Financial Indicators of Banks

	Dutch Bangla Bank	BRAC Bank	Eastern Bank	Dhaka Bank	South Bangladesh Agriculture and Commerce Bank
Year	2018	2018	2018	2018	2018
Organization					
Number of Branches	184	186	85	101	74
Number of ATMs	4,705	448	200	56	25
Number of Deposit Accounts	7,468,445	1,394,529	569,552	505,286	n.a.
Number of Loan Accounts	71,417	210,894	180,548	30,081	n.a.
Number of Employees	8,195	7,085	1,715	1,917	801
Funding and Asset Management					
Total Assets (million BDT)	346,469	315,417	282,451	273,976	70,661
Loans and Advances (million BDT)	231,554	238,008	209,306	180,626	50,255
Investments (million BDT)	32,208	25,765	27,720	27,620	7,033
Total Liabilities (million BDT)	323,383	283,779	259,485	257,360	63,232
Deposits (million BDT)	262,468	228,622	199,629	197,189	59,304
Borrowings (million BDT)	20,201	31,303	46,732	26,680	801
Profitability					
ROA: Return on Assets	1.30%	1.87%	1.15%	0.54%	1.36%
ROE: Return on Equity	19.70%	19.25%	13.83%	8.18%	12.59%
Soundness of Management					
NPL: Non-Performing Loan Ratio	4.10%	3.10%	2.35%	4.99%	1.97%
CAR: Capital Adequacy Ratio	15.60%	13.67%	12.16%	13.84%	15.88%
ADR: Advance Deposit Ratio	76.80%	82.78%	83.08%	82.79%	82.50%
CRR: Cash Reserve Ratio	13.96%	6.21%	5.69%	5.78%	6.00%
SLR: Statutory Liquidity Ratio	19.43%	13.11%	13.79%	13.60%	14.76%
Credit Rating					
Credit Rating - Long term	AA+	AA+	AA+	AA	A3
Credit Rating - Short term	ST-1	ST-1	ST-2	ST-2	ST-2
Credit Agency	CRISL	CRISL	CRISL	ECRL	CRAB
CAMELS Rating	B	B	B	B	A
Lending Policy					
Utilization of Refinance Scheme for Agro-based Product Processing Industries in Rural Area (million BDT as of Oct 2017)	-	1,553	146	10	188
Lending interest rate - Term Loan to large and medium scale industry	9.00-12.00%	11.00-14.00%	10.00-13.00%	11.50-14.50%	8.00-10.00%

Source: Annual reports and web sites of the banks, web site of Bangladesh Bank

Table 99 Key Operating and Financial Indicators of NBFIs

	IDLC Finance Limited	IPDC Finance Ltd	United Finance Limited	BIFFL
Year	2018	2018	2018	2018
Organization				
Number of Branches	30	12	24	0
Number of Deposit Accounts	16,510	23,546	n.a.	-
Number of Employees	1,150	599	482	85
Funding and Asset Management				
Total Assets (million BDT)	105,182	50,511	24,073	30,149
Loans and Advances (million BDT)	82,410	38,448	8,730	16,978
Investments (million BDT)	2,793	869	866	1,563
Leases (million BDT)	-	5,877	9,213	-
Total Liabilities (million BDT)	94,153	46,759	20,953	6,826
Deposits (million BDT)	73,793	37,066	15,170	-
Borrowings (million BDT)	12,246	5,917	2,630	2,461
Profitability				
ROA: Return on Assets	1.61%	1.00%	1.15%	3%
ROE: Return on Equity	14.73%	13.10%	9.01%	4%
Soundness of Management				
NPL: Non-Performing Loan Ratio	2.20%	2.14%	2.96%	0.03%
CAR: Capital Adequacy Ratio	17.34%	14.01%	16.33%	177%
CRR: Cash Reserve Ratio	2.51%	2.59%	2.54%	-
SLR: Statutory Liquidity Ratio	5.07%	12.83%	25.14%	n.a.
Credit Rating				
Credit Rating - Long term	AAA	AA1	AA-	AA-
Credit Rating - Short term	ST-1	ST-1	ST-2	ST-1
Credit Agency	ECRL	CRAB	ECRL	CRISL
Lending Policy				
Utilization of Refinance Scheme for Agro-based Product Processing Industries in Rural Area (million BDT as of Oct 2017)	3,295	-	356	-
Lending interest rate - Industry	12.00-14.88%	11.50-14.25%	16.00-19.00%	4.00-12.00%

Source: Annual reports and web sites of the financial institutions, web site of Bangladesh Bank

(1) Private commercial banks

i) Dutch Bangla Bank

[Organization]

Dutch Bangla Bank (DBBL) is the largest bank in Bangladesh in terms of the total asset, number of customers, and the network of branches. Since DBBL operate a greatest number of deposit account and many of the depositors use their accounts for the bank transfer of payroll, the ADR of DBBL remains at 73%, which is the lowest in the domestic banks.

[Funding and Asset Management]

Only 10% of the total deposits accepted by DBBL is time deposit with the interest rate of 5%, but the majority of the deposit account is savings and current account without any interest. Their funding cost by deposit, therefore, remains less than 3% and the all-in funding cost inclusive of the operation cost for managing their branch and ATM network stays at around 5%. DBBL can consequently control their interest rates considerably lower than other financial institutions; for example, lending interest rate for a creditworthy borrower can be lower than 9% while the average lending interest rate is about 10%. On the other hand, DBBL hardly ever accepts long-term loans whose tenor is longer than five years except for only a few remarkable cases in order to avoid the asset-liability mismatch in terms of the financial term.

[Loan Operations and Credit Analysis]

The Corporate Business Division and SME Business Division are responsible for the business promotion to large-scale corporates and SMEs respectively. Each division has 250 to 300 officers, and about 100 of them belong to the headquarters while about 200 of them belong to a branch office. Since there exist nearly 200 branches nationwide, each branch has one relationship officer in charge of the corporate business and another relationship officer in charge of the SME business on average.

The approval authority is determined based on a credit amount a borrower applies for. If the credit amount of a loan application is small, the loan application can be approved within the Corporate or SME Business Division. If the credit amount becomes larger, the approval authority will be Chief Risk Officer of the Credit Risk Division, Managing Director, the Credit Committee (being held once a week), or the Board Meeting (being held once a month).

When a borrower prepared all the necessary documents in advance, it usually takes about two weeks for a loan application to be judged. A sizable loan application requires more time to be judged due to the schedule of the Credit Committee and Board Meeting. A

governmental organization occasionally asks to provide a loan with a concerned company, but the organization cannot be involved in the appraisal process of the loan. The final decision of the loan approval will be made by DBBL and there is no political intervention in the decision making.

[Monitoring]

A relationship officer of each Business Division is responsible for the regular credit monitoring. A relationship officer at the Corporate Business Division covers five to seven borrowers while one at the SME Business Division covers 20 to 30 borrowers on average, and they check up on repayments each month. Once a borrower is delinquent in the repayment, a relationship officer make contact and follow up with the borrower shortly. A borrower regularly submit financial statements once or twice a year. A large corporate borrower is monitored more frequently, being requested to hand in quarterly financial statements.

The loan classification of DBBL complies with the regulation of Bangladesh Bank. It is basically determined by the overdue period, as well as the internal credit rating. The mechanism of the internal credit rating also complies with the guideline of Bangladesh Bank, and DBBL constructs a rating model which reflects both the quantitative and qualitative aspects of a borrower.

[Loans to SMEs]

80% of the loan portfolio of DBBL is provided to large-scale corporates, while the share of SMEs is 12% and the rest is that of farmers and the retail. DBBL is however going to raise the share of SMEs to about 20% in the near future. They intend to avoid concentrating their loans on a few of large corporates and to diversify the portfolio, and to improve the profitability of the portfolio by increasing loans to SMEs which tend to give a higher margin of profit.

[Loans to Agribusiness and Food Processing Industries]

DBBL is ready to extend loans to agribusiness industry as they have already formulate its credit policy as well as for large corporate, for SME, and for retail. While the share of food and allied industry to the portfolio remains to be no more than 3.1%, DBBL expects that food processing industry in Bangladesh carries great potential because the fishery and vegetable processing industries have already developed steadily and the huge population of Bangladesh can create a substantial demand on the sector. DBBL does not currently have any customer who

specializes cold storage, and thinks cold storage is risky because they are easily affected by the weather, particularly by floods.

Table 100 Sector-wise Allocation of Loans and Advances of Dutch Bangla Bank

Sector-wise Allocation of Loans and Advances	Dutch Bangla Bank	
Year	2018	
Total Loans and Advances	218,037	100%
Agriculture, fisheries and forestry	2,312	1.1%
Pharmaceutical industries	4,471	2.1%
Textile industries	74,775	34.3%
Ready- made garment industries	26,238	12.0%
Chemical industries	1,196	0.5%
Bank and other financial institutions	3,610	1.7%
Transport and communication	6,882	3.2%
Electronics and automobile industries	5,467	2.5%
Housing and construction industries	10,695	4.9%
Energy and power industries	2,155	1.0%
Cement and ceramic industries	3,346	1.5%
Food and allied industries	6,743	3.1%
Engineering and metal industries including ship breaking	5,517	2.5%
Service industries	16,050	7.4%
Other industries	48,581	22.3%

Source: Dutch Bangla Bank Annual Report 2018

ii) BRAC Bank

[Organization]

BRAC Bank is established in 1999 and started business operations as a bank in 2001. There exist four business divisions specializing in SMEs, large-scale corporates, retail, and financial institutions, and the General Manager of each division reports to the Managing Director. From branch offices, Regional Heads report to the Managing Director. Separated from these report lines, Credit Risk Management Division directly reports to the Managing Director from the Chief Risk Officer.

BRAC Bank currently has 186 branches nationwide, but many of them are located in Dhaka, Chattogram and their neighborhood, and serves 140,000 customers in total. More than 7,000 employees work for BRAC Bank and a considerable number of them are in charge of the SME business. The headquarters has about 2,500 staff members specializing in SMEs and about 80 staff members specializing in large-scale corporates.

[Funding and Asset Management]

Their major funding sources are deposit and capital. Besides they participate in a lot of Refinance Schemes of Bangladesh Bank. The average of deposit interest rates slightly exceeds 9% and lending interest rates range from 13% to 15%, and they accordingly secure the margin by at maximum 6% in case of unsecured loans.

[Loan Operations and Credit Analysis]

The approval authority of a credit application is determined based on its credit amount. If a credit amount exceeds BDT 250 million, the board of directors will decide the credit application. Since there exist many micro- and small-scale businesses in rural areas, they proceed with the decentralization of the decision-making process of these businesses, as they appoint Area Credit Managers specializing in each area and oblige them to visit applicants and to conduct on-site inspections as well as to carry on desk-top research.

[Monitoring]

Relationship officers regularly and closely monitor their customers by visiting their office at least once a month and requesting their financial statements periodically. In particular, a small-scale customer is monitored more minutely by relationship officers who also bear the responsibility of collection of the repayments. Internal credit ratings of each borrower are determined complying with the Bangladesh Bank's guidelines. A rating is principally reviewed once a year, but a borrower rated low is examined semiannually.

[Loans to SMEs]

SME finance is their major business, and the outstanding balance of the SME loan is BDT 100 billion out of the total loan of BDT 240 billion. In particular, loans towards small-scale customers amount to BDT 70 billion. The majority of SME customers are manufacturers, and the loan balance to agribusiness and food processing SMEs amounts to only BDT 2.5billion. Their businesses are rice mills, bakery, and so on.

Lending interest rates for SMEs currently range from 15% to 18% in case of unsecured loan and from 11% to 14% in case of secured loans, and they keep the margin at 5% to 6%. In BRAC Bank, larger the scale of borrowers becomes, higher the NPL ratio becomes, as the NPL ratio of small-sized industries is 2.8%, medium-sized 4% and large-sized 7.5% respectively. One of the reasons for this is BRAC Bank provides many of small customers without collateral and examines the credit applications more in detail.

Table 101 Sector-wise Allocation of Loans and Advances of BRAC Bank

Sector-wise Allocation of Loans and Advances	BRAC Bank	
Year	2018	
Total Loans and Advances	238,008	100%
Agriculture	2,790	1.2%
Industry	89,007	37.4%
Service Industry	16,209	6.8%
<u>Agro-based Industry</u>	16,191	6.8%
Commerce and Trade	71,446	30.0%
Consumer Credit	42,365	17.8%

Source: BRAC Bank Annual Report 2018

[Loans to Agribusiness and Food Processing Industries]

BRAC Bank does not regard agribusiness and food processing industries as one of risky sectors. Many of their existing borrower in these sectors are large-scale corporates, and the lending interest rates ranges from 10% to 12%.

Table 102 Example of a Loan Project
 Provided with Agribusiness and Food Processing Industries by BRAC Bank

Borrower	A food processing company producing spices, bakery, puffed rice, mustered oil, semai, and chanachur, hiring 175 employees.
Conditions	The loan amounts to BDT 10 million and is unsecured with the interest rate of 13%.
Purpose	Capital investment etc.
Financing needs	BDT 30 million for expanding their factory and BDT 50 million for initial working capital
Financial performances	The annual turnover amounts to BDT 600 million, and the existing capital investment except for land and buildings amounts to BDT 80 million.
Track record of repayments	No arrears

Source: An interview with the borrower conducted by the Survey Team

iii) Eastern Bank

[Organization]

Eastern Bank is established in August 1992 and extends 85 branches nationwide which deal with most of their SME and retail business. The Corporate Banking Division at the headquarters is responsible for large-scale corporates and has 86 staff members.

[Funding and Asset Management]

Eastern Bank raises their funds by means of current deposit, saving deposit, time deposit, inferior bond, equity, and other borrowings. The increase of acceptance of time deposit recently due to a hike in interest rates leads to a raise in their funding cost. Besides their ALM desk monitors the asset-liability mismatch.

[Loan Operations and Credit Analysis]

A loan application is accepted by a Relationship Manager of a branch office, and sent to the Corporate Banking Division. The approval authority is determined due to the credit amount. If it exceeds BDT 30 million, it requires the CEO's approval, and if it exceeds BDT 250 million, the board of directors decides. It usually takes about ten business days to make a decision of approval on a SME's loan application. A large-scale corporate's case often requires about 21 business days because it needs the CEO's approval.

[Monitoring]

Audited financial statements of borrowers are supposed to be reviewed annually. Financial statements of listed borrowers are examined semiannually. Relationship Officers periodically monitor turnover, inventory, and borrowings of their customers. In addition to these analyses on financial statements, they regularly conduct on-site inspection by visiting their offices or factories.

[Loans to SMEs]

They are rather prudent in providing long-term loans on the whole partly because Bangladesh Bank cut the ADR, and they are selective in extending a large amount of long-term loans, in particular, to large-scale corporates. Then they are currently planning to increase loans to SMEs rather than to large-scale corporates.

[Loans to Agribusiness and Food Processing Industries]

Loans to agribusiness and food processing industries are specialized in mostly by the Retail & SME Banking Division. The Food Processing and Allied Industry of the sector-wise allocation of loans published in their Annual Report includes only manufacturers such as a bakery, except for a wholesaler or retailer. They regard agribusiness and food processing industries as a promising field since the consumption will increase further by the change of tastes of consumers and so on.

The average lending interest rate is 11% for large-scale corporates and ranges from 13% to 15% for SMEs. They do not impose any risk premium on a particular sector, so the interest rates for agribusiness and food processing industries are similar to these averages.

[Needs of Capacity Building]

Although they can smoothly and efficiently conduct credit appraisal from financial and operational aspects, they need capacity buildings on technical knowledges of food safety and hygiene management. One of the challenges in borrowers is lack of reliable information on their accounting and management. SMEs in particular cannot prepare financial statements or regulatory documents, so they can proceed with their loan project more efficiently if the Project will support them to arrange these documents necessary for a loan application.

Table 103 Sector-wise Allocation of Loans and Advances of Eastern Bank

Sector-wise Allocation of Loans and Advances	Eastern Bank	
Year	2018	
Total Loans and Advances	209,306	100%
Agri and micro credit through NGO	10,606	5.1%
Commercial and trading	27,155	13.0%
Construction	7,971	3.8%
Cement and ceramic industries	5,027	2.4%
Chemical and fertilizer	2,519	1.2%
Crops, fisheries and livestock	2,354	1.1%
Electronics and electrical goods	3,553	1.7%
<u>Food and allied industries</u>	11,364	5.4%
Indivisuals	25,975	12.4%
Metal and steel products	13,915	6.6%
Pharmaceutical industries	3,656	1.7%
Power and fuel	8,196	3.9%
Rubber and plastic industries	3,851	1.8%
Readymade garments industry	29,442	14.1%
Ship building & breaking industry	7,891	3.8%
Sugar and edible oil refinery	6,104	2.9%
Transport and e-communication	8,155	3.9%
Textile mills	11,769	5.6%
Other manufacturing or extractive industries	6,580	3.1%
Others	13,221	6.3%

Source: Eastern Bank Annual Report 2018

iv) Dhaka Bank

[Loan Operations and Credit Analysis]

They analyze a loan application from five aspects such as (1) management, (2) financial, (3) technical, (4) marketing, and (5) environmental and social aspects. From a technical aspect, they examine the producer, performance, productivity, and so on of a machinery or equipment purchased by a loan.

[Monitoring]

Monitoring for borrowers is conducted on a daily basis mostly by Business Divisions. In case a borrower, particularly a SME, seems to have difficulty in the repayment, the Special Asset Management Department as well as the Business Division and Credit Analysis Department follow up the borrower more steadily.

[Loans to SMEs]

Their loans to SMEs increased 15% last year, and the share to their portfolio consequently expanded to 17%. Accounts of SMEs similarly increased 19%, so they regard the SME business as the most important field.

[Loans to Agribusiness and Food Processing Industries]

Loans to agribusiness and food processing industries are specialized in by the MSME & Agriculture Department. Their customers in relation to the food value chain are cold storage as well as food processing and transportation. They however regard cold storage as the difficult industry to be financed since many companies collapsed in the past.

Table 104 Sector-wise Allocation of Loans and Advances of Dhaka Bank

Sector-wise Allocation of Loans and Advances	Dhaka Bank	
Year	2018	
Total Loans and Advances	180,626	100%
Agriculture, Fishing, and Forestry	2,535	1.4%
Industry	122,173	67.6%
Trade and Commerce	26,252	14.5%
Construction	17,609	9.7%
Transport	2,750	1.5%
Consumer financing	5,911	3.3%
Loans to financial institutions	3,081	1.7%
Miscellaneous	314	0.2%

Source: Dhaka Bank Annual Report 2018

v) South Bangladesh Agriculture and Commerce Bank (SBAC Bank)

[Organization]

SBAC Bank has 74 branches covering all the region nationwide, half of which are located in rural areas. This is a result of following the Bangladesh Bank's instruction requesting that three of four new branches should be located in rural areas.

[Loan Operations and Credit Analysis]

A loan application prepared by a branch is examined by the General Manager of the branch and then sent as a credit proposal to the Head of Credit Risk Management for further appraisal. The approval authority is determined by the credit amount of an application. In case of a loan application from a SME customer, the loan amount is usually limited so it needs about five business days to reply to the customer since they receive the application. If the credit amount is larger, they make a decision within seven to ten days. These assume that the customer prepares every document necessary for credit appraisal.

[Monitoring]

Monitoring of borrowers are normally conducted on a monthly basis mostly by the Business Division. In case the obligor classification of a borrower becomes less than substandard, the Credit Administration Division is supposed to manage the borrower. Their rules on obligor classification and internal credit rating comply with the Bangladesh Bank's guidelines.

[Loans to SMEs]

They regard the SME business as one of their important field and its share exceeds 40% of the portfolio. Their current credit policy on SMEs follows a circular published by the SMESPD of Bangladesh Bank in 2016. This circular is revised in 2019, and they accordingly are planning to update their credit policy.

[Loans to Agribusiness and Food Processing Industries]

According to their sector-wise allocation of loans, the agro-based processing industry is the third largest sector and the share is 5% to their portfolio. They regard lack of mechanism of keeping food safety and of providing appropriate licenses as challenges to the sector.

Table 105 Sector-wise Allocation of Loans and Advances of SBAC Bank

Sector-wise Allocation of Loans and Advances	South Bangladesh Agriculture and Commerce Bank	
Year	2018	
Total Loans and Advances	50,255	100%
Agriculture, Fisheries, and Forestry	793	1.6%
<u>Agro-based Industry</u>	2,245	4.5%
Small and Medium Enterprise (SME)	20,411	40.6%
Industrial Credit	17,564	34.9%
Trade & Commerce	5,659	11.3%
Others	3,582	7.1%

Source: SBAC Bank Annual Report 2018

(2) Non-bank Financial Institutions (NBFIs)

vi) IDLC Finance Limited

[Organization]

IDLC Finance is established in 1985 led by IFC in cooperation with a lot of foreign and domestic financial institutions such as German Investment and Development Company, Korea Development Financing Corporation, Aga Khan Fund for Economic Development, Kookmin Bank, and City Bank. They operates 30 branches nationwide and has about 1,200 staff members, but only 22 of them are responsible for large-scale corporates while 409 staff members specialize in the SME business.

[Funding and Asset Management]

Their major funding sources are deposits, the inter-bank market, and a corporate bond. Terms of deposits range from three months to 15 years, and the interest rates vary from 5% to 13.25%. Terms in the inter-bank market range from overnight to 180 days, and the interest rates vary from 5% to 9%. The term of the bond is five years and the interest rates vary from 7% to 9%. The average funding cost of these sources is about 9% to 9.5%.

[Loan Operations and Credit Analysis]

A relationship manager receives an application from a borrower and prepares a credit application, then sends it to the Credit Risk Management Division. Then a senior credit analyst who has experiences of more than three years in the area or a credit analyst supervised by a credit manager after conducting an on-site inspection. The Credit Risk Management Division independently proceeds with analysis of the application, makes a credit opinion, and asks a final decision as the institution to the approval authority determined with reference to the credit amount.

[Monitoring]

After the disbursement of loans, relationship officers visit their customers quarterly and examine the business operations. For example, in case of capital investment loan, they examine whether a customer install a machinery or equipment which is supposed to be financed by the loan stipulated in the application. Frequency of visits varies depending on the financial and operational performance of a borrower.

[Loans to SMEs]

They focus on the SME business and allocate one-third of all staff to the sector. As the target of 2019, they planned to increase loans to large-scale corporates by 11% compared to the previous year and to SMEs by 18%.

[Loans to Agribusiness and Food Processing Industries]

Their credit policy to agribusiness and food processing industries are covered by the credit policy revised by their SME Division in November 2018. The current lending interest rate to the industries are 14% in case of a secured loan, 15.5% in case of a partially secured loan, and 16.5% in case of an unsecured loan. They serve a lot of existing customers in food processing industries such as a feed mill and packaging for biscuits.

Table 106 Sector-wise Allocation of Loans and Advances of IDLC Finance Limited

Sector-wise Allocation of Loans and Advances	IDLC Finance Limited	
Year	2018	
Total Loans and Advances	82,410	100%
Agriculture	3,181	3.9%
Cement and Allied Industry	817	1.0%
Electronics and Electrical Products	843	1.0%
<u>Food Production and Processing Industry</u>	2,536	3.1%
Garments and Knitwear	5,032	6.1%
Glass, Glassware and Ceramic Industry	532	0.6%
Housing	26,075	31.6%
Iron, Steel and Engineering	3,134	3.8%
Jute and Jute products	172	0.2%
Leather and Leather Goods	73	0.1%
Paper, Printing and Packaging	907	1.1%
Pharmaceuticals and Chemicals	1,189	1.4%
Plastic Industry	540	0.7%
Power, gas water and sanitary services	876	1.1%
Ship Manufacturing Industry	6	0.0%
Telecommunication and Information Technology	1,930	2.3%
Textile	3,235	3.9%
Trade and Commerce	17,192	20.9%
Transport and Aviation	2,043	2.5%
Others	12,097	14.7%

Source: IDLC Finance Annual Report 2018

vii) IPDC Finance Ltd

[Organization]

IPDC Finance is established in 1981 as the first private development financial institute (DFI). They made the IPO in 2006 and then sold many of the equity owned by GOB. Currently, 22% of the total equity is owned by GOB and 25% is owned by BRAC Bank. Their prioritized businesses are mortgages, SME loans including supply chain finance.

[Funding and Asset Management]

They raised their fund mostly by deposits. The majority of them are current and saving deposits, and time deposits with longer term are limited. There accordingly exists an asset-liability mismatch, but they regularly continue monitoring not to expand it.

[Loan Operations and Credit Analysis]

A credit application is prepared by a Business Unit and analyzed by the Credit Risk Management Unit in the headquarters. The approval authority is determined in accordance with the credit amount of an application. It on average needs 7 to 15 business days from the loan application to the execution.

[Monitoring]

Their loan classification complies with the Prudential Regulation for Financial Institutions and FID circular No.03 dated 29 April 2013 published by Bangladesh Bank. After the disbursement of loans, relationship officers periodically visit their customers and examines their future plan of business expansion as well as business operations. Besides they periodically request and analyzes the financial statements, and revise internal credit ratings of them.

[Loans to SMEs]

They regard the SME business as the most important field as the SME Loan Section has 85 staff members while the Corporate Loan Section has only 15 staff members. Furthermore, the share of SME loans to their portfolio recently tends to increase, as it was 14.55% in 2016 and 24.39% in 2017, and then reached to 27.96%.

[Loans to Agribusiness and Food Processing Industries]

According to their sector-wise allocation of loans, agribusiness and food processing industries are one of the most significant sectors as the third largest sector is agro-based industries whose share is 8.1% and the fourth is food and allied products whose share is 6.2%. Except for cases of Refinance Schemes of Bangladesh Bank, the loan conditions applied for agribusiness and food processing industries are totally same as those of the other sectors, and they provide both capital investment and working capital loans according to the needs of customers.

Table 107 Sector-wise Allocation of Loans, Advances, and Leases of IPDC Finance

Sector-wise Allocation of Loans, Advances, and Leases	IPDC Finance Ltd	
Year	2018	
Total Loans and Advances	44,325	100%
<u>Agro-based industries</u>	3,612	8.1%
Banks and non-banking financial institutions	623	1.4%
Chemicals, pharmaceuticals and allied products	2,035	4.6%
Engineering and building materials	3,921	8.8%
<u>Food and allied products</u>	3,039	6.9%
Glass, ceramic and other non-metallic products	192	0.4%
Hotel, tourism and leisure	77	0.2%
Information and communication technologies	1,181	2.7%
Paper converting and packaging, printing and publishing	1,472	3.3%
Ready made garments and knitwear	4,529	10.2%
Social sector	994	2.2%
Tannery, leather and rubber products	323	0.7%
Textile	2,035	4.6%
Transport and aviation	1,860	4.2%
Others	18,431	41.6%

Source: IPDC Finance Annual Report 2018

viii) United Finance Limited

[Organization]

United Finance allocates about three branches in each District, and also opens small-scale offices in other locations to post about 15 staff members in each District. The number of their branches are limited but can cover Bangladesh nationwide.

[Funding and Asset Management]

The majority of their funding source is deposits, but they try to diversify funding sources by issuing a zero-coupon bond recently. Besides, they limit the terms of lending within five years in order to avoid an asset-liability mismatch as much as possible.

[Loan Operations and Credit Analysis]

A new loan request from a customer is received by a relationship manager, and the Marketing Division prepares a credit application. The approval authority is determined depending on the credit amount of the application. They assess the credit application according to the Lending Guideline which specifies their loan policy and conditions responding to the risks of borrowers and projects. It generally requires 10 to 20 business days to conclude a credit appraisal, and then they can disburse loan within two business days.

[Monitoring]

After the disbursement of loans, relationship managers visit their customers once or twice a month even if they do not have a specific purpose, and they periodically monitor the business operations of the borrowers. In case of a capital investment loan, staff of the headquarters together with relationship managers carry out on-site inspection to examine whether customers install a machinery or equipment as specified in the loan agreement.

[Loans to SMEs]

They intend to put more emphasis on the SME business where they can secure larger loan margins. They consequently plan to increase their total loan amount by 20% by 2020, while they are going to increase loans to SMEs by 30% to 40%.

[Loans to Agribusiness and Food Processing Industries]

Agro-processing industry is specialized in mostly by the Emerging Corporate Unit. The food production sector of their sector-wise allocation of loans includes rice and flour mill, edible oil, snack, bakery, and so on. Most of the borrowers in these categories are retailers and wholesalers and 80% of them are SMEs, so they mainly provide short-term working capital loans with them.

Table 108 Sector-wise Allocation of Loans, Advances, and Leases of United Finance

Sector-wise Allocation of Loans, Advances, and Leases	United Finance Limited	
Year	2018	
Total Loans and Advances	17,942	100%
Agricultural sector	1,481	8.3%
Service industry	1,679	9.4%
<u>Food production/processing industry</u>	1,775	9.9%
Chemical & Pharmaceutical	1,160	6.5%
Plastic industry	450	2.5%
Garments	440	2.5%
Textile	656	3.7%
Paper, Printing and packaging industry	1,129	6.3%
Iron, Steel & Engineering industry	560	3.1%
Leather & leather products	135	0.8%
Electronics and electrical industry	403	2.2%
Telecommunication/information Technology	144	0.8%
Jute and jute products	306	1.7%
Cement/Concrete and allied industry	450	2.5%
Glass and ceramic industry	56	0.3%
Ship Manufacturing Industry	0	0.0%
Power, Gas, Water and sanitary service	171	1.0%
Transport & Communication	1,339	7.5%
Real Estate & Housing	1,194	6.7%
Trade and Commerce	3,730	20.8%
Others	684	3.8%

Source: United Finance Annual Report 2018

(3) Governmental Financial Institution

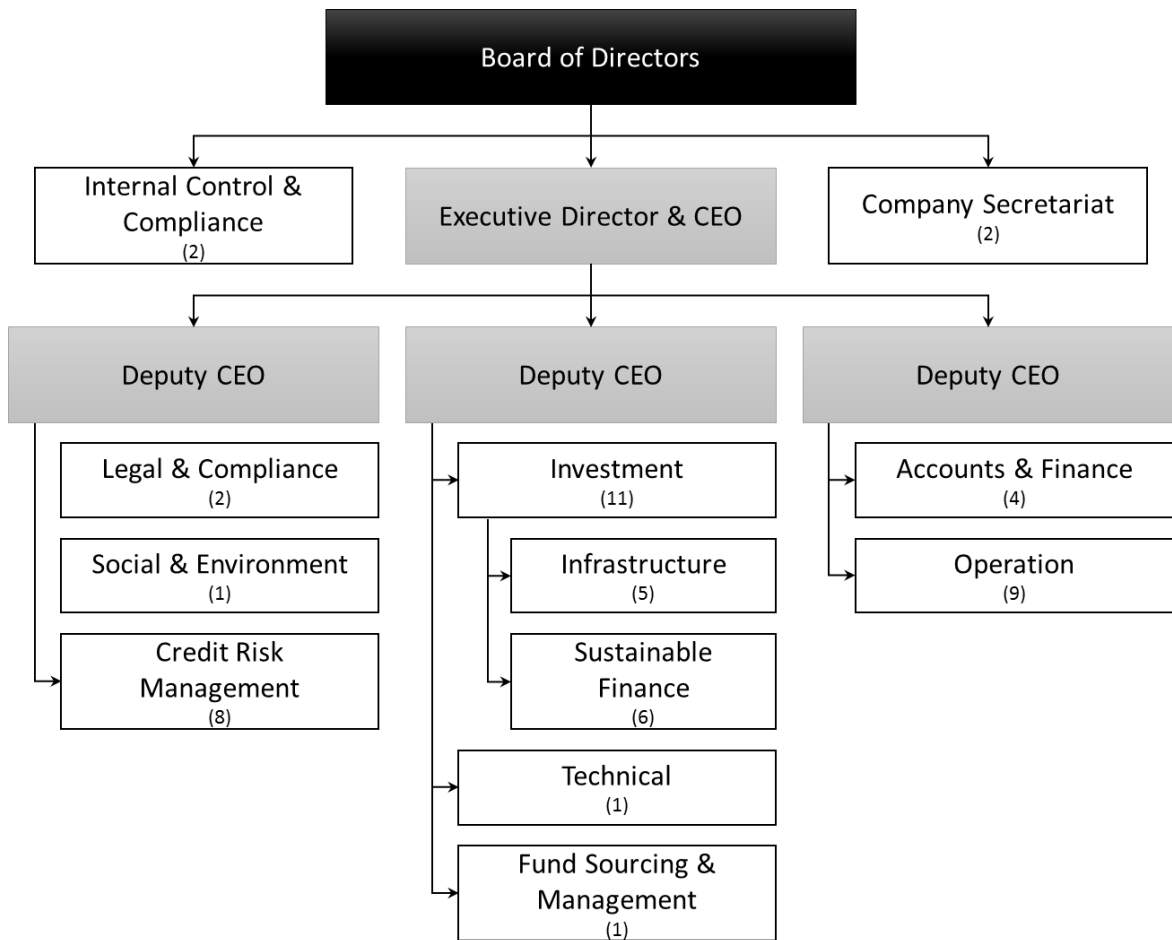
ix) BIFFL

[Organization]

The total number of staff members and officers is 85 as of the beginning of 2019. There existed five units extending loans to customers such as (1) Infrastructure, (2) Sustainable

Finance, (3) Green Construction Material, (4) Women Entrepreneurship, and (5) SME, but as of the end of 2019, SME and Women Entrepreneur Development are not in function and Green Construction material has been merged with Sustainable Finance.

BIFFL has no branch office in rural areas but they think they can seek out new customers in agribusiness and food processing industries because many companies establish their headquarters in Dhaka even if they build factories in rural areas, and they furthermore are supposed to open a new branch in Chattogram and another as necessary. Besides, they have contact points outside Dhaka, such as a mobile lending office in Khulna, as a result of extending loans to women entrepreneurs.



Source: Interviews with BIFFL conducted by the Survey Team

Note: The figures put within round brackets denote the number of employees of each division/unit.

Figure 56 Organogram of BIFFL (as of the end of 2019)

[Funding and Asset Management]

They obtain long-term funds from GOB and donors as a governmental financial institution to fill the funding gap of long-term loans in the market. The base rate (all-in funding cost of a financial institution as a whole) of BIFFL is much lower than those of PCBs and private NBFIs funded by deposits and billowing from other financial institutions.

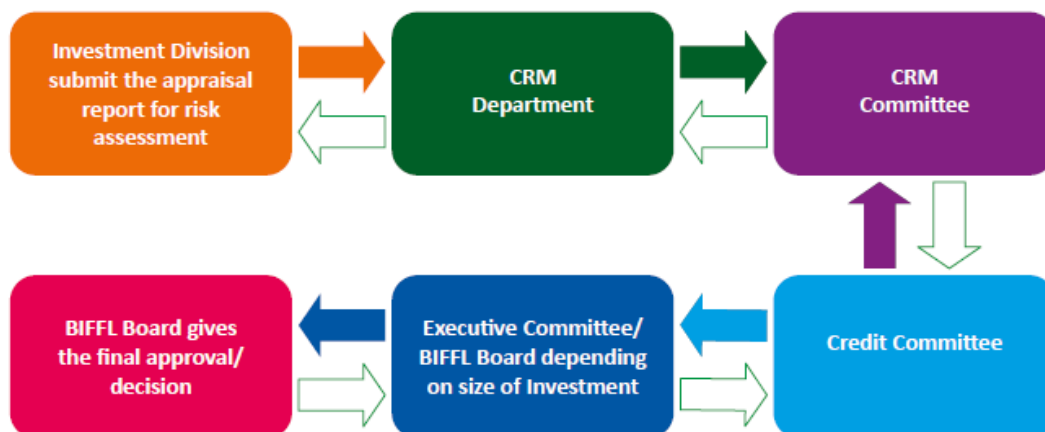
In the meantime, their portfolio is too focused on the transport and communications sector, as they started their business to finance infrastructure projects. They however intend to increase the share of industries against their total loans to 33% by 2021 in their five-year strategic investment plan.

[Loan Operations and Credit Analysis]

When they operate a refinance scheme or TSL project, the interest rate to end-borrowers is decided as the sum of the funding cost of that scheme and their margin, not as the sum of their base rate and margin.

Collateral conditions will be decided on a case-by-case basis. Some cases require 100% to 150% of the credit amount while other cases needs only 20% to 30%, but the average will be 80% to 90% of the credit amount. They will be determined due to many factors all combined such as the creditworthiness and repayment track record of a borrower.

First a credit application prepared by the Investment Department is reviewed by the Credit Risk Management Unit. Then the Executive Committee makes a decision after the review of the Credit Committee. In case the credit amount is considerably large, the Board of Directors makes a decision.



Source: BIFFL Annual Report 2018

Figure 57 Loan appraisal processes at BIFFL

[Monitoring]

Whenever they accept a loan application from a borrower, they request the borrower to submit its credit rating which is issued by one of the six external rating agencies certified by Bangladesh Bank, such as Credit Rating Agency of Bangladesh (CRAB). Since a green-field project cannot obtain such a credit rating, they substitute one for a technical certification etc. to examine the feasibility of the Project.

[Loans to Agribusiness and Food Processing Industries]

Their track records in food processing industries are a working capital facility for PRAN and an IFC-funded loan to Golden Harvest which is the largest frozen food company in Bangladesh. As for agricultural finance, they provided loans to women entrepreneurs engaging in crop farming. The loan amounts range from BDT one to three million, and the tenor is three years.

They revised the Credit Policy on February 2019 and designated an agricultural development project, including agricultural processing, machinery, and product, as their eligible investment. They however have realized no achievement in investing agribusiness and food processing industries at present other than few projects mentioned above, so once they are appointed to participate in the Project to finance agribusiness and food processing industries, they plan to assign the project director and establish the PIU as soon as possible with the support of other units with respect to legal issue, fund management and so on.

Table 109 Sector-wise Allocation of Loans and Advances of BIFFL

Sector-wise Allocation of Loans and Advances	BIFFL	
Year	2018	
Total Loans and Advances	16,978	100%
Glass and Ceramics	1,104	6.5%
Iron, Steel and Engineering	737	4.3%
Power & Energy	1,177	6.9%
Services	1,227	7.2%
Textiles	1,445	8.5%
Transport & Communication	5,683	33.5%
Others	5,606	33.0%

Source: BIFFL Annual Report 2018

4.3. Challenges in Financing Agribusiness and Food Processing Industries

(1) Challenges for Industries in Borrowing

According to a survey conducted in 2018 by JICA to BAPA member companies, challenges for industries when obtaining loans are (1) higher interest rates, (2) collaterals, and (3) length of time to wait for an approval. On the other hand, most of the financial institutions interviewed in the Survey pointed out that borrowers cannot prepare some of legal documents necessary for lending, such as business licenses and tax certificates. Besides micro- and small-scale industries in particular can rarely prepare financial statements and accounting documents, but some financial institutions support borrowers to draw out these documents and then provide loans with them. Most of the financial institutions, however, do not deliver such a practical assistance for borrowers and they do not provide loans with those who cannot submit financial statements when applying.

(2) Challenges for Financial Institutions in Financing Agribusiness and Food Processing Industries

Even in a bank which has a track record in financing agribusiness and food processing industries, many relationship officers and credit analysts tend to lack the knowledge of technical aspects of the business. They accordingly require a variety of technical assistance as to from the basic issues like the business characteristics to the specialized knowledge such as equipment and

machineries necessary for food safety and hygiene management and the legislations and certifications.

Defects in the food safety management of borrowers can be a potential risk for financial institutions since they might result in ceasing their operation as a result of a BFSA's inspection. It seems that financial institutions do not prepare a standardized manual or checklist how to assess the food safety of agribusiness and food processing industries.

(3) Issues in Training programs for Financial Institutions' Personnel

If training programs taken by personnel of financial institutions are categorized by type of the organizers, they can be roughly divided into (i) internal training programs conducted by each financial institution and (ii) external training programs conducted by Bangladesh Institute of Bank Management (BIBM) and Bangladesh Bank Training Academy (BBTA). In general, internal training programs cover practical topics such as internal operating procedures and how to operate computers, whereas external training programs offer theoretical courses focusing on credit management, business administration including the personnel management and financial regulations.

BIBM is an organization established in 1974 to provide training programs with staff of domestic financial institutions, to improve the level of their knowledge and skills, and to strengthen the banking sector in Bangladesh as a whole. While BIBM is regarded as a department of Bangladesh Bank, BIBM is established jointly by Bangladesh Bank and commercial financial institutions, so the governing board of BIBM is chaired by the Governor of Bangladesh Bank and Managing Directors of commercial financial institutions participate it as a member of the board. Training courses offered by BIBM in 2019 are listed in the following table.

Table 110 List of Training Courses Offered by BIBM in 2019

Date	Course	Target Group
Mar 24	Working Capital Financing	Senior Officer or Equivalent Officer and above
Mar 31	Legal Aspects of General Banking and Credit	Senior Officer or Equivalent Officer and above
Apr 15	International Trade Payment and Finance	Senior Officer or Equivalent Officer and above working / likely to work in International Division of Head Office and AD Branches
Apr 28	Internal Credit Risk Rating System in Banks	Senior Officer or Equivalent Officer and above

Date	Course	Target Group
Apr 28	Rural and Agricultural Financing	Senior Officer or equivalent officer and above
May 5	Leadership	Head/In-Charge of Branch/Operation Manager/Prospective Branch Managers
May 5	Project Financing and PPP	Senior Officer or Equivalent Officer and above
May 5	Foundation Training Course for the Officers of BRAC Bank Limited	BRAC Bank Officials
May 12	Branch Management and Branch Simulation	Head of Branch/Deputy Manager/Prospective Manager
May 13	Risk Based Internal Audit in Banks	Senior Officer or equivalent officer and above
May 19	Capital Adequacy Assessment for Branch Executives	Senior Officer or Equivalent Officer and above
Jun 16	IT Security and Fraud Prevention in Banks	Senior Officer or Equivalent Officer and above working in IT Security/IT Audit/IT Division
Jul 28	Working Capital Financing	Senior Officer or Equivalent Officer and above
Aug 25	Banking Technology for Non-IT Executives	Senior Officer or Equivalent Officer and Above (Other than IT Department)
Aug 26	Credit Risk Management in Banks	Senior Officer or Equivalent Officer and above working/likely to work in the Credit Department
Sep 1	Financing Agro-based Business	Senior Officer or Equivalent Officer and Above
Sep 8	Internal Control and Compliance in Banks	Senior Officer or Equivalent Officer and Above
Sep 29	Green Banking	Senior Officer or Equivalent Officer and Above
Sep 30	SME Financing and Entrepreneurship Development	Senior Officer or Equivalent Officer and Above
Oct 13	Information System Audit in Banks for Non-IT Executives	Senior Officer or Equivalent Officer and above who are working in the ICC/Audit department having no IT Background

Date	Course	Target Group
Nov 3	Forex Dealing	Senior Officer or Equivalent Officer and above working in Treasury Department and newly appointed Dealers
Nov 11	Internal Audit and Bank Inspection	Senior Officer or Equivalent Officer and above
Nov 17	Risk Management in Banks	Senior Officer or Equivalent Officer and above
Dec 2	Prevention of Financial Crimes in Banks	Senior Officer or Equivalent Officer and above

Source: Bangladesh Institute of Bank Management

While BBTA is a training department of Bangladesh Bank established in 1977, they offer human resource development and capacity building programs to officers and staff of commercial financial institutions in addition to Bangladesh Bank. In particular, they provide a wide range of training programs such as a foundation course, executive program, training of trainers, and international training program, and organize a workshop and policy dialogue for stakeholders to update them with live issues concerning monetary and financial policy. Training courses offered by BBTA in 2019 are listed in the following table.

Table 111 List of Training Courses Offered by BBTA in 2019

Number of courses	Sum of frequency	Total number of participants (maximum)
A. Central Banking & General Banking		
6 (Foundation Training, In service Training, Banking Laws & Regulations, Financial Consumer Protection, Financial Stability Analysis, Islamic Banking)	11	480
B. Economics & Monetary Policy		
3 (Monetary Policy Formulation and Implementation Process, Public Debt Management and Securities Market, Understanding Economic Indicators)	5	150
C. Bank Supervision		

Number of courses	Sum of frequency	Total number of participants (maximum)
4 (Basel III, Technics of Inspection, Understanding & Analysis of Financial Statement of Bank, ISS Reporting)	11	490
D. Risk Management		
3 (Core Risk Management, Credit Risk Management, Environmental & Social Risk Management & Green Financing)	3	110
E. Foreign Exchange & Foreign Trade		
2 (International Trade Finance, Foreign Exchange Transactions Reporting)	11	440
F. Research & Data Analysis		
4 (Research Methodology, FDI & External Debt Reporting, Money & Banking Data Reporting, CIB Business rules & Collateral Database)	21	1,150
G. Agricultural Financing, SME & Financial Inclusion		
2 (Financial Inclusion, Financing in Agricultural & Rural Development)	2	60
H. Digital Bangladesh & SDGs		
3 (Innovation in Public Service, Integrity and Anticorruption, SDGs)	3	540
I. Currency Management & Payment System		
2 (Payment & settlement system, Detection & Disposal of Forged & Mutilated Notes)	9	620
J. Human Capital Development & HRM Policy		
9 (Strategic Planning, Management & Leadership Development for GM/DGM/DD/JD, Etiquette & Personal Grooming, English Language Proficiency, Communicative English, Corporate Governance, Presentation Skills, Safety, Security & Disaster Management)	14	420
K. IT Security & IT Skill Development		

Number of courses	Sum of frequency	Total number of participants (maximum)
4 (Network and Hardware Security Awareness, MS Word/Excel/PowerPoint, Guidelines on ICT Security, IT Auditing)	5	145
L. Anti-Money Laundering & Combating Financing of Terrorism		
2 (Prevention of Money Laundering and Terrorist Financing, Combating Money Laundering and Terrorist Financing and Trade Based Money Laundering)	6	240
M. Miscellaneous Program		
1 (Procurement Management)	1	40
N. International Course		
2 (International Study Visit Program on Financing MSMEs in Bangladesh, Agricultural Financing & Rural Development)	2	60
O. Workshop/Seminar/Policy Dialogue		
5 (Current Issues & Challenges in Banking, Emerging Threats in IT Security, Policy Dialogue to improve supervisory tools and techniques, Executive Development Seminar, Present & Future Challenges of Central Banking)	11	760
P. TOT for SBs and Bangladesh Bank		
6 (Important Guidelines of Bangladesh Bank and ISS Reporting, CIB Business Rules and Collateral Database, NPL Management, SME Financing, Trade-based Money Laundering)	6	185
Q. Distance Learning		
6 (Digital Banking and Payments, Cyber Security, Trade-based Money Laundering, SME Financing, Understanding Economic Indicators, Office Procedure)	7	-
R. E- Learning		
2 (Leadership Development, Detection & Disposal	N.A.	N.A.

Number of courses	Sum of frequency	Total number of participants (maximum)
of Forged and Mutilated Notes		

Source: Bangladesh Bank Training Academy

(4) Collateral Conditions

Companies interviewed in the aforementioned survey conducted by BAPA pointed out that one of the major challenges for them is collateral conditions requested by financial institutions. On the other hand, according to interviews with commercial financial institutions conducted in the Survey, they often provide loans without collateral or with collateral partially covering credits to their customers, particularly in case of large-scale corporates.

When financing SMEs, financial institutions generally determine on a case-by-case basis whether they request collateral, depending on the creditworthiness of borrowers and the characteristics of loan applications. Only a few financial institutions require their SME customers of full coverage by collateral: on the contrary, some financial institution lend to SMEs without collateral, particularly if a loan amount is small.

Characteristics of collateral conditions requested by financial institutions can be summarized as follows:

i) Collateral Property

Many financial institution specify real estate, third party's guarantee, credit insurance, and deposit as collateral, but some of them accept movable assets purchased with loan.

ii) Assessment of Forced Sale Value

Many financial institutions assess the forced sale value of a collateral property as 60% to 80% of the market value, although Bangladesh Bank suggests that it should be set as 50% of the market value.

iii) Frequency of Renewal of Collateral Value

All financial institutions renew the valuation of a collateral at least once three years, complying with the Bangladesh Bank's guideline.

iv) Requirement of Collateral for SMEs

Only a few financial institutions require their SME customers of full coverage by

collateral, and some financial institutions ask collateral worthy of the loan amount. Furthermore, not a few financial institutions provide working capital loans without collateral to micro- and small-scale enterprises, particularly if a loan amount is small.

Table 112 Collateral Conditions of Financial Institutions

	SMEs	Large-scale corporates
Dutch Bangla Bank	Almost 100% of a loan amount is covered by a real estate collateral.	Collateral is requested on a case-by-case basis.
BRAC Bank	Unsecured or partially secured if the loan amount is less than BDT 10 million.	Fully secured loans are only 10% of the total.
Eastern Bank	Collateral with the equivalent value of loan will be basically requested.	The collateral conditions are less strict than SMEs.
Dhaka Bank	On average, half of a loan amount is covered by collateral.	
SBAC Bank	Credit decision is usually made based on the cash flow, not depending on collateral.	
IDLC Finance	They request a real estate collateral in case of long-term loans.	
IPDC Finance	In case of purchasing fixed assets by loan, the asset can be the primary collateral.	
United Finance	They do not request collateral in case of working capital loans whose amount is less than BDT 2.5 million.	

Source: Interviews with financial institutions conducted by the Survey Team

Collateral conditions of BIFFL can be summarized as follows:

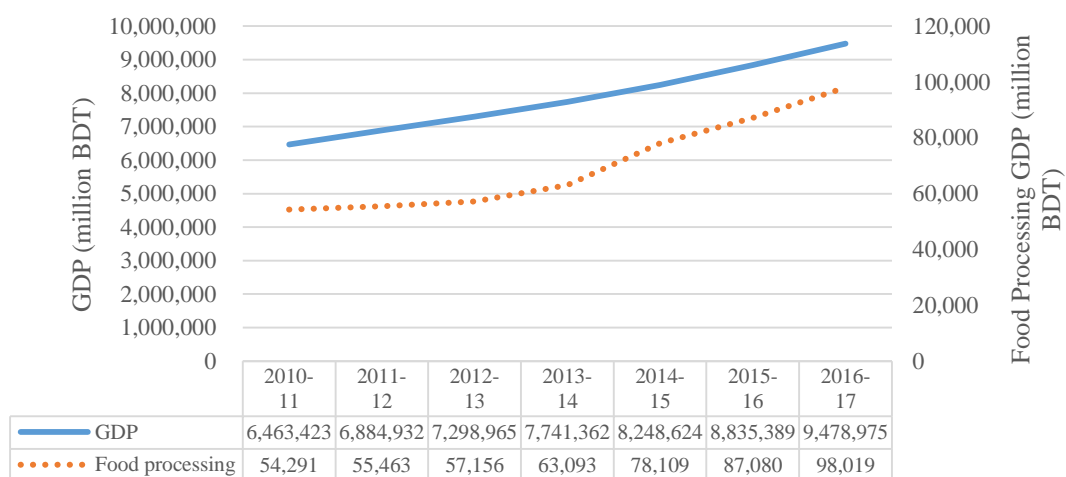
- | |
|--|
| <p>a) Regarding collateral, it is totally on a case basis and the board makes decision based on each project.</p> <p>b) BIFFL does consider machineries as the security. BIFFL can finance considering the equipment or the structure itself as guarantee for infrastructure projects with ensured revenue guarantee/sovereign guarantee, such as capacity payment (power plant) or ensured traffic guarantee (roads, bridges). In case of capital machinery it is difficult to provide loan if the machineries will be installed to a land that is mortgaged to other lenders as the right of anything on the land is assigned or mortgaged to that lender.</p> |
|--|

5. Proposed Plan of the Project

5.1. Background and Rationale of the Project

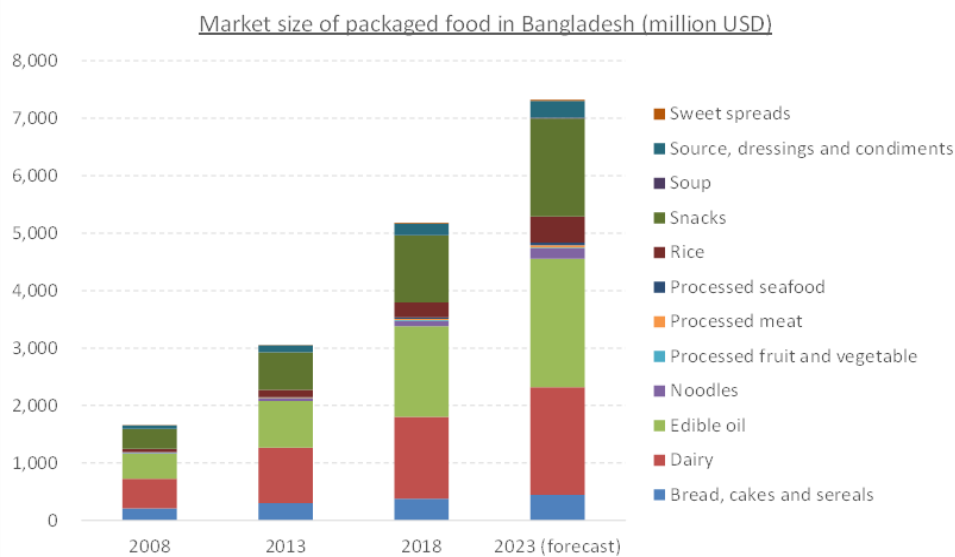
5.1.1. Growth of Domestic Consumer Market and Food Processing Industry

In Bangladesh, processed food (packaged food) domestic market as well as its GDP has been growing fast in accordance with recent economic growth. Domestic consumer market, in particular, is expected to play as a driving force for economic development of Bangladesh as it has achieved 11.1% growth per annum in the last five years and is also forecasted to grow at 7.2% per annum in next five years.



Source: BBS (2019) Statistics Yearbook Bangladesh 2018

Figure 58 Transition of Real GDP and Food Processing GDP (million BDT)



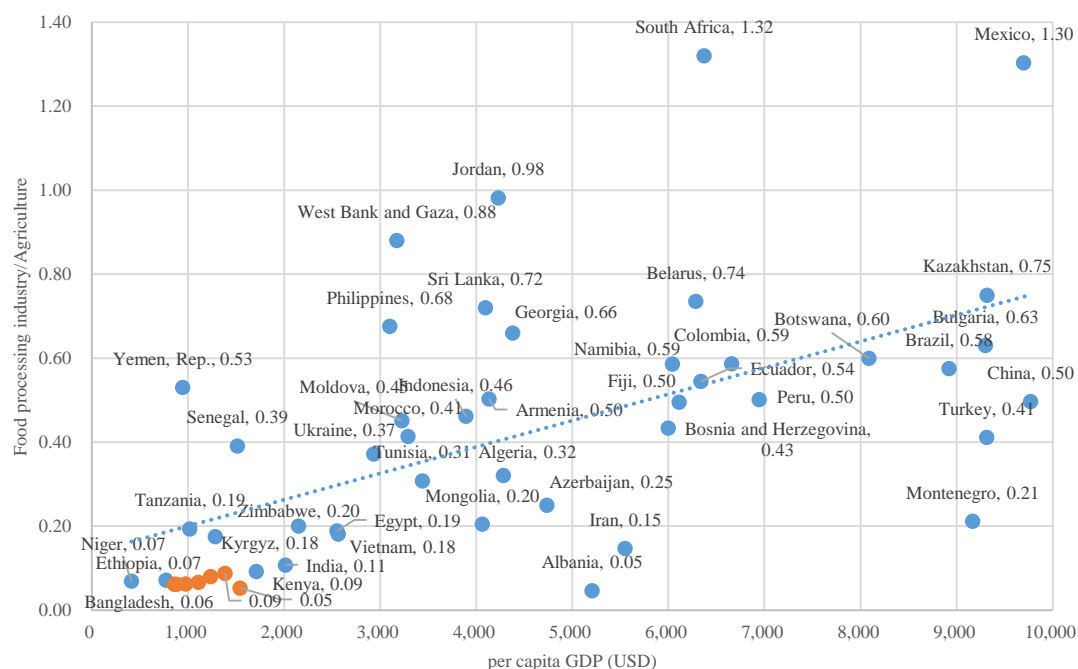
Source: The Survey Team based on Euromonitor International

(Note) This data does not include beverage and unpacked food.

Figure 59 Package Food Market Size in Bangladesh

5.1.2. Issues and Development Situation of Food Processing Industry in Comparison with Other Countries

As the figure below shows, when comparing the share of food processing industry's GDP out of agriculture's in the countries of which GDP per capita is lower than 10,000 USD, general trend can be observed that higher the GDP per capita, higher the share of food processing industry to agriculture. However, Bangladesh's figure is much lower than general approximate line (blue broken line). In this regard, further promotion of food processing industry is badly needed in Bangladesh.



Source: World Bank, World Development Indicator, BBS (2019) Statistical Year Book Bangladesh 2018

Figure 60 Comparison of Countries for Share of Food Processing Industry and Agriculture GDP in relation with GDP Per Capita (Countries of which GDP per capital is lower than 10,000 USD)

Value Added Ratio

In comparison with value added ratio of food processing industry of Bangladesh and those of South Eastern Asian countries, it can be said that not only the value added ratio but also food processing industry's share to GDP is much lower than the latter's. In this regard, increasing added value in food processing industry is critical in Bangladesh.

Table 113 Comparison of Added Value and Share to GDP in Asian Countries

	Added Value (2013)	Share to GDP (2018)
Thailand	20.1%	15.3%
Philippines	34.6%	9.7%
Indonesia	29.6%	6.3%
Vietnam	22.8%	15.0%
India	9.9%	7.6%
Bangladesh	13.5%	2.7%

Source: The Survey Team based on World Economic Indicator and Statistical Bureau of Each Country

Processing Ratio

One of the major issues of food value chain in Bangladesh is low processing ratio for agricultural products. The following table shows the processing rate for major crops in Bangladesh.

Table 114 Processing Ratio for Major Crops

Type of Crop	Processing Rate
Mango	6%
Tomato	5%
Potato	2%
Maize	1%
Chili	12%

Source: Katalyst (2016), Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

As far as processing ratio is concerned, very limited information is available for international comparison. The table below compares Bangladesh's processing rate for potato, tomato and mango with that of Japan, US and the Philippines. Regarding potato, its rate is significantly lower than that of Japan and US. Similarly, with respect to tomato, the Bangladesh's rate is much lower than that of US. Furthermore, regarding mango, its figure is also considerably lower than that of the Philippines⁶⁴.

Table 115 Comparison of Processing Ratio for Main Agricultural Products

	Bangladesh	Japan	US	Philippines
Potato	2%	55.6%	65.5%	-
Tomato	5%	3.5%	91.2%	-
Mango	6%	-	-	25%

Source:

Bangladesh: Katalyst (2016), Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

Japan (potato): Ministry of Agriculture, Forestry and Fishery of Japan website

⁶⁴ Due to public data unavailability in neighboring countries such as India, the Survey Team compared Bangladesh's data with those of Japan and the US as examples of developed countries and that of the Philippines as an example of South Eastern Asian countries, which could be obtained from public source.

Japan (tomato): Portal Site of Official Statistic of Japan website

US: Agricultural Marketing Resource Center website

Philippines: Regional Board of Investment, Bansagsamoro Autonomous Region in Muslim Mindanao, Philippines website

Post-harvest Losses

As the table below shows, Bangladesh has high post-harvest losses ratio as 20-30% due to insufficient infrastructure such as cold chain facilities, which is much higher than India's. However, it should be noted that it is difficult to simply compare post-harvest losses with other countries as sometimes survey method is different by country to country. In addition, recently Bangladesh's post-harvest loss ratio has been improving by using plastic crates and packaging materials, and some reliable data show that its ratio for mango 24%⁶⁵ and for tomato 23%⁶⁶.

Table 116 Post-harvest Loss Ratio in Bangladesh and India (%)

	Bangladesh					India						
	Farmer	Bepari	Wholesaler	Retailer	Total	Harvesting	Collection	Sort / grading	Packaging	Transport	Storage	Total
Fruit												
Mango	4.40	8.10	8.10	6.80	27.40	2.09	0.30	3.26	0.23	1.04	2.24	9.16
Banana	7.70	5.10	8.60	3.20	24.60	1.62	0.26	2.06	0.19	1.91	1.72	7.76
Papaya	6.10	13.70	12.20	7.90	39.90	0.98	0.42	1.46	0.34	0.92	2.58	6.70
Vegetable												
Tomato	6.90	9.10	8.00	8.90	32.90	3.16	0.52	3.74	0.24	1.75	3.03	12.44
Cauliflower	4.20	9.20	10.30	10.70	34.40	2.21	0.26	3.78	0.38	0.92	2.00	9.56

Source: Bangladesh data: USAID (2010) Post-harvest Handling Guide

Ministry of Food Processing Industry (2015) India data: Assessment of Quantitative Harvest and Post-harvest Losses of Major Crops and Commodities in India

According to FAO data, as the table below shows, Bangladesh's post-harvest loss ratio of rice is higher than those of other neighboring Asian countries.

⁶⁵ M. A. HOSSAIN et al (2017) Post-harvest loss assessment of major fruits grown in hill regions of Bangladesh"

⁶⁶ Dr. Paresh Kumar Sarma, BAUP (2018), Post-harvest Losses of Tomato: A Value Chain Context of Bangladesh

Table 117 Post-harvest Loss Ratio of Rice in Asian Countries (%)

		Harvest	Drying, Threshing, Processing	Transport	Wholesale	Storage	Retail	Total
Bangladesh	2010	1.8	5.0	1.0	0.2	3.8	0.3	11.9
Philippines	2015	-	-	-	-	-	-	1.0
Indonesia	2013	-	-	-	-	-	-	5.4
India	2001	-	-	-	-	-	-	1.4
Sri Lanka	2015	-	-	-	-	-	-	7.7
Japan	2016	-	-	-	-	-	-	1.5
Tanzania	2003	-	3.1	6.7	-	3.7	-	13.5

Source: FAO (<http://www.fao.org/food-loss-and-food-waste/flw-data>)

Quality and Food Safety Management System

With regard to ISO, quality management system, the number of acquisition per a million population indicates that Bangladesh's figure is much lower than that of other Asian countries such as India, Indonesia and the Philippines, not to mention Japan and China. Particularly, Bangladesh needs to increase acquisition of ISO 22000 which is to holistically manage quality and food safety in order to promote export.

Table 118 Number of ISO Acquisition per a Million Population in Asian Countries

	Population (million)	Number of acquisition			Number of acquisition per a million population		
		ISO9000	ISO14000	ISO22000	ISO9000	ISO14000	ISO22000
Japan	126.5	767	302	1283	6.1	2.4	10.1
China	1392.7	11854	1765	11581	8.5	1.3	8.3
India	1352.6	345	130	1976	0.3	0.1	1.5
Indonesia	267.7	1,042	3,893	160	3.9	14.5	0.6
Philippines	106.7	331	3,101	83	3.1	29.1	0.8
Bangladesh	161.4	18	5	35	0.1	0.0	0.2

Source: The Survey Team based on World Development Indicator (2018) and ISO Survey 2018

5.1.3. Issues of Food Value Chain to be addressed

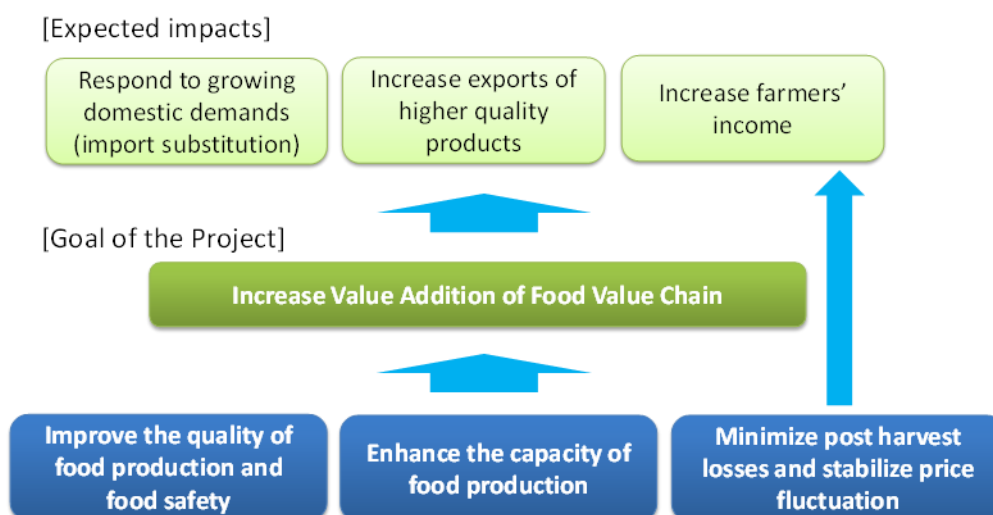
As it has been mentioned above, while Bangladeshi food processing industry has huge growth potential, it has also challenges such as high post-harvest losses, low added value, insufficient quality and food safety management system, which impede the country from fully take advantage of market opportunities.

In addition to the above challenges, financial issues should be addressed. According to

the interviews with food processing companies in the Survey, although almost all companies have capital investment plans that are supposed to be financed by financial institutions, even relatively large companies face difficulties to have medium and long-term loans after “Liquidity Crisis” (mentioned in Chapter 4). As of November 2019, loan interest ranges from 12 to 15% (real interest rate is 6.5% to 9.5% as inflation rate is about 5.5 %) ⁶⁷, which discourages their investment appetites.

Taking into account the above situation, the Project sets its goal to increase value addition of food value chain and aims to achieve impacts to increase exports of higher quality products, respond growing domestic demands and increase farmers’ income by improving the quality of food production and food safety, enhancing the capacity of food production and minimizing post-harvest losses and stabilizing price fluctuation.

With a view to achieving the above mentioned goal and impacts, the Project targets food processing industries (including fruit, vegetable, spice, rice, wheat, bean, and edible oil), seed manufacturing, organic fertilizer manufacturing, warehouse/ logistics, wholesale, transportation and retail industries, and provides financial and technical supports for investing necessary equipment and upgrading managerial and technical capacity for addressing bottlenecks in each stage of production, distribution, processing and retail in food value chain (mentioned in 3.3.5).



Source: The Survey Team

Figure 61 Main Goal and Expected Impacts of the Project

⁶⁷ Regarding interest rate, Bangladesh Bank website (<https://www.bb.org.bd/fnansys/interestlending.php>). For inflation rate, Bangladesh Bank website (<https://www.bb.org.bd/econdata/inflation.php>).

On the other hand, while extremely large companies among large scale industries can make capital investment by raising dollar denominated fund from foreign financial institutions, and micro and cottage industries can also obtain loans with concessional interest rate by policy lending measures such as a Bangladesh Bank’s refinancing scheme as well as from micro finance institutions and Non-Government Organizations (NGOs).

For the industries that do not belong to the above mentioned layers, there are no other options but getting short-term loans from private financing institutions with higher interest rate, which causes so called “Missing Middle” problem.

As the following table shows, added value of medium scale industries is lower than those of both large and small industries. This reason can be estimated that while medium industries generally tend to be incorporated into supply chain of large industries, small industries tend to produce and sell to local markets, and as a result the former’s profit margin is smaller than the latter’s.

In addition, the acquisition ratio of ISO9001, ISO22000 and HACCP of medium scale industries is much lower than those of large scale industries, which impedes the former from playing sufficient role in export promotion as well as raising the level of food processing industry as a whole.

Table 119 Added Value Ratio by Industry Scale

	Added Value / Production Value	Added Value / Net Fixed Asset
Average	29.0%	131.5%
Small Industry	30.7%	130.6%
Medium Industry	25.8%	126.7%
Large Industry	29.4%	129.0%

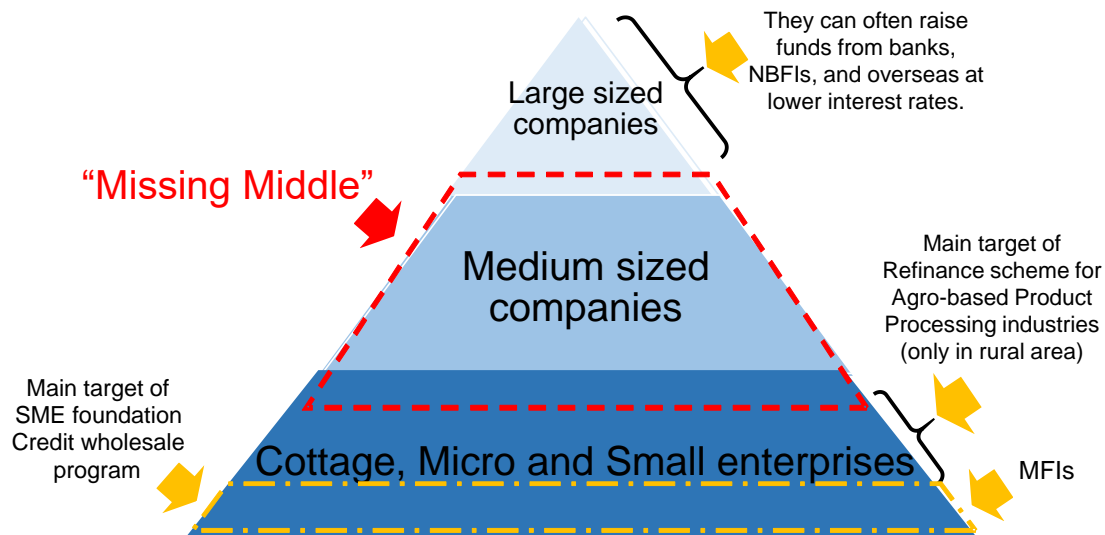
Source: The Survey Team based on Manufacturing Census (2012)

Table 120 Acquisition Ratio of ISO and HACCP

	ISO9001	ISO22000	HACCP
Micro Industry	7.5%	3.8%	3.8%
Small Industry	27.4%	8.2%	8.2%
Medium Industry	71.2%	37.9%	43.9%
Large Industry	100.0%	100.0%	95.8%

Source: JICA survey (2018)

Considering above mentioned background, by targeting medium scale industries, “Missing Middle” that have not been able to contribute to raising the level of whole food processing industries due to limited access of medium and long-term finance, the Project aims to increase added value in whole food value chain by capital investment expansion through TSL and improvement of management and food safety through capacity building.



Source: The Survey Team

Figure 62 Image Size of Targeted End-borrowers

5.1.4. Consistency with Japan’s Cooperation Policy and Effective Utilization of Knowhow and Latest Technology

“The Global Food Value Chain Strategy”⁶⁸ issued by the Ministry of Agriculture, Forestry and Fisheries of Japan (MAFFJ), emphasizes the needs of “Building New Scheme of Supporting Developing Countries”, namely enhancing economic development, increasing farmers’ income and reducing post-harvest losses in developing countries by constructing food value chain through linkage of private sector’s investment and ODA, which is consistent with the Project’s concept mentioned above.

In addition, it is also consistent with the strategies mentioned in “The Development Cooperation Policy for People’s Republic of Bangladesh (2018)” and “JICA Country Analysis Paper for People’s Republic of Bangladesh (March 2019)”. The above papers emphasize the needs of fostering competitive industries such as manufacturing industry, diversification of industries

⁶⁸ https://www.maff.go.jp/j/kokusai/kokkyo/food_value_chain/pdf/senryaku_3.pdf

and creating of conducive investment climate.

Furthermore, the above MAFFJ's strategy aims to promote attractive project formation as "Export of Food Infrastructure" from Japan to developing countries by packaging hard infrastructure (e.g. cold chain, cold temperature logistics center, processing facilities, agricultural machinery, plant factories and irrigation facilities) and soft infrastructure (e.g. ICT, energy conservation/ environmental technology, technology for preservation of freshness, quality control technology, human resource development, institutional building for standardization of agricultural production and food). As the Project aims to improve the capacity of food processing, quality control and food safety by effectively utilizing Japan's advanced technology of cold chain infrastructure, food processing and inspection facilities, it closely links with MAFFJ's policy.

As for the utilization of Japan's knowhow and latest technology, Japanese products have big potential to be adopted as a new or replacement facility by Bangladeshi companies that target to produce high-end products. For example, there are considerable needs for measuring equipment and filling machinery that assure accurate volume of material, and Japan's brands such as Ishida, Kawasaki and Yamato have extensive sales track records to Bangladeshi food processing companies. Similarly, in the area of testing equipment such as metal detector, analyzer of chemical ingredients, Japanese products such as Hitachi are widely used. Moreover, Japanese compressor brand, including MYCOM for cold storage for vegetable, fruit, fishery and dairy products are widely used in large food processing companies in Bangladesh due to appreciation of high quality. In general, it can be said that Bangladeshi companies adopt Japanese machinery by considering quality and price on the whole in comparison with European machinery. However, as its price is several times higher than Chinese machinery's, it may be difficult to be adopted for the companies of short-term approach.

The Project plans to provide business matching opportunities between Bangladeshi food processing companies and Japanese machinery companies as a strategy for the formers to explore high-end products by introducing the benefits of such machinery in terms of quality and productivity.

5.1.5. Contribution to the increase of the income and livelihood of farmers

The following is a summary of possibility for contribution to improvement of farmers' income and livelihood through implementation of the Project.

1) Increase of transactions between food processing industries and farmers

It is assumed that with the implementation of the Project, the transactions between food

processing industries and farmers can increase and improve farmers' income and livelihood by the increase of production types and volume of agro and agro-processing products through promotion of capital investment.

In the Survey, it was observed that farmers can be assured of sales price and volume through contract farming as well as obtaining necessary input goods and agricultural technology from food processing companies for procurement of varieties of potato, which has eventually improved farmers' income. Regarding mango, as food processing companies require farmers to use plastic crate, post-harvest losses has significantly decreased (e.g. Its ratio during the distribution stage from farmers to wholesale markets/ factories has decreased from 15% to around the level of 2-3%), which has also contributed to increase of farmers' income. As mentioned in Chapter 3, Pran group has been trying to maximize farmers' income by developing unique procurement network through allocation of Hub Leaders.

Indeed, some food processing companies have been actively promoting contract farming and direct transactions with farmers in order to assure stable raw material procurement, holding down of traders' margin and assurance of traceability.

In addition, as Section 5.3.2 elaborates, as for the training for food processing companies, it is proposed to cover such topics as contract farming, direct transactions with farmers and GAP. Furthermore, identifying potential processed products by analyzing the market trend of food processing industry is also proposed to be included in the capacity building program.

2) Cold storage

The Survey has confirmed that cold storage contributes directly to the decrease of post-harvest losses and price stabilization of potato through the data analysis of price fluctuation of agricultural products. However, as around 90% of cold storage is used for potato, multi-purpose cold storage to enable temperature control by type of crop is needed to store other agricultural products.

In this regard, it is proposed to introduce multi-purpose cold storage as well as to include cold storage as the target of capital investment for end-borrowers.

3) Production of seeds, organic fertilizer and bio pesticide

In Bangladesh, in general, lower quality seeds are utilized since around 80% of seeds used by farmers is collected by themselves. However, private companies have been also playing an important role by producing seeds for 90% of vegetable, 95% of hybrid rice, 98% of hybrid maize and 70% of potato which are sold in markets.

As those private seed companies need investment of laboratory related equipment quality for R&D and quality control purpose, strengthening seeds production companies by supporting such capital investment will also contribute farmers to improve their income and livelihood.

Although organic fertilizer and bio pesticide directly contribute to the improvement of productivity and food safety, their market penetration is still developing stage. Therefore, it is expected to contribute to farmers' income and livelihood through improvement of their productivity and food safety by supporting the industries for necessary capital investment and diffusing these products to markets.

5.2. Financing Scheme

5.2.1. Proposal on Fund Flow

(1) Implementing Agency of the Project

An Implementing Agency of a TSL project must specialize in the banking and finance industry, be comprehensively familiarized with its business and operation, and be completely neutral towards PFIs, since it will manage the ODA loan fund on-lent by MOF of the GOB and, when sub-loans are provided through PFIs, on-lend the fund to them. The Implementing Agency of the Project must consequently be nominated from the governmental financial institutions, but Bangladesh Bank, which has a series of a track record as the Implementing Agency of the existing JICA's TSL projects, refused to serve a function of the Implementing Agency of the Project. The other governmental financial institutions are state-owned commercial banks (SCBs), development financial institutions (DFIs), and state-owned non-bank financial institutions (NBFIs), while many of them hold a large amount of NPL and face financial difficulties.

- State-owned commercial banks (SCBs)
 - ✓ There exist six SCBs in Bangladesh: Agrani Bank, Bangladesh Development Bank, BASIC Bank, Janata Bank, Rupali Bank, and Sonali Bank.
 - ✓ All of the SCBs face financial difficulties as their NPL ratios exceed 10%.
- Development financial institutions (DFIs)
 - ✓ There exist three DFIs: Bangladesh Krish Bank, Rajshahi Unnayan Bank, and Probashi Kallayan Bank.
 - ✓ NPL ratios of Bangladesh Krishi Bank and Rajshahi Krishi Unnayan Bank exceed 20% and they face financial difficulties. Probashi Kallyan Bank have better financial soundness but they cannot perform a function of an Implementing Agency of a TSL

project since they specialize in remittances by Bangladeshi overseas workers.

- State-owned non-bank financial institutions (NBFIs)
 - ✓ There exist three state-owned NBFIs: Bangladesh Infrastructure Finance Fund Limited (BIFFL), Infrastructure Development Company Limited (IDCOL), and Agrani SME Financing Company Limited which is a subsidiary of Agrani Bank.
 - ✓ Agrani SME Financing Company itself has financial soundness, but the NPL ratio of their parent company, Agrani Bank, is fairly high and their group faces financial difficulties as a consolidated basis.

This Survey accordingly settles on BIFFL and IDCOL as candidates of the Implementing Agency of the Project since they are currently working as the Implementing Agency of another JICA TSL project. Their organizational and financial highlights are summarized as follows:

Table 121 Organizational and Financial Highlights of BIFFL and IDCOL

	BIFFL	IDCOL
Number of Branches	0	17
Number of Employees	85	358
Total Assets (mil. BDT)	30,149	82,293
Loans and Advances (mil. BDT)	16,978	60,742
Investments (mil. BDT)	1,563	-
Leases (mil. BDT)	-	-
Total Liabilities (mil. BDT)	6,826	75,491
Deposits (mil. BDT)	-	-
Borrowings (mil. BDT)	2,461	67,566
ROA: Return on Assets	3%	0.85%
ROE: Return on Equity	4%	10.34%
% of Classified Loans against Total Loans and Advances	0.03%	7.15%
CAR: Capital Adequacy Ratio	177%	11.53%
Shareholders	GoB (MOF) 99.99%	GoB (MOF) 99.99%
Major Funding Sources	Government, multilateral and bilateral donors	Government, multilateral and bilateral donors
Major Loan Targets	Power & Energy, Connectivity & Economic Zone, Green & Renewable Energy, Tourism Infrastructure, Social Infrastructure, Women Entrepreneur, Agricultural Development	Physical infrastructure, renewable energy, energy efficiency

Source: Annual reports of BIFFL and IDCOL

The amount of total asset and the number of employees of IDCOL are bigger than those of BIFFL. However, BIFFL is financially more stable than IDCOL, as the ratio of classified loans against total loans and advances of BIFFL is only 0.03%, while that of IDCOL is 7.0%.

Both BIFFL and IDCOL do not have sufficient loan experiences in providing loans to food processing industry, as the main targets of BIFFL are power and energy, connectivity and

economic zone, and green and renewable energy, while those of IDCOL are physical infrastructure, renewable energy and energy efficiency.

However, as agro-processing industry is listed as one of the eligible sector of BIFFL in their Credit Policy⁶⁹, BIFFL seems to be more aggressive in lending to agribusiness and food processing industries. BIFFL accordingly can be regarded as the most appropriate institution which can perform the role as the Implementing Agency of the Project.

(2) Accreditation Criteria of PFIs

The Survey Team confirmed that plural banks and NBFIs can be appointed as candidates for PFIs of the Project. In order to be nominated as PFIs, longlisted banks and NBFIs should be screened by an accreditation criteria. As a result of examining the objective of the Project, financial regulations, and indicators of financial soundness, the Survey Team proposes accreditation criteria of PFIs listed in the table below:

⁶⁹ “Credit Policy of BIFFL: 3rd Revision”, 22nd February 2019

Table 122 Proposed Accreditation Criteria of PFIs

Criteria	Purpose
License from Bangladesh Bank	To prove the legality.
Minimum three years operational experiences	To prove a track record in the business.
Commitment to agribusiness and food processing industries	To examine if a candidate can satisfactorily carry out the purpose of the Project.
Meet the minimum Capital Adequacy requirement (10%)	To prove the management soundness and compliance with the regulation of Bangladesh Bank.
Profitable operation for the last two consecutive years	To prove the profitability and managerial soundness.
NPL ratio not exceeding 10%	To prove the managerial soundness and compliance with the regulation of Bangladesh Bank.
External credit rating (equivalent to 1, 2, or 3 of Bangladesh Bank Rating Scale)	To prove the managerial soundness.
Compliance with prudential guidelines (e.g. Advance deposit ratio)	To prove compliance with the regulation of Bangladesh Bank.

Source: The Survey Team

The results of analysis of the potential PFIs listed in Section 4.2 in accordance with the proposed accreditation criteria are summarized in the table below, and all of the financial institutions satisfactorily fulfill the criteria.

Table 123 Assessment of potential PFIs based on the accreditation criteria

Criteria	Dutch Bangla Bank	BRAC Bank	Eastern Bank
License from Bangladesh Bank	Obtained in 23 July 1995. <OK>	Obtained in accordance with the Bank Company Act 1991. <OK>	Obtained in accordance with the Bank Company Act 1991. <OK>
Minimum three years operational experiences	Yes <OK>	Yes <OK>	Yes <OK>
Commitment to agribusiness and food processing industries	They prepared the credit polity in agribusiness as well as large-scale corporates, SMEs, and retail. <OK>	The agro-based industry accounts for 6.8% of their total portfolio. <OK>	The food and allied industries accounts for 5.4% of the total portfolio. <OK>
Meet the minimum Capital Adequacy requirement (10%)	15.60% <OK>	13.67% <OK>	12.16% <OK>
Profitable operation for the last two consecutive years	Net profit in 2017: 2.5 billion, in 2018: BDT 4.2 billion <OK>	Net profit in 2017: 5.5 billion, in 2018: BDT 5.7 billion <OK>	Net profit in 2017: 2.4 billion, in 2018: BDT 3.1 billion <OK>
NPL ratio not exceeding 10%	4.10% <OK>	3.10% <OK>	2.35% <OK>
External credit rating (equivalent to 1, 2, or 3 of Bangladesh Bank Rating Scale)	AA+ (CRISL) <OK>	AA+ (CRISL) <OK>	AA+ (CRISL) <OK>
Compliance with prudential guidelines (e.g. Advance deposit ratio)	ADR: 76.80%, CRR: 13.96%, SLR: 19.43% <OK>	ADR: 82.78%, CRR: 6.21%, SLR: 13.11% <OK>	ADR: 83.08%, CRR: 5.69%, SLR: 13.79% <OK>

* CRISL: Credit Rating Information and Services Limited, ADR: Advance-Deposit Ratio, CRR: Cash Reserve Ratio, SLR: Statutory liquidity Ratio, ECRL: Emerging Credit Rating Limited

Criteria	Dhaka Bank	SBAC Bank	IDLC Finance
License from Bangladesh Bank	Bangladesh Bank License No. BCD (D) 200/57-421/95 <OK>	Obtained in accordance with the Bank Companies Act 1991. <OK>	Bangladesh Bank License No.: BCD (Non-banking)/Dhaka/2/95 dated 07 February 1995 <OK>
Minimum three years operational experiences	Yes <OK>	Yes <OK>	Yes <OK>
Commitment to agribusiness and food processing industries	They possess enough track records of financing food processing and transport companies as well as cold storage. <OK>	The agro-based industry accounts for 4.5% of their portfolio. <OK>	They utilizes the Refinance Scheme on agro-based product processing industries of the Bangladesh Bank most frequently. <OK>
Meet the minimum Capital Adequacy requirement (10%)	13.84% <OK>	15.88% <OK>	17.34% <OK>
Profitable operation for the last two consecutive years	Net profit in 2017: 1.5 billion, in 2018: BDT 1.4 billion <OK>	Net profit in 2017: 1.0 billion, in 2018: BDT 0.9 billion <OK>	Net profit in 2017: 2.3 billion, in 2018: BDT 2.2 billion
NPL ratio not exceeding 10%	4.99% <OK>	1.97% <OK>	2.20% <OK>
External credit rating (equivalent to 1, 2, or 3 of Bangladesh Bank Rating Scale)	AA (ECRL) <OK>	A3 (CRAB) <OK>	AAA (ECRL) <OK>
Compliance with prudential guidelines (e.g. Advance deposit ratio)	ADR: 82.79%, CRR: 5.78%, SLR: 13.60% <OK>	ADR: 82.50%, CRR: 6.00%, SLR: 14.76% <OK>	CRR: 2.51%, SLR: 5.07% <OK>

Criteria	IPDC Finance	United Finance	BIFFL
License from Bangladesh Bank	Bangladesh Bank License No: BCD (Non-Banking)/Dhaka/3/'95 dated 02 February 1995 <OK>	Obtained in accordance with the Financial Institutions Act 1993 <OK>	GOB owns 99.9% of the equity of BIFFL <n.a.>
Minimum three years operational experiences	Yes <OK>	Yes <OK>	Yes <OK>
Commitment to agribusiness and food processing industries	The agro-based industries and the food and allied products account for 8.1% and 6.2% of the total portfolio respectively. <OK>	The food production/processing industry accounts for 9.9% of the total portfolio. <OK>	Their Credit Policy states that Agricultural Development is one of their target sectors. <OK>
Meet the minimum Capital Adequacy requirement (10%)	14.01% <OK>	16.33% <OK>	177% <OK>
Profitable operation for the last two consecutive years	Net profit in 2017: 0.3 billion, in 2018: BDT 0.5 billion <OK>	Net profit in 2017: 0.3 billion, in 2018: BDT 0.3 billion <OK>	Net profit in 2017: 0.8 billion, in 2018: BDT 0.8 billion <OK>
NPL ratio not exceeding 10%	2.14% <OK>	2.96% <OK>	0.03% <OK>
External credit rating (equivalent to 1, 2, or 3 of Bangladesh Bank Rating Scale)	AA1 (CRAB) <OK> <OK>	AA- (ECRL)<OK>	AA- (CRISL) <OK>
Compliance with prudential guidelines (e.g. Advance deposit ratio)	CRR: 2.59%, SLR: 12.83% <OK>	CRR: 2.54%, SLR: 25.14% <OK>	n.a. <n.a.>

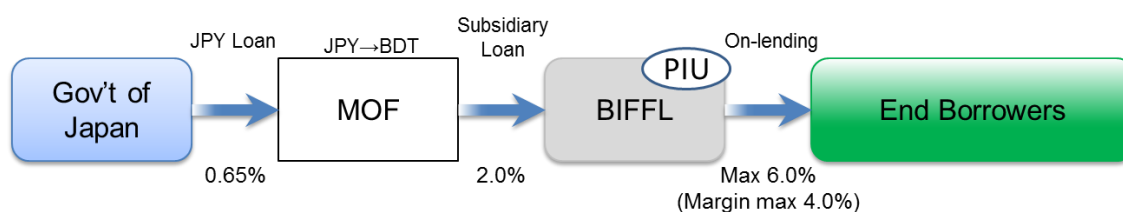
Source: Annual reports of financial institutions, interviews with financial institutions conducted by the Survey Team

(3) Financing Scheme

In addition to the Implementing Agency and PFIs, MOF is one of the key players in a TSL financing scheme in Bangladesh. They are supposed to fill the major role of an executing agency to on-lend ODA funds provided by GOJ to the Implementing Agency. The on-lending interest rate imposed by MOF on the Implementing Agency is supposed to be 2.0% which will be equivalent to that of Energy Efficiency and Conservation Promotion Financing Project (EECPFP), and the margin MOF can secure will be 1.35% which is obtained by 2.0% minus 0.65% which is the current ODA loan interest rate from GOJ to GOB.

Based on the analyses on and consultations with stakeholders of the Project, the Survey Team proposes two options of the financing scheme listed below to facilitate the Project.

i) Option 1: BIFFL will function as both the PIU and sole lender to end-borrowers.



Source: The Survey Team

Figure 63 Option 1 of Fund Flow

In this option, BIFFL will function as the Implementing Agency of the Project and also as the sole lender to all end-borrowers. BIFFL receives the ODA loan fund from Ministry of Finance and carry out all administrative operations of On-Lending Loans as the Implementing Agency.

The Government of Bangladesh, or Ministry of Finance, will on-lend the ODA loan fund to BIFFL under the Subsidiary Loan Agreement to be concluded between them. Then, BIFFL provides On-Lending Loans to end-borrowers, by providing the ODA loan fund received from the government.

In this fund flow, the loan interest rates end-borrowers will bear are proposed to be at maximum 6%⁷⁰, while the interest rate of Subsidiary Loans MOF charges to BIFFL will be 2% (less than the Bangladesh Bank Rate by 3%). Accordingly, the margin on an On-Lending Loan

⁷⁰ As previously stated in Footnote 1, the ceiling of the interest rate could be set at 5% per annum.

BIFFL can secure will be at maximum 4%⁷¹.

As the prevailing lending interest rates imposed by private financial institutions approximately range from 13% to 15%, this option with the interest rate of at maximum 6% must be much more attractive to end-borrowers than proper loans provided by banks and NBFIs regularly.

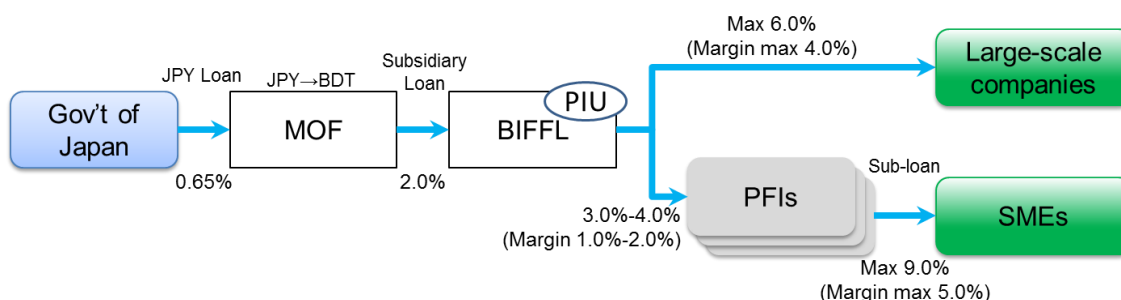
Advantages and disadvantages of this fund flow is summarized in the following table.

Table 124 Advantages and Disadvantages of Fund Flow Option 1

Advantages	Disadvantages
<ul style="list-style-type: none"> Since the number of stakeholders are smaller, the process of loan administration must be simpler. If the funding cost of BIFFL (the interest rate MOF charges to BIFFL) remains low, the interest rates end-borrowers bear can be also set low. 	<ul style="list-style-type: none"> BIFFL does not have extensive relationship with potential end-borrowers. BIFFL does not have branches in rural areas and is not commonly acknowledged by potential end-borrowers. Technical assistances on promotional activities will be required.

Source: The Survey Team

ii) Option 2: BIFFL will function as the Implementing Agency and directly provides On-Lending Loans with large-scale companies, while private financial institutions appointed as PFIs will provide sub-loans with SMEs.



Source: The Survey Team

Figure 64 Option 2 of Fund Flow

⁷¹ In case the ceiling of the interest rate is set at 5% per annum, the margin will be at maximum 3%.

In this option, BIFFL functions as the Implementing Agency and carries out administrative operations of managing the ODA loan funds, and also provides On-Lending Loans to large-scale companies. On the other hand, private banks and NBFIs, which have better access to SMEs through their branch network, are appointed as PFIs of the Project and also participate in the Project and provide sub-loans with SMEs.

BIFFL functions as the Implementing Agency of the Project and review loan applications submitted by PFIs to examine whether the loan applications comply with the eligibility of a sub-loan of the Project. PFIs provides sub-loans to end-borrowers only after they go through the eligibility checking by BIFFL.

A major concern over this option is that the Implementing Agency can misuse information of PFIs' customers when they ask the Implementing Agency for a review of loan applications. In order to avoid such a conflict of interests between the Implementing Agency and PFIs, BIFFL, the Implementing Agency, is supposed to concentrate on On-Lending Loans to large-scale corporates and PFIs are supposed to concentrate on SMEs in this option because BIFFL has already closed their window to SME business and clearly asserts that they are going to focus on large-scale corporates and infrastructure projects. The Survey Team asked some private financial institutions their opinions and comments on this proposal of fund flow of the Project, and they mentioned that there exists no chance of the conflict of interests with BIFFL and the fund flow will be feasible.

In this option, the proposed loan interest rates large companies will bear are supposed to be at maximum 6.0%, while those SMEs will bear are supposed to be at maximum 9.0%. The interest rate of Subsidiary Loans MOF charges to BIFFL will be 2.0% which is less than the Bangladesh Bank Rate by 3.0%. The maximum loan margin on an On-Lending Loan BIFFL can secure will be at maximum 4.0% in case of directly providing On-Lending Loans to large-scale companies and at maximum 2.0% in case of on-lending to PFIs which will provide sub-loans to SMEs. The margin PFIs will secure cannot exceed 5%.

Advantages and disadvantages of this fund flow option are summarized in the following table.

Table 125 Advantages and disadvantages of Fund Flow Option 2

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ More SMEs will have a chance to gain access to ODA loan funds through the branch network of PFIs. ▪ The existing network between PFIs and potential borrowers can be extensively utilized. ▪ PFIs will gain more experiences in providing loans to agribusiness and food processing industries. 	<ul style="list-style-type: none"> ▪ PFIs might not be much attracted to participate in the Project because they can provide sub-loans to SMEs only.

Source: The Survey Team

As a result of a series of discussions regarding these two options of fund flow with stakeholders, the Option 1 is likely to be adopted as the fund flow of the Project because it can support a wide array of SMEs by providing lower-interest loans, and it accordingly will be examined further in the following sections.

5.2.2. Terms and Conditions of On-Lending Loan

(1) Fund arrangement

Allocation of loan proceeds: The allocation of loan proceeds of the TSL to small- and medium-scale enterprises and large-scale enterprises will be set as 40% and 60% respectively.

The Project will allocate the fund both for small- and medium-size enterprises and for large-scale enterprises. The allocation of loan proceeds of the TSL to small- and medium-scale enterprises will be set as 40% and 60% respectively based on the financial demand estimated by the Preparatory Survey. Definitions of the scales of enterprises comply with National Industrial Policy 2016 and the proceeding policy if required. Special attention, however, should be given to medium-scale enterprises since they do not have sufficient financial access compared to the other categories.

As for large-scale corporates, some renowned companies can raise funds through proper loans of domestic financial institutions with lower interest rates or, in some cases, through foreign financial institutions with interest rates in line with overseas markets. These prominent large-scale corporates consequently will be excluded from the major target of the Project.

Besides, as for small-scale industries, micro-, small-, and medium-scale industries of which the value of fixed assets excluding lands and buildings is less than BDT 100 million are eligible for the Refinance Scheme for Agro based Product Processing Industries in Rural Areas of Bangladesh Bank, so they are not necessarily included in the major target of the Project.

Table 126 Definition of Scale of Companies in Refinance Schemes of Bangladesh Bank

Scale of Companies	Definition	
	Amount of Existing Investment	Employees
Medium		
Manufacturing	BDT 150~500 mil.	121 – 300
Service	BDT 20~300 mil.	51 – 120
Small		
Manufacturing	BDT 7.5~150 mil.	31 – 120
Service	BDT 1.0~20 mil.	15 – 50
Micro		
Manufacturing	BDT 1.0~7.5 mil.	16 – 30
Service	BDT 1.0 mil. and below	15 and below

Source: Bangladesh Bank

(2) Eligibility of end-borrower

Legal eligibility of end-borrower:

- i) Public limited company
- ii) Private limited company
- iii) Private proprietor
- iv) Partnership
- v) Cooperative

Legal eligibilities of end borrowers are detailed above. Definitions of the eligibilities are described in the table below.

Table 127 Definitions of legal eligibility of end borrowers

Legal eligibility	Definition	Source
Public limited company	"Public company" means a company incorporated under this Act or under any law at any time in force before the commencement of this Act and which is not a private company	The Companies Act, 1994

Private limited company	"Private company" means a company which by its articles (i) restricts the right to transfer its shares, if any; (ii) prohibits any invitation to the public to subscribe for its shares or debenture, if any; (iii) limits the number of its members to fifty not including persons who are in its employment; provided that where two or more persons hold one or more shares in a company jointly, they shall, for the purposes of this definition, be treated as a single member	The Companies Act, 1994
Private proprietor	Any Bangladeshi citizen of at least 18 years old may register as the sole proprietor. As a sole proprietor, the owner has complete control over all matters related to the business and all profits are considered personal income. However, the owner and the business are not considered separate legal entities and therefore its owner is personally liable for all liabilities incurred.	https://oldbaileybd.com/incorporating-sole-proprietorship-partnership
Partnership	"Partnership" is the relation between persons who have agreed to share the profits of a business carried on by all or any of them acting for all	The Partnership Act, 1932
Cooperative	Cooperative is an autonomous association of persons' united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise.	https://pdfs.semanticscholar.org/69e0/315174647e6d2b0158643e20e6da397e28eb.pdf

Source: The Survey Team based on some materials

As already mentioned, the main target of the Project is a medium-scale industry, and the majority of them will be a i) public limited company or ii) private limited company. On the other hand, small-scale industries which are relatively sizable and then ineligible for other governmental or NGO's financial supports are supposed to be the objectives of the Project, so a iii) private proprietor, iv) partnership, and v) cooperative will also be eligible for the Project.

Sub-sectors eligible for On-Lending Loans of the Project are listed below. In each sub-sector, the eligibility and non-eligibility of raw materials to be processed, products, and investment items are also specified in the following tables.

1) Fruit processing industry

	Eligible	Non-eligible
Eligible raw materials to be processed	<ul style="list-style-type: none"> • Mangoes, pineapples and other fruits 	
Eligible products	<ul style="list-style-type: none"> • Processed fruits, including fruit juice, jam and jelly, dried fruits, frozen fruits, canned fruits and fruit pickles 	<ul style="list-style-type: none"> • Fruit flavored candies • Fruit flavored drink (proportion of fruits is smaller than 10%) • Wine and liquors produced from fruits
Eligible investment items	<ul style="list-style-type: none"> • Equipment, machineries and structures for the products listed above (Production processes included sorting, washing, pressing / extraction, pasteurization, Aseptic filling, drying, cooling, packing and cartooning) 	<ul style="list-style-type: none"> • Vehicles and warehouses without freezing, refrigerating or humidity or temperature controlling equipment • Any items which are movable and usable for other purposes • Any production processes which do not include foreign object detection system, such as doors and curtains at the entrance of production lines

2) Vegetable processing industry

	Eligible	Non-eligible
Eligible raw materials to be processed:	<ul style="list-style-type: none"> • Tomatoes, potatoes, and other vegetables 	
Eligible products	<ul style="list-style-type: none"> • Processed vegetables, including ketchup, frozen vegetables, frozen samosa, frozen French fries, dried vegetables, vegetable juice, pickles, starch and sauce. 	<ul style="list-style-type: none"> • Any products which are not mainly produced from vegetables, such as mayonnaise and oyster sauce

Eligible investment items	<ul style="list-style-type: none"> Equipment, machineries and structures for the products listed above (Production processes include washing, sorting, grinding, peeling, cutting, concentration, frying, weight measurement, homogenization, cooling, pasteurization, aseptic filling, metal detector, freezing, packing and cartooning). 	<ul style="list-style-type: none"> Vehicles and warehouses without freezing, refrigerating or humidity or temperature controlling equipment Any items which are movable and usable for other purposes Any production processes which do not include foreign object detection system, such as doors and curtains at the entrance of production lines
---------------------------	---	--

3) Spice processing industry

	Eligible	Non-eligible
Eligible raw materials to be processed:	<ul style="list-style-type: none"> Spices, including peppers, chili peppers, corianders, turmeric, onions and other spices 	
Eligible products	<ul style="list-style-type: none"> Processed spices, including dried powdered spices 	
Eligible investment items	<ul style="list-style-type: none"> Equipment, machineries and structures for the production of processed foods listed above (Production processes include cooling, magnet, sorting, washing, drying, metal detector, filling, packing and cartooning) 	<ul style="list-style-type: none"> Vehicles and warehouses without freezing, refrigerating or humidity or temperature controlling equipment Any items which are movable and usable for other purposes Any production processes which do not include metal detection

4) Rice, wheat, and bean processing industry

	Eligible	Non-eligible
Eligible raw materials to	<ul style="list-style-type: none"> Rice, wheat, and beans 	

be processed:		
Eligible products	<ul style="list-style-type: none"> • Rice snacks (including puffed rice), biscuits, cookies, breads, chanachur and processed beans (including fried dal), frozen beans 	<ul style="list-style-type: none"> • Milled and powdered rice • Wheat flour • Snacks which are not mainly produced from rice, wheat and beans, such as chocolate, gum and candies • Beer, liquors and other alcoholic beverage
Eligible investment items	<ul style="list-style-type: none"> • Equipment, machineries and structures for the products listed above (Production processes include weighing, mixing, fermentation, formation, baking, frying, metal detector, packing and cartooning) 	<ul style="list-style-type: none"> • Vehicles and warehouses without freezing, refrigerating or humidity or temperature controlling equipment • Any items which are movable and usable for other purposes are not eligible. • Any production processes which do not include foreign object detection system, such as doors and curtains at the entrance of production lines

5) Edible oil processing industry

	Eligible	Non-eligible
Eligible raw materials to be processed:	<ul style="list-style-type: none"> • Mustard, rice bran and sesame 	
Eligible products	<ul style="list-style-type: none"> • Mustard oil, rice bran oil, sesame oil 	<ul style="list-style-type: none"> • Edible oil other than mustard oil, rice bran oil and sesame oil • Refined oil produced from imported crude oil

Eligible investment items	<ul style="list-style-type: none"> Equipment, machineries and structures for the products listed above (Processes include heating, cracking, pressing, refining, bleaching, dewaxing, filtering, deodorization, packing). 	<ul style="list-style-type: none"> Vehicles and warehouses without freezing, refrigerating or humidity or temperature controlling equipment Any item which are movable and usable for other purposes Any production process which do not include pressing
---------------------------	--	--

6) Seed processing industry

	Eligible	Non-eligible
Eligible products	<ul style="list-style-type: none"> Seeds 	
Eligible investment items	<ul style="list-style-type: none"> Equipment, machineries and structures for the improvement of the quality of seeds (including laboratories and inspection equipment) Seed production facilities, including drying and coloring facilities Storage facilities with temperature and humidity control 	<ul style="list-style-type: none"> Vehicles and warehouses without freezing, refrigerating or humidity or temperature controlling equipment Any items which are movable and usable for other purposes

7) Organic fertilizer producers / biological pesticide producers

	Eligible	Non-eligible
Eligible products	<ul style="list-style-type: none"> Organic fertilizers and biological pesticide 	<ul style="list-style-type: none"> Chemical fertilizer and chemical pesticide
Eligible investment items	<ul style="list-style-type: none"> Equipment, machineries and structures for the production of organic fertilizers (including fermenter mixers and packing equipment), and for the production of biological pesticide (including laboratory equipment, production 	<ul style="list-style-type: none"> Vehicles and warehouses Any item which are movable and usable for other purposes

	equipment and packaging equipment)	
--	------------------------------------	--

8) Logistics industry, wholesalers, and transport industry

	Eligible	Non-eligible
Eligible investment items	<ul style="list-style-type: none"> Vehicles, warehouses with freezing, refrigerating or humidity or temperature controlling equipment 	<ul style="list-style-type: none"> Vehicles and warehouses without freezing, refrigerating or humidity or temperature controlling equipment Vehicles, warehouses and other facilities not used for food products

9) Retail industries (including supermarkets)

	Eligible	Non-eligible
Eligible investment items	<ul style="list-style-type: none"> Freezing and refrigerating or humidity and temperature controlling equipment Vehicles and warehouses with freezing, refrigerating, or humidity or temperature controlling equipment 	<ul style="list-style-type: none"> Vehicles and warehouses without freezing, refrigerating or humidity or temperature controlling equipment Equipment, vehicles, warehouses, and other facilities not used for food products

(3) On-Lending Loan amount

On-Lending Loan amount: Up to BDT 500 million per one end-borrower (The Working Committee has the authority to approve the loan more than the maximum amount.)

The background of the limit of an On-Lending Loan amount per an end-borrower or a corporate group is as follows. First, according to interviews with agribusiness and food processing companies, one of the most expensive production line to be established in Bangladesh is a juice production line, and it will cost at maximum 700 million BDT as shown in the following table.

Table 128 Typical Production Line or Equipment of Agribusiness and Food Processing Industries

Production line / Equipment	Cost	Examples of machinery
Mango and tomato pulp production line	BDT 150 million or below	<input type="checkbox"/> Mango washing machine <input type="checkbox"/> Sorting conveyer <input type="checkbox"/> Mango crasher <input type="checkbox"/> Homogenizer <input type="checkbox"/> Pasteurizer <input type="checkbox"/> Mixer <input type="checkbox"/> Reserve/Storage tank <input type="checkbox"/> Weighting and filling machine
Juice production line	BDT 700 million or below	<input type="checkbox"/> Pet bottle blower <input type="checkbox"/> Mixing tank <input type="checkbox"/> Mixer <input type="checkbox"/> Homogenizer <input type="checkbox"/> Pasteurizer <input type="checkbox"/> Weighting and filling machine
Potato chips production line	<input type="checkbox"/> Made in India or China: BDT 50 million to 70 million <input type="checkbox"/> Including machineries made in industrialized countries: BDT 200 million	<input type="checkbox"/> Potato washer <input type="checkbox"/> Sorting conveyer <input type="checkbox"/> Pilling machine <input type="checkbox"/> Cutter (Slicer) <input type="checkbox"/> Slicer washer <input type="checkbox"/> Blancher/dewater machine <input type="checkbox"/> Fryer <input type="checkbox"/> Mixer (with spice) <input type="checkbox"/> Weighting and filling machine
Potato chips filling machine	<input type="checkbox"/> Made in China: BDT 1 million <input type="checkbox"/> Made in Japan: BDT 10 million	-
Multi-purpose cold storage facilities	BDT 10 million to 500 million	<input type="checkbox"/> Compressor <input type="checkbox"/> Control panel
Refrigerated, frozen or insulated vans	Imported: BDT 7.5 million	<input type="checkbox"/> Chiller ban <input type="checkbox"/> Freezer ban <input type="checkbox"/> Insulated ban

Source: Interviews with agribusiness and food processing companies conducted by the Survey Team

Second, according to interviews with financial institutions, they can usually finance up to 70% of a project cost borrowers apply. The limit of an On-Lending Loan amount per an end-borrower or a corporate group therefore is set as 500 million BDT which is 700 million BDT multiplied by 70%, in order to meet a wide variety of capital investment needs of agribusiness and food processing companies.

In order to avoid concentrating sub-loans on a few of corporate groups or conglomerates and to diversify the portfolio of the Project, the Project will regard a corporate group or conglomerate as one borrower, and the loan amount to such a corporate group is supposed to be limited up to BDT 500 million as well.

Maximum coverage by an On-Lending Loan on the total cost of a sub-project cost: Maximum amount of the cost of a sub-project which can be financed through TSL is to be determined in accordance with the credit policy of each PFI, but it must not exceed 90% of the cost of the sub-project.

This condition intends to retain the ownership of an end-borrower by asking them to bear at least 10% of the total estimated cost of the sub-project by their resources, in cash or in kind.

(4) Interest rate

[Option 1] At maximum 6% regardless of the size of an end-borrower

[Option 2] At maximum 6% as to large-scale corporates and at maximum 9% as to SMEs

Table 129 Interest Rates of the Existing Policy Lending Schemes for SMEs

Scheme	Source of fund	Eligible end-borrowers	Maximum interest rate on end-borrowers
Refinance Scheme for Agro-based Product Processing Industry in Rural Areas	Bangladesh Bank	SME	10%
Refinancing Fund for New Entrepreneurs in Cottage, Micro and Small Industry	Bangladesh Bank	Cottage, micro and small industry	10%
Refinancing Scheme for Small Enterprise	Bangladesh Bank	Small enterprise	To be determined between PFI and borrower (9% for women entrepreneurs)
Financial Sector Project for the Development of SME (FSPDSME)	JICA	SME	To be determined between PFI and borrower (9% for women

			entrepreneurs)
Credit Wholesaling Program	SMEF	Micro enterprise	9%

Source: Bangladesh Bank Annual Report 2017-2018 and interviews conducted by the Survey Team

In each option, the interest rate of an On-Lending Loan is not more than 9%, which is substantially lower than the prevailing loan interest rates in the market ranging from 13% to 15%. This also meets the requirement set by GOB and Bangladesh Bank of reducing lending interest rates below 10%.

In option 2, PFIs can secure sufficient amount of loan interest margin such as 4% for large companies and 5% for SMEs. In case the maximum interest margin is set lower than this, PFIs would be reluctant to extend loans especially to SMEs whose credit risk and transaction costs are rather larger than those of large companies.

(5) Eligible purpose

- i) Long term capital investment in agribusiness and food processing industries (only for new equipment, machinery, and production line)
- ii) Technical Know-how such as necessary expense for obtaining accreditation related to food safety and food processing including ISO, HACCP and halal certification

As indicated above, working capital is not eligible for the Project. This is because (1) the Project can maximize its contribution to intensify the value added of the Food Value Chain in Bangladesh by allocating all of the funds to tangible (or fixed) and intangible asset investments, (2) eligible end-borrowers are assumed to be creditworthy enough to raise short-term working capital loans by themselves, and (3) some NBFIs does not accept settlement deposit accounts so they have difficulties in grasping daily cash transactions of their customers, and accordingly does have little experiences in extending working capital loans.

(6) Maturity and collateral

The maturity and collateral for a sub-loan will be determined by the Implementing Agency in compliance with the rules and regulations prevailing in Bangladesh.

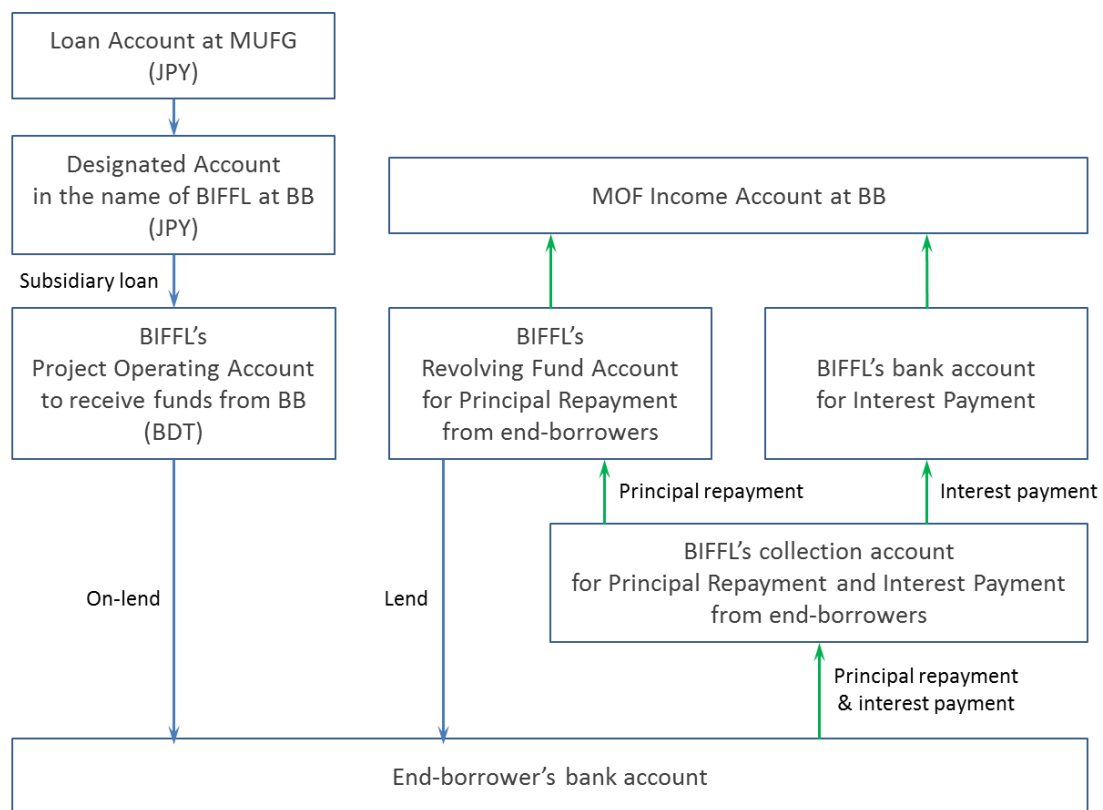
(7) Revolving fund

The principal portion of the repayment from the end-borrowers will be credited to the

Revolving Fund Account directly from the borrowers through the Collection Account in order to ensure that the 2nd and the successive generations of the loan from JICA will be utilized for the Project's objective. The accounts shall be opened and maintained at BIFFL under the Project's name and shall be separate and distinct from other accounts.

The principal of the Loan shall be used for the 2nd and the succeeding proceeds of the sub-loan at least until 50% of the On Lending Loan has been utilized for the 2nd generation of sub-loans through the Revolving Fund. After 50% of the On Lending Loan has been utilized for the 2nd generation of sub-loans, the principal would revolve until otherwise specified by MOF of its usage, until the end of the repayment period.

The eligibility of the lending from the Revolving Fund should be coherent with the Project's until three years after project completion.



Source: The Survey Team

Figure 65 Fund Flow and Accounts

Besides the Revolving Fund Account as well as the Designated Account, Project Operating Account, Collection Account, and Interest Payment Account will be audited by an external auditor annually within six months after the end of each fiscal year, i.e. by December of

each year until 50 % of the principal of the original loan amount are used for the second and successive generations of the loans to PFIs and the end-borrowers.

5.3. Technical Support and Capacity Building

5.3.1. Technical Support for Financial Institutions

As described in 5.2.1, it is assumed that the executing financial institution, BIFFL, provides financing to end-borrowers and other financial institutions are not involved in the proposed Project as PFIs. Therefore, this section describes proposed technical support only for BIFFL.

Proposed technical support for BIFFL include (1) technical support for the TSL project management, (2) technical support for analysis of agribusiness and food processing sector, and (3) technical support for monitoring and evaluation activities.

Details of the proposed technical support are explained as follows.

(1) Technical support for the TSL project management

Technical support required for the TSL project management includes (a) support on effective management of the Project and control of the fund, (b) support on fund planning, and (c) support on preparation and submission of reports on TSL implementation.

(b) Support on fund planning is for making a funding demand forecasts and also for making disbursement request to JICA in every quarter, while (c) preparation of reports is for the preparation of various reports on TSL implementation, such as quarterly progress reports and repayment and overdue status reports.

(2) Technical support for analysis of agribusiness and food processing sector

Through interviews with financial institutions including BIFFL, it was confirmed that they have sufficient experience and capabilities in ordinary banking operations, such as loan screening and loan monitoring. In contrast, they have need for support from the technical aspects of agribusiness and food processing.

Proposed technical support therefore include (a) analysis on the market trend of the agribusiness and food processing industry, (b) identification of analytical viewpoints on food safety management of borrowers upon loan appraisals and loan monitoring, (c) capacity building on the review of equipment to be procured by agribusiness and food processing companies, and (d) promotion of understanding on food processing and food safety management through workshops and on-the-job training.

Analysis on the market trend is proposed to cover a wide range of eligible sectors, such as fruit processing and vegetable processing. For some sub-sectors with higher loan demand, such as mango processing and potato processing, analytical viewpoints necessary for loan appraisals are proposed to be compiled utilizing the survey result. For other sectors, such as spice processing, cold storage facilities and, refrigerated, frozen and insulated vans, sector analysis reports are proposed to be prepared.

(3) Technical support for monitoring and evaluation activities

Monitoring and evaluation activities to be conducted by BIFFL include (i) monitoring of sub-projects after disbursements and (ii) update of operation and effect indicators of the proposed Project.

Monitoring of sub-projects, which will be conducted jointly with consultants, include review of the installation, operation and maintenance status of the equipment and examination of the issues in food safety management. Upon monitoring sub-projects, technical supports are proposed to be provided by the consultants to BIFFL, so that BIFFL can examine the issues in food safety management by itself in the future. Preparation of a monitoring sheet that summarizes the analytical viewpoints upon sub-project monitoring will be also needed.

Information necessary for the update of operation and effect indicators are to be collected upon appraisal and two years after the commencement of commercial operation. Information to be collected from end-borrowers will include number of suppliers and customers of end-borrowers, number of certifications and licenses relating to food safety, amount of purchases of agricultural products of end-borrowers from contract farmers and improvement in the food safety management of the benefited food processing companies.

Technical support for financial institutions is also proposed to include promotion activities, such as preparation of publicity materials. Seminars on food processing and food safety, which are proposed to be organized inviting agribusiness and food processing companies, will be good opportunities to promote the proposed Project.

5.3.2. Capacity Building for Agribusiness and Food Processing Companies

As described above, the issues of agribusiness and food processing companies were identified for (i) business and financial management capacity, (ii) food processing, and (iii) food safety. Identified issues are summarized as follows;

(i) Business and financial management capacity

- Many companies cannot even apply for loans as they have difficulties in obtaining legal documents necessary for loan applications, such as business permits, tax payment certificates, and BSTI licenses.
- Companies cannot select most appropriate equipment for their operations.
- Companies cannot prepare investment plans or business plans.

(ii) Food processing

- Inappropriate use of seeds suitable for processing
- Lack of understanding of contract farming (including GAP certification and introduction of IPM)
- Lack of understanding of multipurpose cold storage facilities
- Lack of understanding of appropriate use of refrigerated, frozen and insulated vans and use of plastic crates for vegetable and fruit transportation
- Insufficient processing technology, including lack of understanding of high-precision weighing / packaging machines and lack of understanding of nitrogen filling for degradation control
- Lack of diversification of processed products

(iii) Food safety

- Inadequate sanitary design in factories
- Lack of laboratories and inspection equipment
- Inadequate safety and quality control of raw materials
- Lack of knowledge on food safety and inadequate food safety management

(1) Capacity Building for Business and Financial Management

As agribusiness and food processing companies find it difficult to obtain legal documents required for loan applications, capacity building on such issues will be needed. One of capacity building programs will be compiling a handbook that describes the procedures to obtain such legal documents and giving seminars on the procedures.

Other proposed capacity building includes a training program for the preparation of business plans. Even though such business plans do not necessarily make it easy for companies to access to bank loans, they will help companies to make decisions on capital investments. For example, companies would be able to make projections on their production sizes and change in

cash flow after the capital investments and they will be also able to estimate the payback periods of investments. They are then expected to be able to choose most appropriate equipment for their businesses using the business plans.

Capacity building for business and financial management is proposed be given in conjunction with the seminars for the food processing described below.

(2) Capacity Building for Food Processing Improvement

For the capacity building for food processing improvement, it is proposed to hold seminars and also to develop training materials for the following topics.

- Diversification of processed products, processing technology and processing equipment, and quality improvement
- Promotion of multi-purpose cold storage facilities and improvement in the transportation of fruits and vegetables

The main target participants of the seminars on “diversification of processed products, processing technology and processing equipment, and quality improvement” will be small and medium-sized agribusiness and food processing companies. On the other hand, the target participants of the seminars on “promotion of multi-purpose cold storage facilities and improvement in the transportation of fruits and vegetables” are cold storage operators and other companies involved in the distribution and storage of fruits, vegetables, spices and other food items.

Outline of a draft seminar agenda is as follows.

Table 130 Outline of a draft seminar agenda (food processing)

<p>a) Diversification of processed products, processing technology and processing equipment, and quality improvement</p> <p>Note: Seminar topics will be determined according to the sub-sectors of seminar participants, such as potato processing, vegetable processing, fruit processing, edible oil production, bread and confectionery manufacturing.</p> <ul style="list-style-type: none"> - Market trends of processed foods - Necessary machinery and equipment necessary for food processing (including equipment introduction by suppliers) - Improvement in raw material procurement (including contract farming, good
--

<p>agricultural practice (GAP), integrated pest management (IPM)</p> <ul style="list-style-type: none"> - Preparation of investment plan - Improving financial access (procedures to obtain legal documents required for loan application) - Overview of the TSL program, including application procedures <p>b) Promotion of multipurpose cold storage facilities and improvement in the transportation of fruits and vegetables</p> <ul style="list-style-type: none"> - Necessity of multipurpose cold storage facilities, refrigerated, frozen and insulated vans and transportation facilities - Necessary equipment and transportation facilities for multipurpose cold storage facilities (including introduction of suppliers) - Preparation of investment plan - Improving financial access (procedures to obtain legal documents required for loan application) - Overview of the TSL program, including application procedures
--

Source: The Survey Team

As it is not possible for BIFFL to conduct the capacity building on “diversification of processed products, processing technology and processing equipment, and quality improvement”, SMEF and BSCIC are proposed to support the implementation of the capacity building program as executing partners. Similarly, the implementation of capacity building on “promotion of multipurpose cold storage facilities and improvement in the transportation of fruits and vegetables” will be supported by Bangladesh Cold Storage Association (BCSA).

As many edible oil producers and bakers are located in the industrial estates operated and managed by BSCIC, capacity building on “diversification of processed products, processing technology and processing equipment, and quality improvement” of edible oil production and baked goods, is proposed to be provided with the support of BSCIC mainly. Other food processing related seminars will be also supported by BSCIC in consultation with SMEF and BSCIC. As SMEF provides a wide range of training programs for food processing companies other than edible oil and bakers, capacity building on “diversification of processed products, processing technology and processing equipment, and quality improvement” of many other issues are proposed to be given in collaboration with SMEF mainly.

Upon providing capacity building on “promotion of multipurpose cold storage facilities

and improvement in the transportation of fruits and vegetables”, BCSA is proposed to be involved in the promotion of seminars, such as by making announcement of the proposed seminars to their member companies.

Considering the location of many food processing companies, the seminars mentioned above are proposed to be organized in Dhaka and Chattogram. A part of seminars on “diversification of processed products, processing technology and processing equipment, and quality improvement”, especially on mango and potato processing, is proposed to be held in major production areas.

Table 131 Proposed seminar schedule (food processing)

Seminar title	Frequency and location	Executing partner
1) Diversification of processed products, processing technology and processing equipment, and quality improvement		
Potato processing	At least twice a year at Dhaka, Chattogram, and another city (three cities in total)	SMEF, BSCIC
Other vegetable processing	At least twice a year at Dhaka, Chattogram, and another city (three cities in total)	SMEF, BSCIC
Fruit processing such as mango	At least twice a year at Dhaka, Chattogram, and Rajshahi (three cities in total)	SMEF, BSCIC
Edible oil manufacturing and bread manufacturing	At least twice a year at Dhaka, Chattogram, and other city (three cities in total)	BSCIC
2) Promotion of multi-purpose cold storage facilities and improvement in the transportation of fruits and vegetables	At least twice a year at Dhaka, Chattogram, and another city (three cities in total)	SMEF

Source: The Survey Team

Regarding the capacity building for food processing improvement, it is proposed to invite Japanese companies, which handle food processing related machineries and cold storage facilities, as instructors of the seminars. It is expected for the Japanese companies to introduce and explain about their equipment and facilitates to companies in Bangladesh, and have a business matching seminar between the companies in the both countries.

(3) Capacity building for food safety

As for the capacity building for food safety, a basic course for a wide range of participants and an advanced course for export companies and others are proposed to be held. Outline of a draft seminar agenda is as follows.

Table 132 Outline of a draft seminar agenda (food safety)

- | |
|--|
| <p>1) Basic course for food safety</p> <ul style="list-style-type: none">- Importance of food safety management- Regulations on food safety and necessary actions<ul style="list-style-type: none">➤ Food hygiene regulation➤ Food labeling regulations➤ Food additives regulations➤ Chemical contamination, toxic and hazardous residue regulations➤ Sampling and analysis, how to set an expiration date➤ Food contact materials- Necessary actions to obtain HACCP and ISO22000 <p>2) Advanced course for food safety</p> <p>Day 1: Food Safety and International Trend</p> <ul style="list-style-type: none">- Importance of food safety management- Food safety standards in Bangladesh- Necessity of food safety certificates (e.g. HACCP, ISO, GMP and GAP)- International food safety trends and certification system (e.g. Codex, International Standard, GFSI, FSSC22000 and EHEDG)- Case studies of other countries <p>Day 2: Factory Operation</p> <ul style="list-style-type: none">- Food safety management at factories- Information sharing (including complaint management) and record keeping- Traceability management- Quality analysis and quality control- Case studies of measurement equipment and measurement frequency |
|--|

Day 3: Hygienic engineering design

- Operational principles for food safety
- Application of food safety to actual equipment
- Elimination of pollution sources
- Specific food safety measures for factory facilities and equipment (e.g. washing and disinfection of equipment, equipment materials, sanitary structure of equipment and countermeasures against foreign objects)

Source: The Survey Team

The basic course on food safety is designed to enable agribusiness and food processing companies to understand food safety rules and regulations so that they can take necessary actions to enhance their food safety management.

Seminars are supposed to be organized with the cooperation from one of the executing agencies, BFSA. The seminars, which are to be provided by consultants as a part of consulting services at the initial stage, are proposed to be gradually transferred to BFSA.

Participation in the basic course is proposed to be mandatory for the persons in charge of food safety management of existing and potential end-borrowers. In case end-borrowers have specific certifications for food safety, such as HACCP, they will be exempt from receiving such seminars.

BIFFL officers in charge of loans to agribusiness and food processing companies are also required to participate in the basic course of food safety, so that they can obtain deeper knowledge on food safety issues and underlying risks in the agribusiness and food processing industry. The basic course will be held at least twice a year in Dhaka and Chattogram.

On the other hand, the main targets of the advanced course on food safety will be large sized companies and export companies that need to comply with higher safety standards. As most of such companies are BAPA members and BAPA has enough experiences in holding seminars on food safety by utilizing external resources, it is proposed to receive support from BAPA upon conducting the advanced course. The advanced course is also proposed to accept the attendance of stakeholders, such as BFSA, BSTI, IFST, BAPA, MoInd, SMEF, BSCIC, and universities, who are expected to contribute to the improvement in food safety management in Bangladesh in the future.

Table 133 Proposed seminar schedule (food safety)

Seminar title	Frequency and area	Executing partner
1) Basic course on food safety	At least twice a year in each city: Dhaka and Chattogram	BFSA
2) Advanced course on food safety (i) Food Safety and International Trend (ii) Factory Operation (iii) Hygienic Engineering Design	At least twice a year in each city: Dhaka and Chattogram	BAPA

Note: The advanced course will be held for three consecutive days and covers one theme per day.

Participants shall be able to participate in the seminar on the desired theme and do not have to participate in the three consecutive days.

Source: The Survey Team

Through interviews with several organizations, information on food safety training experiences and internal resource persons were collected. Upon providing capacity building program, it is recommended to update their resource persons.

Table 134 Experience in food safety training and resource persons

Superior government agency	Ministry of Commerce	Ministry of Industries	Ministry of Industries	Ministry of Food	Ministry of Industry	Ministry of Commerce	NSDA	(UN)	Ministry of Science and Technology	Ministry of Agriculture	Ministry of Agriculture	Ministry of Industries
Organization Training area, resource	BAPA	SME Foundation	BSCIC	BFSA	BSTI	DCCI	CEAFS	FAO	IFST	BARI	NATA	BAB
Current Program of seminar/training on food safety												
- Good Agricultural Practice (GAP), Good Manufacturing Practice (GMP)	●	●				●	● (trained 10,000 farmers)			●	● (e.g. Food Security, etc)	
ISO 22000 & HACCP		●		(●)								
- Others	● ("Food Safety of Agro Processed Products & Strategy for ensuring it", "Food Safety in Bangladesh-Prospects & Challenges")	● (BSTI certificates, inspection, QC, Kaizen for SME)		Not regular contents, Not regular Base, Need Base (Main service is Inspection)	Not regular contents, Not regular Base, Need Base (Main service is Inspection)		● (trained GMP for 10,000 farmers)	(capability for International trend)	Food Science and Technology, QA/QC			Accreditation
Proposed Program of seminar/training on food safety												
Basic Course				●								
International Trend								●				
New equipment, New Technology												
QC/QA									●			
Factory Operation					●							
Hygienic Engineering												
Resource Preson												
- Internal		● (e.g., Kaizen)			●	● (8 full time)		● (1 person knows very well)	● (50 Scientists & Technologists)	● (755 Scientists & Researchers)	● (40 Scientific Trainers)	
- External	● (54 industrial trainers)	● (17 resource persons for agro-processing sector, around 100 resource persons for general)	● (around 20 resource persons in marketing)	●		● (30 resource person)(from germany, Switzaand for GAP)	● (100 resource person from SMB of DAE and Netherland)					
- Dispatch person to other Organizations					● to BSCIC, SME, BAPA				● to BSCIC, BFSA			
Own Facilities												
- Training institution and center			● (SCIT, 15 SDC)		●	●			●	●	●	

Source: The Survey Team based on interviews

(4) Support for overseas study tour and exhibitions

It is proposed to organize an overseas study tour for Bangladeshi agribusiness and food processing companies so that they can experience advanced food safety practices in developed countries, such as Japan.

It is also proposed to support Bangladeshi agribusiness and food processing companies to participate in overseas food exhibitions, in order to promote their businesses with overseas companies and also to achieve export growth in the future.

Such proposed support is summarized as in the following table.

Table 135 Proposed study tour and exhibitions

Item	Content and number of implementations	Expected participants	Executing partner
Overseas study tour	<ul style="list-style-type: none"> ● Business matching seminar with overseas companies, visit to food safety related organizations and food processing companies ● Once in this Project (for a week) 	10 participants from government agencies and others (MoInd, BIFFL, SMEF, BSCIC, BAPA, BFSA, etc.) and five participants from companies	BAPA
Overseas exhibitions	<ul style="list-style-type: none"> ● Joining overseas exhibitions related to food processing (e.g. FOODEX Japan (Japan), SIAL Paris (France) and Gulfood (UAE)) ● Thrice in this Project (one per year x three times) (for a week) 	4 participants from government agencies and others (MoInd and BAPA are expected), six participants from companies	BAPA

Source: The Survey Team

5.3.3. Monitoring of Capacity Building

As described in 5.3.1 Technical Support for Financial Institutions, sub-projects are proposed to be monitored upon loan appraisals and two years after the commencement of commercial operations, through the technical support for BIFFL.

The information to be collected from end-borrowers include (i) number of suppliers and customers of end-borrowers, (ii) number of certifications and licenses relating to food safety, (iii) amount of purchases of agricultural products of end-borrowers from contract farmers and (iv) improvement in the food safety management of the benefited food processing companies. The impacts by the capacity development will be then examined by the information collected through the monitoring of sub-projects.

The impacts of capacity building on food safety management is also proposed to be examined through such monitoring. Such impacts should be examined from various aspects, such as equipment, raw materials, risk management, customer management, human resource management, and certifications, using the checklist to be explained later (See Appendix 2 and 3).

5.3.4. Proposed Consulting Services

The proposed consulting service period is five years from September 2021 to September 2026. Required specialties and working months (M/M) of experts are summarized as follows based on the information collected from financial institutions and food processing companies.

Table 136 Experts and M/M of the consulting services

Position	M/M
A1 Team Leader / Financial Specialist	24.7 M/M
A2 Agro-processing Specialist	16.7 M/M
A3 Food Safety Specialist	16.7 M/M
B1 Monitoring & Evaluation Specialist	23.0 M/M
B2 Promotion / Public Relations Specialist	35.0 M/M
B3 Fund Management Specialist/ Administration Staff	32.5 M/M

Source: The Survey Team

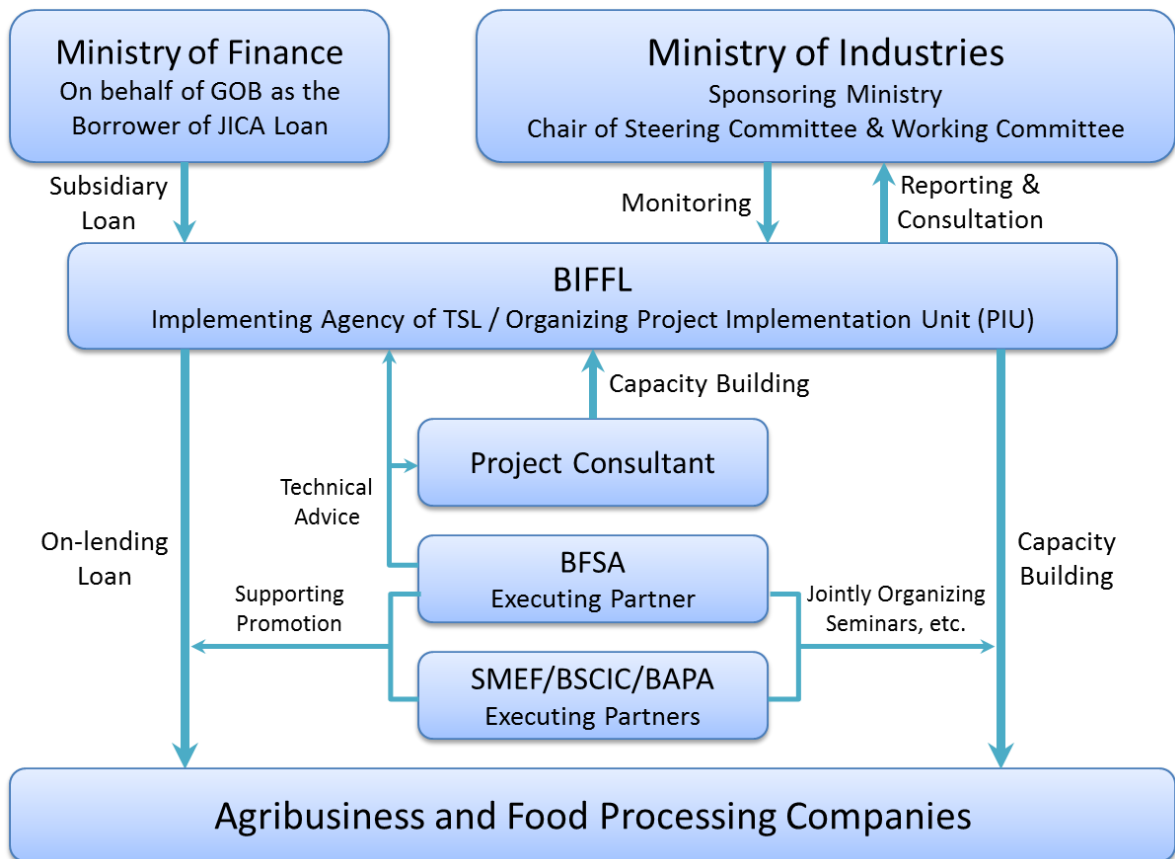
The proposed TOR (Terms of Reference) of the consulting services is attached in the Appendix 4. The timing and amount of inputs of experts are proposed based on the technical support provided for financial institutions and seminars organized for agribusiness and processing companies.

In this Survey, it was confirmed that there were many candidate seminar lectures for food processing and food safety management such as university professors and government officers. However, Bangladeshi domestic individual consultants or consulting firms which have sufficient expertise required for A2 Agro-processing specialist and A3 Food safety specialist were not identified. It is appropriate to utilize international consultants for these experts.

5.4. Organization for Project Implementation

5.4.1. Organization for Project Implementation

Organizations for the implementation of the Project is proposed as the following diagram.



Source: The Survey Team

Figure 66 Organizations for Project Implementation

The Ministry of Industries (MoInd) is supposed to supervise all the Project as the Sponsoring Ministry. MoInd will form and chair the Steering Committee and Working Committee and monitor the progress and impacts of the Project. They will also ensure the coordination among the Implementing Agency and by the Executing Partners such as SMEF and BSCIC for the implementation of the capacity building of agribusiness and food processing industries.

BIFFL is supposed to select and employ Project Consultant for supporting project management and execution of capacity building, and to extend On-Lending Loans to end-borrowers as the Implementing Agency directly. They will also promote the Project by means of PR activities through website, brochures and seminars, and monitor the progress of the sub

projects to report MoInd and JICA.

The Project Consultant is supposed to support BIFFL by providing the consulting service managing TSL and seminars for end-borrowers, collaborating with executing partners such as SMEF and BSCIC.

The function, roles, frequency of the meeting, and members of the Steering Committee are detailed in the following table.

Table 137 Function, Roles, Frequency of Meeting, and Members of the Steering Committee

Role & Function
<ul style="list-style-type: none"> ▪ Monitoring and supervision of the overall project progress; ▪ Creating conducive environment for the implementation of the Project and coordinating among various stakeholders in effective manner; ▪ Formulating necessary policy, rules and regulations for the successful implementation of the Project; ▪ Provide policy level instruction to Implementing Agency and Partners for Project implementation; ▪ Approval of important issues or major changes if arises during the Project implementation with JICA's concurrence; ▪ Coordination among the Project's stakeholders in effective manner and; ▪ Any other issues necessary for the implementation of the Project.
Frequency of the meeting
<ul style="list-style-type: none"> ▪ The Steering Committee will convene biannually and whenever required.
Member
<ul style="list-style-type: none"> ▪ Chairperson: <ol style="list-style-type: none"> (1) Secretary of MoInd (Sponsoring Ministry); ▪ Member: <ol style="list-style-type: none"> (2) Representative from MoInd (as the representative of the Working Committee, not below the rank of Joint Secretary); (3) Representative from Prime Minister's Office; (4) Representative from Economic Relations Division, Ministry of Finance (not below the rank of Joint Secretary); (5) Representative from Finance Division, Ministry of Finance (not below the rank of Joint Secretary); (6) Representative from Financial Institution Division, Ministry of Finance (not below the rank

- of Joint Secretary);
- (7) Representative from Ministry of Agriculture;
- (8) Representative from Ministry of Commerce;
- (9) Representative from Bangladesh Bank;
- (10) CEO, BIFFL;
- (11) Project Director from PIU/BIFFL and;
- (12) Observer: JICA

Source: The Survey Team

BFSA, SMEF, BSCIC, and BAPA are supposed to collaborate with BIFFL in the TSL project and capacity building for end-borrowers as the Executing Partners. Their function and roles are detailed in the following table.

Table 138 Function and Roles of Executing Partners

BAPA	
1.	Support BIFFL to; (i) promote TSL to the member companies; (ii) conduct an overseas study tour by recommending participating companies; (iii) organize business matching seminar and; (iv) arrange the participation to international exhibition events for the potential end borrowers.
2.	Organize seminars and training programs for the potential end borrowers with the support from BIFFL and the consultants (mainly about business development and advanced food safety) through <ul style="list-style-type: none"> • Working with BIFFL and the consultants to formulate training or seminar materials for agribusiness and food processing companies to enhance their food safety management, including hygiene management, food safety certifications and quality assurance. • Working with BIFFL to mobilize appropriate resource persons as lectures, and • Holding seminars jointly with BIFFL, with the support of the consultants.
3.	Support potential end borrowers to find export opportunities through; <ul style="list-style-type: none"> • Working with BIFFL to organize business matching seminars, and • Participating in trade exhibition in other countries.
SMEF	
1.	Support BIFFL by introducing TSL to the potential end borrowers and inviting them to the seminars and training programs through its network.
2.	Organize seminars and training programs for the potential end borrowers with the support from BIFFL and the consultants (mainly about business development and food processing for

<p>SMEs) through</p> <ul style="list-style-type: none"> • Working with BIFFL and the consultants to formulate training or seminar materials for agribusiness and food processing companies to enhance their food production skills and capacity (e.g. fruit and vegetable processing, cold chain management and productivity improvement), and financial access. The main targets are SMEs. • Working with BIFFL to mobilize appropriate resource persons as lectures, and • Holding seminars jointly with BIFFL, with the support of the consultants.
BSCIC
<ol style="list-style-type: none"> 1. Support BIFFL by introducing TSL to the potential end borrowers and inviting them to the seminars and training programs leveraging its nationwide network. 2. Organize seminars and training programs for the potential end borrowers with the support from BIFFL and the consultants (about productivity improvement in edible oil processing and baked goods if the needs are confirmed in the area) through <ul style="list-style-type: none"> • Working with BIFFL and the consultants to formulate training or seminar materials for agribusiness and food processing companies to enhance their food production skills and capacity (e.g. fruit and vegetable processing, cold chain management and productivity improvement), and financial access. The main targets are SMEs, • Working with BIFFL to mobilize appropriate resource persons as lectures, and • Holding seminars jointly with BIFFL, with the support of the consultants.
BFSA
<ol style="list-style-type: none"> 1. Provide technical advice to BIFFL and the Consultants about the training on food safety 2. Organize seminars and training programs about the basics of food safety with the support from BIFFL and the consultants through <ul style="list-style-type: none"> • Working with BIFFL and the consultants to formulate training or seminar materials for agribusiness and food processing companies to enhance their basic food safety management, including meeting regulatory requirements. • Working with BIFFL to mobilize appropriate resource persons as lectures, and • Holding seminars jointly with BIFFL, with the support of the consultants.

Source: The Survey Team

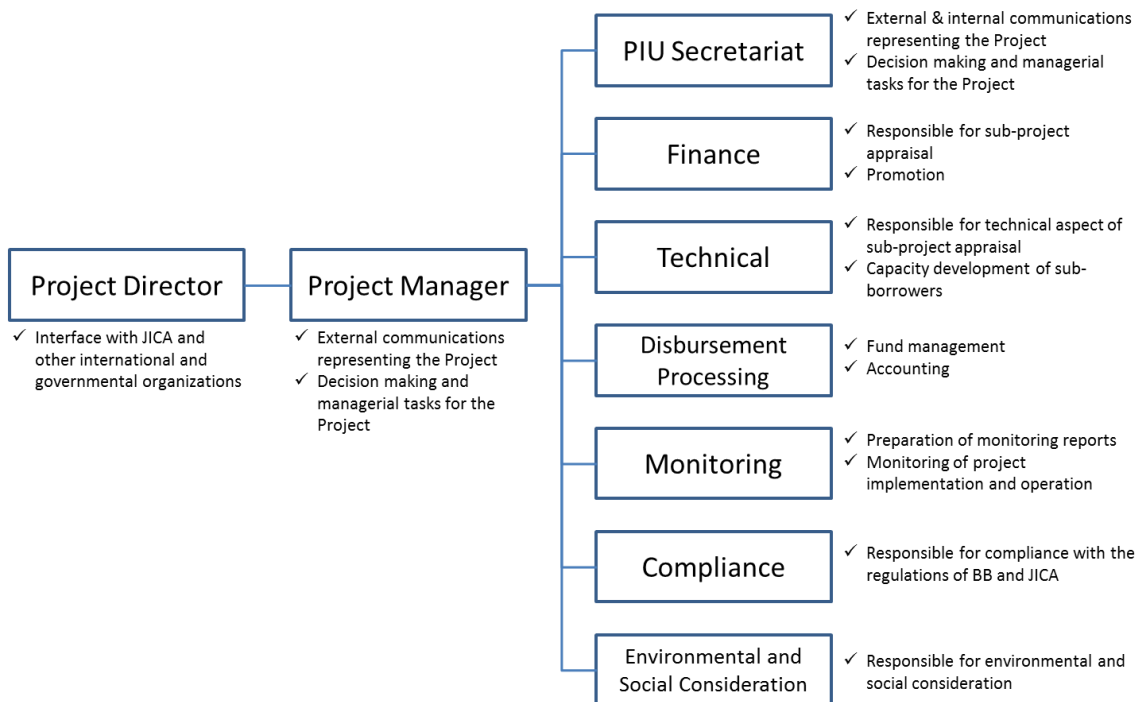
Participants in the Working Committee and focal person from the Executing Partners are detailed in the following table.

Table 139 Participants in the Working Committee and Focal Person from the Executing Partners

	Working Committee participant	Focal person
BAPA	General Secretary (Mr. Md. Iqtadul Hoque)	Executive Marketing (Mr. Evance Rozario)
SMEF	General Manager (Mr. Md. Nazeem Hassan Satter)	Assistant General Manager (Finance & Credit) (Mr. Suman Chandra Saha)
BSCIC	Director (Technology) (Dr. Md. Abdus Salam)	Extension Officer (Mr. Muhammad Ashikur Rahman)
BFSA	Member (Pub. Health & Nutrition) (Mr. Monzur Morshed Ahmed)	Member (Pub. Health & Nutrition) (Mr. Monzur Morshed Ahmed)

Source: Interviews with each organization conducted by the Survey Team

The PIU established in the Implementing Agency will be organized as detailed in the following table.



Source: The Survey Team

Figure 67 Proposal of Organization of the PIU in the Implementing Agency

Project Director is supposed to entirely supervise the Project as the head of the PIU and to work as the representative negotiating with JICA and other international organizations, although Project Manager is supposed to manage their routine operations on full-time basis. The Project Manager will lead eight members who are responsible for PIU Secretariat (Project Coordinator), Finance (two analysts), Technical, Disbursement Processing, Monitoring, Compliance, and Environmental and Social Consideration.

5.4.2. Monitoring and Reporting

The Project is supposed to be monitored by the Monitoring member of the PIU in cooperation with the financial analysts and environmental and social consideration specialist. Reports prepared as a result of the monitoring, the responsible organizations, and frequency of reporting are summarized in the following table. Besides, forms of the reports are attached to the Draft Operational Guidelines (Appendix 5).

Table 140 List of Monitoring Reports

	Document	(a) prepared by	(b) submit from (a) to and reviewed by	submit from (a) or (b) to and approved by	timing of submission/frequency
1	Quarterly Progress Report (QPR)	BIFFL/ Consultant	MoInd	JICA	every quarter
	(1) Project Status Report	BIFFL/ Consultant	MoInd	JICA	every quarter
	(2) Time-bound Action Plan	BIFFL/ Consultant	MoInd	JICA	every quarter
	(3) Sub-project Status Report	BIFFL/ Consultant	MoInd	JICA	every quarter
	(4) Appraisal Process Status Report	BIFFL/ Consultant	MoInd	JICA	every quarter
	(5) Anti-corruption Monitoring Sheet	BIFFL/ Consultant	MoInd	JICA	every quarter, until the procurement of the project consultants is completed
	(6) On-site Physical Inspection Report	BIFFL/ Consultant	MoInd	JICA	quarterly, only when the inspection is conducted
	(7) Ongoing Sub-project Summary and Financial Report	BIFFL/ Consultant	MoInd	JICA	every quarter
2	Statement of the Designated Account, Project Operating Account, the Revolving Fund Account of the proceeds of the Loan, and the Collection Account	auditor	-	BIFFL	annually within 6 months after the end of each fiscal year, i.e. by December of each year until 50 % of the principal of the original loan amount are used for the second and successive generations of the loans to the end-borrowers
3	Current Repayment and Overdue Status Report	BIFFL/ Consultant	-	JICA	annually within 6 months after the end of each fiscal year, i.e. by December of each year until 50 % of the principal of the original loan amount are used for the second and successive generations of the loans to the end borrowers
4	Certified Audit Report on Statements of Expenditures and Internal Audit Report	auditor	-	BIFFL	annually, within 9 months after the end of each fiscal year
5	Project Completion Report	BIFFL/ Consultant	-	JICA	not later than 6 months after all disbursement to the end borrowers have been completed

Source: JICA and the Survey Team

5.5. Estimation of the Project Cost

5.5.1. Funding needs by agribusiness and food processing industries

(1) Estimation of investment needs

Upon estimating the investment needs and funding needs of agribusiness and food processing industries, this Survey focused only on major products or processed items. In the estimation of investment needs for fruit processing for example, the investment needs for mango processing were estimated, but those of other fruits, such as pineapples, were not estimated. This is because the production of pineapples is much smaller than mangoes and the quantity of processed pineapples is also limited. Excluding pineapples from the estimation of investment

needs and funding needs would not change the estimation results significantly.

Similarly, this section discusses financial issues of food value chains but not technical issues, such as (i) insufficient seed quality, (ii) limited production of raw materials suitable for processing and (iii) low agricultural productivity due to inappropriate uses of organic fertilizers and bio pesticide. Such technical issues are discussed in later sections.

1) Estimation of the investment needs for mango processing

Currently only 6% (60,000 MT) of mangoes produced in Bangladesh is processed. Out of this, 50,000 MT (84%) is processed to mango juice and remaining 10,000 MT (16%) is to mango bars and pickles⁷². However, because mango bars are mostly produced by PRAN and the quantity of pickle production is marginal, the Survey analyzes the investment needs only for mango juice production.

As raw mangoes are firstly produced to mango pulp, and then to mango juice, the investment needs are separately estimated for mango pulp production and for mango juice production.

(i) Mango pulp production

Investments needs for production expansion

According to mango juice producers in Bangladesh, about 70% of mango pulp processed to mango juice in Bangladesh is domestically procured and 30% is imported. As 50,000 MT of raw mangoes is processed to mango juice, the quantity of mango pulp import is estimated to be equivalent to 21,429 MT of raw mangoes. Total quantity of mango pulp processed to mango juice would be equivalent to 71,429 MT, as depicted in the following table.

Table 141 Quantity of mango pulp processed to mango juice (estimated)

Domestic production	50,000 MT (70%)
Import	21,429 MT (30%)
Total	71,429 MT

Source: Estimate of the Survey Team

As the mango juice consumption is expected to increase by 8.2% per year⁷³, the quantity

⁷² Source: Katalyst (2016), Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

⁷³ Source: <https://www.thepages.com.bd/2017/07/25/juice-beverage-industry-potential-emerging-sector/>

of mango pulp processed to mango juice is estimated to increase by 34,500 MT in the following five years.

An example of a mango pulp production facility, with its major equipment, processing capacity and estimated investment cost, is as in the following table. Based on this, the investment cost necessary for the increase in mango pulp production (34,500 MT) is estimated to be USD 4.6 million.

Table 142 Example of a mango pulp production facility (Non-aseptic line)

Major equipment	Mango washing machine, Sorting conveyer, Mango crusher, Pasteurizer, Mixer, Reserve tank, Storage tank, Weighting and filling machine, generators, tanks and pumps
Processing capacity	4,000 MT / year
Estimated investment cost	USD 530,0000

Source: Estimate of the Survey Team based information provided by engineering companies

Investments needs for import substitution

As mentioned above, Bangladesh imports mango pulp for the production of mango juice, in spite of large production of raw mangoes in the country. This would be because mango pulp is produced mainly in non-aseptic lines in Bangladesh.

If produced in non-aseptic lines, the quality and taste of mango pulp, which is produced only during the harvest period (two to three months) and processed to mango juice production throughout a year, deteriorates while it is stored.

Therefore, by installing aseptic lines in mango pulp production processes, domestic mango pulp is expected to substitute the import of mango pulp, which is estimated to be equivalent to 21,429 MT of raw mangoes.

As the investment cost of an aseptic line of mango pulp production is 1.625 times larger than a non-aseptic line, the investment cost of an aseptic line with the processing capacity of 4,000 MT per year is assumed to be USD 861,000⁷⁴.

Then, the investment cost necessary for substituting the mango pulp import by domestic production is estimated to be USD 4.6 million.

Investment needs for equipment replacement

The total investment cost of existing mango pulp production facilities in Bangladesh is

⁷⁴ This is based on the information provided by a mango juice producing company.

estimated to be USD 9.5 million, based on the information that 71,429 MT of mangoes is processed into mango pulp by the existing facilities and the investment cost of a non-aseptic line with the annual processing capacity of 4,000 MT is USD 530,000.

The value of existing facilities is supposed to depreciate by 20% per year following the Income Tax Ordinance, 1984 and Income Tax manual published by National Board of Revenue⁷⁵, and the depreciation amount for the following five years is calculated as USD 6.4 million.

In order to maintain the production capacity, equipment of the existing facilities needs to be replaced. The investment cost for equipment replacement, which is equal to the amount of depreciation, is therefore estimated to be USD 6.4 million.

Table 143 Estimated depreciation amount of existing mango pulp production facilities

Estimated investment cost of existing facilities	USD 9.5 million
Estimated value after five years	USD 3.1 million = USD 9.5 million x (0.8) ⁵
Amount of depreciation	USD 6.4 million

Source: Estimate of the Survey Team

(ii) Mango juice production

Investments needs for production expansion

The quantity of mango pulp processed to mango juice was estimated to be 71,429 MT as mentioned above. Mango juice produced from 39,939 MT of mango pulp (55.9%) is estimated for domestic consumption and the juice produced from the remaining 31,490 MT (44.1%) is for export. This is estimated based on the size of domestic consumption of processed mangoes (USD 15.6 million, 55.9%) and the size of export (USD 15.1 million, 44.1%)⁷⁶.

Because the domestic mango juice consumption is expected to increase by 8.2% per year, the quantity of mango pulp processed into mango juice is estimated to increase by 19,290 MT from 39,393 MT in the following five years.

An example of a mango juice production facility, including its major equipment, production capacity and estimated investment cost, is as in the following table. Based on this, the investment cost necessary for processing 19,290 MT of mango pulp into mango juice is estimated to be USD 13.7 million.

⁷⁵ The value of the existing facility in the following year is will be 80% of the previous year.

⁷⁶ Source: Katalyst (2016), Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

Table 144 Example of a mango juice production facility⁷⁷

Major equipment	Mixing tank, pasteurizer, vacuum tank, filling machines, casing machine, PET bottle blowing and washing machine
Production capacity	36,000 bottles / hour
Quantity of mango juice production (Year)	22,464 MT = 36,000 bottles x 250 ml x 8 hour x 312 days / year
Estimated quantity of raw mangoes included in mango juice	11,232 MT (50% of mango juice)
Estimated investment cost	USD 8,000,000

Source: Estimate of the Survey Team

Investments needs for export promotion

The major export destinations of the mango juice produced in Bangladesh are India, Netherland, USA and Saudi Arabia.

The export of mango juice from Bangladesh is assumed to increase by 3.3% per year, as calculated by the weighted average of the growth rates of soft drink markets in such export destination countries. For example, the demand for soft drinks in India and Netherland is expected to increase by 8.2% and 1.2% respectively per year for the following five years.

Based on this, the volume of mango pulp processed to mango juice for export purpose, is estimated to increase by 5,479 MT from 31,490 MT for the following five years.

As the production facilities for export purpose are assumed to be aseptic lines, whose costs are 1.625 times bigger than those of non-aseptic lines, the investment cost of mango juice production facility with the processing capacity of 11,232 MT per year is assumed to be USD 13,000,000.

Then the investment cost necessary to increase the production of mango juice (5,479 MT) for export purpose is estimated to be USD 6.3 million.

Investment needs for equipment replacement

The investment cost of existing mango juice production facilities in Bangladesh is estimated to be USD 50.9 million, based on the information that 71,429 MT of mango pulp is processed into mango juice by the existing facilities and the investment cost of a non-aseptic line with the production capacity of 4,000 MT per year is USD 861,000.

⁷⁷ This is based on the information provided by a mango juice producing company.

The value of existing facilities is supposed to depreciate by 20% per year following the Income Tax Ordinance, 1984 and Income Tax manual published by National Board of Revenue, and the depreciation amount for the following five years is calculated as USD 34.2 million.

In order to maintain the production capacity, equipment of the existing facilities needs to be replaced. The investment cost for equipment replacement, which is equal to the amount of depreciation, is therefore estimated to be USD 34.2 million.

Table 145 Estimated depreciation amount of existing mango juice production facilities

Estimated investment cost of existing facilities	USD 50.9 million
Estimated value after five years	USD 16.7 million = USD 50.9 million x (0.8) ⁵
Amount of depreciation	USD 34.2 million

Source: Estimate of the Survey Team

2) Estimation of the investment needs for tomato processing

In Bangladesh, only 5% (4,500 MT) of domestic tomato production is processed and almost all of them are processed to ketchup⁷⁸.

Ketchup is produced from tomato pulp, which is processed from raw tomatoes. However, tomato pulp lines are not separately set up, as tomato pulp is normally produced using the same production lines as mango pulp and the harvest seasons of mangoes and tomatoes are different. Then, this section analyze only the investment needs for the production of ketchup from tomato pulp.

(i) Ketchup production

Investments needs for production expansion

As mentioned above, 4,500 MT of tomatoes produced in Bangladesh is processed into tomato pulp, which is then processed to ketchup. Tomato pulp is also imported for ketchup production.

As the amount of imported tomato pulp is 1,200MT⁷⁹, the total amount of tomato pulp processed to ketchup is estimated to be 5,700 MT, as described in the following table.

⁷⁸ Source: Katalyst (2016), Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

⁷⁹ Source: International Trade Center Website

Table 146 Estimated quantity of tomato pulp processed to ketchup

Domestic production	4,500 MT
Import	1,200 MT
Total	5,700 MT

Source: Estimate of the Survey Team

As the ketchup consumption is expected to increase by 6% per year⁸⁰, the quantity of tomato pulp processed to ketchup is estimated to increase by 1,928 MT from 5,700 MT in the following five years.

An example of a ketchup production facility, with its major equipment, production capacity and estimated investment cost, is as in the following table. Based on this, the investment cost necessary for the increase in ketchup production (1,928 MT) is estimated to be USD 0.9 million.

Table 147 Example of a ketchup production facility

Major equipment	Melting Tank, Vacuum Homogenizer, Sterilizer, Bottle Washer, Paste Filling Machine
Production capacity	600kg / hour (Final product)
Annual production of ketchup	1,152 MT = 600kg / hour x 8 hours / day x 240 days / year
Quantity of tomatoes included in ketchup	1,210 MT = 1,152 MT x 35% (proportion of concentrated tomato paste in ketchup) x 3-fold concentration
Estimated investment cost	USD 557,000

Source: Estimate of the Survey Team based information provided by engineering companies

Investments needs for import substitution

As mentioned above, 1,200 MT of tomato pulp is imported, probably because domestic tomato pulp is produced by non-aseptic lines and its quality and taste deteriorate while it is stored. Then, the imported tomato pulp is expected to be substituted by domestic production once aseptic lines are installed.

However, because tomato pulp is basically produced by mango pulp processing lines, investments needs for tomato pulp production is not considered in this section.

⁸⁰ Source: Euromonitor International (2019) Packaged Food in Bangladesh

Investment needs for equipment replacement

The investment cost of existing ketchup production facilities in Bangladesh is estimated to be USD 2.4 million, based on the information that 5,700 MT of tomato pulp is processed into ketchup by the existing facilities and the investment cost of a ketchup production facility with the processing capacity of 1,210 MT per year is USD 557,000.

The value of existing facilities is supposed to depreciate by 20% per year following the Income Tax Ordinance, 1984 and Income Tax manual published by National Board of Revenue, and the depreciation amount for the following five years is calculated as USD 1.6 million.

In order to maintain the production capacity, equipment of the existing facilities needs to be replaced. The investment cost for equipment replacement, which is equal to the amount of depreciation, is therefore estimated to be USD 1.6 million.

Table 148 Estimated depreciation amount of existing ketchup production facilities

Estimated investment cost of existing facilities	USD 2.4 million
Estimated value after five years	USD 0.8 million = USD 2.4 million x (0.8) ⁵
Amount of depreciation	USD 1.6 million

Source: Estimate of the Survey Team

3) Estimation of the investment needs for potato processing

In Bangladesh, only 2% (177,000 MT) of domestic potato production is processed⁸¹. Out of this, 110,000 MT is processed to potato chips or crackers and remaining 42,000 MT and 25,000 MT are processed to potato flakes and potato starch respectively.

Potato crackers, which are made from potato starch or flakes, are more widely seen than potato chips, probably because potato varieties suitable for potato chips have not been widely produced in Bangladesh. Only recently a few companies, such as Quasem Food Products and Danish, started the production of potato chips.

A potato cracker production line produces potato starch first and then potato crackers, while a potato chip production line produces potato chips from raw potatoes. However, the investment cost for a potato cracker production line and that of potato chip production line are assumed to be same in this Survey based on the information obtained through interviews.

⁸¹ Source: Katalyst (2016), Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

(i) Potato chip and cracker production

Investments needs for production expansion

As mentioned above, 110,000 MT of potatoes produced in Bangladesh is processed to potato chips and crackers. As the consumption of potato chips and crackers is expected to increase by 8.5% per year⁸², the quantity of potatoes processed to potato chips and crackers is estimated to increase by 55,402 MT from 110,000 MT in the following five years.

An example of a potato chip production facility, with its major equipment, processing capacity and estimated investment cost, is as in the following table. Based on this, the investment cost necessary for the increase in potato chip and cracker production (55,402 MT) is estimated to be USD 10.6 million.

Table 149 Example of a potato chip production facility (1)

Major equipment ⁸³	Washing and peeling machine, Potato slicing machine, Bubble Washing machine, Blanching machine, Drying machine, Frying machine, Seasoning machine
Processing capacity	500kg / hour (Raw potatoes)
Quantity of potatoes processed to potato chips (Year)	960 MT = 500kg / hour x 8 hours / day x 240 days / year
Estimated investment cost	USD 183,000

Source: Estimate of the Survey Team based information provided by engineering companies

Investments needs for import substitution

While a large proportion of potato chips and crackers consumed in Bangladesh is domestically produced, imported potato chips with the brand name of “Lays” by PepsiCo has an 11.5% market share. The sales of potato chips by PepsiCo is estimated to be equivalent to 12,294 MT of raw potatoes.

Suppose the sales by PepsiCo increases by 8.5% per year following the expected market growth of potato chips, the increase in its potato chip sales for the following five years will be equivalent to 7,200 MT of raw potatoes.

In order to substitute the increase in the import of potato chips by domestic production, introduction of high quality production facilities would be need.

An example of such high quality production facility, with major equipment, processing

⁸² Source: Euromonitor International (2019) Packaged Food in Bangladesh

⁸³ Equipment is to be procured from Chinese or Bangladeshi producers.

capacity and estimated investment cost, is as in the following table. In this production facility, most of the production processes are assumed to be automated.

Table 150 Example of a potato chips production facility (2)

Major equipment ⁸⁴	Washing and peeling machine, Potato slicing machine, Bubble Washing machine, Blanching machine, Drying machine, Frying machine, Seasoning machine
Processing capacity	200kg /hour (Raw potatoes)
Quantity of potatoes processed potato chips (Year)	384 MT=100kg / hour x 8 hours / day x 240 days / year
Estimated investment cost	USD 396,000

Source: Estimate of the Survey Team based information provided by engineering companies

The investment cost necessary for substituting the increase in the potato chip import by domestic production (7,200 MT) is then estimated to be USD 7.4 million.

Investment needs for equipment replacement

The investment cost of existing potato chip and cracker production facilities in Bangladesh is estimated to be USD 21.0 million, based on the information that 110,000 MT of potatoes are processed into potato chips and crackers by the existing facilities and the investment cost of the annual processing capacity of 960 MT per year is USD 183,000.

The value of existing facilities is supposed to depreciate by 20% per year following the Income Tax Ordinance, 1984 and Income Tax manual published by National Board of Revenue, and the depreciation amount for the following five years is calculated as USD 14.1 million.

In order to maintain the processing capacity, equipment of the existing facilities needs to be replaced. The investment cost for equipment replacement, which is equal to the amount of depreciation, is therefore estimated to be USD 14.1 million.

⁸⁴ Equipment is to be procured from Italian or Taiwanese producers.

Table 151 Estimated depreciation amount of existing potato chip and cracker production facilities

Estimated investment cost of existing facilities	USD 21.0 million
Estimated value after five years	USD 6.9 million = USD 21.0 million x (0.8) ⁵
Amount of depreciation	USD 14.1 million

Source: Estimate of the Survey Team

(ii) Potato flake production

Investments needs for production expansion

As mentioned above, 42,000 MT of potato is processed into potato flakes. As potato flakes are processed to various food items, such as soup, ice cream, and bakery items, the consumption of potato flakes is expected to increase at the average growth rate of packaged foods (7.2% per year⁸⁵).

Then, quantity of potatoes processed to potato flakes is estimated to increase by 17,460 MT from 42,000 MT in the following five years.

An example of a potato flake production facility, with its major equipment, processing capacity and estimated investment cost, is as in the following table. Based on this, the investment cost necessary for the increase in potato flake production (17,460 MT) is estimated to be USD 5.8 million.

Table 152 Example of a potato flake production facility

Major equipment	Washing and peeling machine, Cutting machine, Blanching machine, Drying machine, Frying machine
Processing capacity	500kg /hour (Raw potatoes)
Quantity of potatoes processed to flakes (Year)	600 MT=500kg/ hour x 8 hours / day x 150 days / year
Estimated investment cost ⁸⁶	USD 200,000

Source: Estimate of the Survey Team

Investments needs for import substitution

In spite of a large production of potato, Bangladesh imports 1,674 MT of potato flakes

⁸⁵ Source: Euromonitor International (2019) Packaged Food in Bangladesh

⁸⁶ This is estimated based on the equipment cost by a Chinese producer, as the equipment cost could not be obtained in Bangladesh.

per year⁸⁷, which is equivalent to about 10,000MT of raw potatoes. This suggests that about 20% of potato flakes consumed in the country is imported.

The import of potato flakes would be able to be substituted by domestic products once domestic processing capacities are enhanced. The investment cost necessary for substituting the potato flake import by domestic production (10,000 MT of raw potatoes) is estimated to be USD 3.3 million.

Investment needs for equipment replacement

The investment cost of existing potato flake production facilities in Bangladesh is estimated to be USD 14.0 million, based on the information that 42,000 MT of raw potatoes are processed into potato flakes by the existing facilities and the investment cost of a potato production line with the annual processing capacity of 600 MT is USD 200,000.

The value of existing facilities is supposed to depreciate by 20% per year following the Income Tax Ordinance, 1984 and Income Tax manual published by National Board of Revenue, and the depreciation amount for the following five years is calculated as USD 9.4 million.

In order to maintain the production capacity, equipment of the existing facilities needs to be replaced. The investment cost for equipment replacement, which is equal to the amount of depreciation, is therefore estimated to be USD 9.4 million.

Table 153 Estimated depreciation amount of existing potato flake production facilities

Estimated investment cost of existing facilities	USD 14.0 million
Estimated value after five years	USD 4.6 million = USD 14.0 million x (0.8) ⁵
Amount of depreciation	USD 9.4 million

Source: Estimate of the Survey Team

(iii) Potato starch production

Investments needs for production expansion

As mentioned above, 25,000 MT of raw potatoes is processed to potato starch. Because potato starch is also processed to various food items, the consumption of potato starch is expected to increase at the average growth rate of packaged foods (7.2% per year⁸⁸).

Then, the quantity of potatoes processed to potato starch is estimated to increase by 10,393 MT from 25,000 MT in the following five years.

⁸⁷ Source: International Trade Center Website

⁸⁸ Source: Euromonitor International (2019) Packaged Food in Bangladesh

An example of a starch production facility, with major equipment, processing capacity and estimated investment cost, is as in the following table. Based on this, the investment cost necessary for the increase in potato starch production (10,393 MT) is estimated to be USD 1.0 million.

Table 154 Example of a starch production facility

Major equipment	Mixer, Extruder, Drying machine, Crushing machine
Processing capacity	900kg /hour (Raw potatoes)
Quantity of potatoes processed to starch (Year)	1,080 MT=900kg / hour x 8 hours / day x 150 days / year
Estimated investment cost ⁸⁹	USD 100,000

Source: Estimate of the Survey Team

Investments needs for import substitution

Similar to potato flakes, Bangladesh imports 1,253 MT of potato starch per year⁹⁰, which is equivalent to 7,513 MT of raw potatoes. This suggests that about 23% of potato starch consumed in the country is imported.

The import of potato starch would be able to be substituted by domestic products once domestic production capacities are enhanced. The investment cost necessary for substituting the potato starch import by domestic production (7,513 MT) is estimated to be USD 0.8 million.

Investment needs for equipment replacement

The investment cost of existing potato starch production facilities in Bangladesh is estimated to be USD 2.5 million, based on the information that 25,000 MT of potatoes are processed into potato starch by the existing facilities and the investment cost of a starch production facility with the annual processing capacity of 1,080 MT is USD 100,000.

The value of existing facilities is supposed to depreciate by 20% per year following the Income Tax Ordinance, 1984 and Income Tax manual published by National Board of Revenue, and the depreciation amount for the following five years is calculated as USD 1.7 million.

In order to maintain the production capacity, equipment of the existing facilities needs to be replaced. The investment cost for equipment replacement, which is equal to the amount of

⁸⁹ This is estimated based on the equipment cost by a Chinese producer, as the equipment cost could not be obtained in Bangladesh.

⁹⁰ Source: International Trade Center Website

depreciation, is therefore estimated to be USD 1.7 million.

Table 155 Estimated depreciation amount of existing potato starch production facilities

Estimated investment cost of existing facilities	USD 2.5 million
Estimated value after five years	USD 0.8 million = USD 2.5 million x (0.8) ⁵
Amount of depreciation	USD 1.7 million

Source: Estimate of the Survey Team

4) Estimation of the investment needs for spice processing

Investments needs for production expansion

In Bangladesh, 13,000 MT of chili peppers (12% of domestic production) and 136,000 MT of turmeric (100% of domestic production) are processed. Processed spices, mainly powdered spices, are consumed domestically, while some portion is exported to USA, UK or Middle East countries⁹¹. The quantity of processed spice export is estimated to be 2,582 MT, based on the export amount (USD 3.43 million) and unit export price (USD 1.33 / kg). The quantity of domestic consumption is then estimated to be 146,648 MT.

As the domestic consumption of powdered spices is expected to increase by 5.9% per year⁹², the quantity of spices processed to powdered spices is estimated to increase by 48,666 MT from 146,648 MT in the following five years.

An example of a spice production facility, with its major equipment, processing capacity and estimated investment cost, is as in the following table. Based on this, the investment cost necessary for the increase in powdered spice production (48,666 MT) is estimated to be USD 22.0 million.

⁹¹ Source: Katalyst (2016), Study on the roles and opportunities for private sector in agro-food processing industry of Bangladesh

⁹² Source: Euromonitor International (2019) Packaged Food in Bangladesh

Table 156 Example of a powdered spice production facility

Major equipment	Crushing machine, Drying machine, Grinding machine, Sieving machine, Blending machine, Packing machine
Processing capacity	150kg /hour
Quantity of powdered spice production (Year)	288 MT=150kg / hour x 8 hours / day x 240 days / year
Estimated investment cost	USD 130,000

Source: Estimate of the Survey Team based information provided by engineering companies

Investments needs for export promotion

The major export destinations of the powered spices from Bangladesh are USA, UK and Middle East countries and the export quantity is estimated to be 2,582 MT, as mentioned above.

The market sizes and estimated growth rates of such major export destinations are summarized as in the following table. Based on this, the export of powdered spices from Bangladesh is expected to increase by 1.8% per year for the following five years and thus the export quantity is expected to increase by 269 MT from 2,582 MT.

Table 157 Market size and estimated growth rate

	Market size (2019, MT)	Growth rate
USA	788,351	1.7%
UK	110,146	0.3%
Middle East and Africa	124,227	3.7%
Weighted average		1.8%

Source: Estimate of the Survey Team based on the data of Euromonitor International

In case powdered spices are produced for export purpose, the production line would have to include such food safety measures as metal detectors or foreign object detection systems, while production lines targeting on the domestic market normally do not incorporate such measures.

The additional cost necessary for including a metal detector in a production line would be USD 20,000 and the investment cost of a powdered spice production line with the annual processing capacity of 288 MT will be USD 150,000.

Based on this, the investment cost necessary to increase the export volume of powdered spices by 269 MT is estimated to be USD 0.1 million.

Investment needs for equipment replacement

The investment cost of existing powdered spice production facilities in Bangladesh is estimated to be USD 67.3 million, based on the information that 13,000 MT of chili peppers and 136,000 MT of turmeric (in total 149,200 MT) are processed into powdered spices by the existing facilities and the investment cost of a powdered spice production line with the annual processing capacity of 288 MT is USD130,000.

The value of existing facilities is supposed to depreciate by 20% per year following the Income Tax Ordinance, 1984 and Income Tax manual published by National Board of Revenue, and the depreciation amount for the following five years is calculated as USD 45.3 million.

In order to maintain the production capacity, equipment of the existing facilities needs to be replaced. The investment cost for equipment replacement, which is equal to the amount of depreciation, is therefore estimated to be USD 45.3 million.

Table 158 Estimated depreciation amount of existing powdered spice production facilities

Estimated investment cost of existing facilities	USD 67.3 million
Estimated value after five years	USD 22.1 million = USD 67.3 million x (0.8) ⁵
Amount of depreciation	USD 45.3 million

Source: Estimate of the Survey Team

5) Estimation of the investment needs for wheat processing

Investments needs for production expansion

The wheat production in Bangladesh is limited and majority of wheat consumption depends on import. However, many wheat products, such as breads, biscuits, savory snacks and noodles, are domestically produced and some of them are exported.

Table 159 Market sizes and estimated growth rates of major wheat products

Items	Market size (thousand MT)	Estimated growth rate	Export (million USD)
Breads	262	1.80%	52.4
Biscuits	106.6	7.00%	45
Savory snacks	47.5	6.90%	-
Noodles	32.5	12.80%	13.4

Source: Estimate of the Survey Team based on Euromonitor International and Export data of Export Promotion

Examples of production facilities of breads, biscuits, chanachur (traditional savory snacks of Bangladesh) and noodles, with their major equipment, processing capacities and estimated investment costs are as in the following tables.

Table 160 Example of a bread production facility

Major equipment	Mixer, Dough Roller, Filling Machine, Cutting Machine, Encrusting Machine, Rotary Rack Oven, and Packing Machine
Processing capacity	200kg / hour (Raw material)
Annual production of breads	480 MT=200kg/ hour x 8 hours / day x 300 days / year
Estimated investment cost	USD 74,000

Source: Estimate of the Survey Team based information provided by engineering companies

Table 161 Example of a biscuit production facility

Major equipment	Mixer, Sugar Grinder, Cookies Depositor Machine, Rotary Molder, Rotary Rack Oven and Packing Machine
Processing capacity	150kg / hour (Raw material)
Annual production of biscuits	360 MT=150kg / hour x 8 hours / day x 300 days / year
Estimated investment cost	USD 448,000

Source: Estimate of the Survey Team based information provided by engineering companies

Table 162 Example of a chanachur production facility

Major equipment	Mixer, Circular Fryer, Extruder, Spicy Mixer Machine and Packing Machine
Processing capacity	50kg / hour (Raw material)
Annual production of chanachur	120 MT=50kg/ hour x 8 hours / day x 300 days / year
Estimated investment cost	USD 30,000

Source: Estimate of the Survey Team based information provided by engineering companies

Table 163 Example of an instant noodle production facility

Major equipment	Dough mixer, Roller pressing machine, Boiling machine, Cutting machine, Electric fryer, Cooler and Packing machine
Processing capacity	11,000 packs / day (8 hours) (Raw material)
Annual production of instant noodles	330 MT = 11,000 packs / day x 100 g x 300 days / year
Estimated investment cost ⁹³	USD 35,000

Source: Estimate of the Survey Team

Based on these examples and estimated growth rates of wheat products, the investment cost necessary for production expansion is estimated to be USD 8.1 million.

Table 164 Investment needs for production expansion of major wheat products

Items	Market size (thousand MT)	Estimated growth rate	Expected increase in market size in five years (thousand MT)	Investments needs for production expansion (million USD)
Breads	262	1.80%	24.4	3.8
Biscuits	106.6	7.00%	9.9	1.2
Savory snacks	47.5	6.90%	4.4	2.8
Noodles	32.5	12.80%	3.0	0.3
Total	-	-	-	8.1

Source: Estimate of the Survey Team based on Euromonitor International (2019)

Investments needs for export promotion

Due to its limited production, Bangladesh depends its wheat consumption on import. On the other hand, breads, biscuits and other products are domestically produced for domestic consumption and also for export.

The quantities and expected growth of major wheat products are given as in the following table.

⁹³ This is estimated based on the equipment cost by a Chinese producer, as the equipment cost could not be obtained in Bangladesh.

Table 165 Expected growth of major wheat products

Items	Export (amount million USD)	Unit price (USD / kg)	Export (quantity, thousand MT)	Expected growth of export	Expected increase in export (quantity, (thousand MT)
Breads	8.8	1.2	7.4	3.3%	1.3
Biscuits	35.4	6.0	5.9	14.6%	5.8
Savory snacks	-	-	-	-	-
Noodles	13.4	2.9	4.6	12.1%	3.6

Note: Expect growth rates of exports are estimated based on the market growth rate of India. Information on export amount of savory snacks and its growth rate was not obtained.

Source: Estimated based on the information by Euromonitor International and Export Data of Export Bureau of Bangladesh

Based on the investment costs and processing capacities of production facilities, the investment cost necessary to meet the increase in export volume is estimated to be USD 1.3 million.

In this estimation, it was assumed that the production facility for export purposes and that of domestic consumption are basically same, as the products from Bangladesh targets on the low-end or ethnic markets in neighboring countries, such as India or Middle Eastern countries.

Table 166 Investment needs for export promotion of major wheat products

Items	Expected increase in export (quantity, thousand MT)	Investment needs for Export promotion (million USD)
Breads	1.3	0.2
Biscuits	5.8	0.7
Savory snacks	-	-
Noodles	3.6	0.4
Total		1.3

Source: Estimated based on the information by Euromonitor International and Export Data of Export Bureau of Bangladesh

Investment needs for equipment replacement

The investment cost of existing wheat production facilities in Bangladesh is estimated to

be USD 8.7 million, based on the information of processing capacities and investment costs of sample production facilities given in the previous section.

The value of existing facilities is supposed to depreciate by 20% per year following the Income Tax Ordinance, 1984 and Income Tax manual published by National Board of Revenue, and the depreciation amount for the following five years is calculated as USD 5.8 million.

In order to maintain the production capacity, equipment of the existing facilities needs to be replaced. The investment cost for equipment replacement, which is equal to the amount of depreciation, is therefore estimated to be USD 5.8 million.

Table 167 Estimated depreciation amount of existing facilities of wheat products

Items	Market size (thousand MT)	Estimated value of existing facilities (million USD)	Amount of depreciation in five years (million USD)
Breads	262	4.1	2.7
Biscuits	106.6	1.3	0.9
Savory snacks	47.5	3.0	2.0
Noodles	32.5	0.3	0.2
Total	-	8.7	5.8

Source: Estimated based on the information by Euromonitor International

6) Estimation of the investment needs for edible oil production

Investments needs for production expansion

Bangladesh depends its edible oil consumption on import, and the majority of imported edible oil is palm oil and soybean oil. Such edible oil, imported in the form of crude oil, is refined, bottled and then distributed in the domestic market for consumption.

Although a part of soybean oil is expressed and refined in Bangladesh, oil mills mainly use imported soybeans for soybean oil production. Mustard oil, rice bran oil and sesame oil are produced from domestically produced raw materials.

As the domestic consumption of edible oil is expected to increase by 7.3% per year for the following five years⁹⁴, the consumption of mustard oil, rice bran oil and sesame oil is also assumed to increase at the same speed.

However, it would not be realistic to assume that the consumption of palm oil and soybean

⁹⁴ Source: Euromonitor International (2019) Packaged Food in Bangladesh

oil is substituted by domestically produced mustard oil, rice bran oil and sesame oil, as the prices of palm oil and soybean oil are much more competitive than others.

The total amount of mustard oil and other oil consumption, including rice bran oil and sesame oil, is 146,000 MT⁹⁵ and this is expected to increase by 61,700 MT in the following five years, assuming that the consumption of such edible oil increases by 7.3% per year.

An example of an edible oil production facility, with its major equipment, production capacity and estimated investment cost, is as in the following table. Based on this, the investment cost necessary to increase the production of edible oil (61,700 MT) is estimated to be USD 9.9 million.

Table 168 Example of an edible oil production facility

Major equipment	Oil press machine, Centrifugal filter, Oil refining equipment and Oil Fractionation machine
Production capacity	100 MT / day (final product)
Annual production of edible oil	30,000 MT = 100 MT /day x 300 days / year
Estimated investment cost	USD 4,800,000

Source: Estimate of the Survey Team based information provided by BIDA

Investment needs for equipment replacement

The investment cost of existing production facilities of mustard oil, rice bran oil and sesame oil in Bangladesh is estimated to be USD 23.4 million, based on the information that 146,000 MT of such edible oil is produced by the existing facilities and the investment cost of an edible oil production facility with the annual production capacity of 30,000 MT is USD 4,800,000.

The value of existing facilities is supposed to depreciate by 20% per year following the Income Tax Ordinance, 1984 and Income Tax manual published by National Board of Revenue, and the depreciation amount for the following five years is calculated as USD 15.7 million.

In order to maintain the production capacity, equipment of the existing facilities needs to be replaced. The investment cost for equipment replacement, which is equal to the amount of depreciation, is therefore estimated to be USD 15.7 million.

⁹⁵ Source: Oil world 2018

Table 169 Estimated depreciation amount of existing production facilities of mustard oil, rice bran oil and sesame oil

Estimated investment cost of existing facilities	USD 23.4 million
Estimated value after five years	USD 7.7 million = USD 23.4 million x (0.8) ⁵
Amount of depreciation	USD 15.7 million

Source: Estimate of the Survey Team

7) Estimation of the investment needs for organic fertilizer production

Investments needs for production expansion

The overall demand for organic fertilizer in Bangladesh is estimated to be 30,000 MT per year, based on the information that top supplier (ACI) has about 66.7% market share, with the annual supply of 20,000 MT.

Reacting to the growing demands for organic fertilizer, the top supplier company, having ten existing production facilities⁹⁶, is planning to establish five new production facilities per year. The investment cost of one production facility, with the annual production capacity of 2,000 MT is estimated to be BDT 20 million (USD 236,000).

Although the investment plan of other organic fertilizer producers is not clear, the investment needs of the top supplier company alone for the following five years is estimated to be USD 5.9 million (USD 236,000 / Unit x five units x five years).

Investment needs for equipment replacement

The investment cost of existing organic fertilizer production facilities in Bangladesh is estimated to be USD 3.5 million, based on the information that the overall demand is 30,000 MT and the investment cost of a production facility with the annual production capacity of 2,000 MT is USD 236,000.

Suppose the existing facilities depreciate by 20% per year, the total amount of depreciation for the following five years will be USD 2.4 million. The amount of investment needs for equipment replacement is therefore estimated to be USD 2.4 million.

⁹⁶ Production facilities are owned and operated by external businesses.

Table 170 Estimated depreciation amount of existing organic fertilizer production facilities

Estimated investment cost of existing facilities	USD 3.5 million
Estimated value after five years	USD 1.2 million = USD 3.5 million x (0.8) ⁵
Amount of depreciation	USD 2.4 million

Source: Estimate of the Survey Team

8) Estimation of the investment needs by logistics industries, wholesalers and transport industries

i) Cold storage facilities

Investments needs for the expansion of cold storage facilities

The number of existing cold storage facilities in Bangladesh, which were established mainly for the storage of potatoes, is 428 with the total storage capacity of 5.5 million MT. The capacities of such cold storage facilities vary from 10,000 MT to 15,000 MT.

The number of cold storage facilities is assumed to increase by 50 units for the following five years, based on the information obtained through the field survey. It is also assumed that the number of multipurpose cold storage facilities, whose average capacity is 5,000 MT, is going to increase by 25 units during the same period.

As the unit investment cost of a conventional cold storage facility with the capacity of 10,000 MT is about USD 1.5 million and that of a multipurpose cold storage facility with the capacity of 5,000 MT is USD 0.8 million, the total investment needs for new cold storage facilities is estimated to be USD 95.6 million.

Table 171 Estimated investments needs for the expansion of cold storage facilities

	Estimated increase in cold storage facilities (unit)	Investment cost per facility (million USD)	Estimated investment needs (million USD)
Conventional cold storage	50	1.5	75.0
Multipurpose cold storage	25	0.8	20.6
Total	75	2.3	95.6

Source: Estimate of the Survey Team

Investment needs for equipment replacement

The investment cost of the existing cold storage facilities is estimated to be USD 824 million, based on the information that the number of existing cold storage facilities is 428 and the

investment cost of a cold storage facility with the capacity of 10,000 MT is USD 1.5 million.

The total value of existing cold storage facilities is supposed to depreciate by 20% per year following the Income Tax Ordinance, 1984 and Income Tax manual published by National Board of Revenue, and the depreciation amount for the following five years is calculated as USD 554.3 million.

In order to maintain the storage capacity, equipment of the existing facilities needs to be replaced. The investment cost for equipment replacement, which is equal to the amount of depreciation, is therefore estimated to be USD 554.3 million.

Table 172 Estimated depreciation amount of existing cold storage facilities

Estimated investment cost of existing facilities	USD 824 million
Estimated value after five years	USD 270.2 million = USD 824 million x (0.8) ⁵
Amount of depreciation	USD 554.3 million

Source: Estimate of the Survey Team

ii) Investment needs for freezing, refrigerated and insulated vans

Investment needs for new purchases

The number of existing freezing, refrigerated and insulated vans used in Bangladesh is estimated to be 2,000 units, based on the information collected in the field survey. Following the growth of the frozen food market, which is estimated to be 10-15% per year, the number of new purchases of freezing, refrigerated and insulated vans per year, is expected to be 200, for the for the following five years.

Freezing, refrigerated and insulated facilities are mainly imported from Malaysia and installed on vans imported from India. The investment cost for one freezing, refrigerated and insulated van is about BDT 3.0 million (USD 35,000), according to several suppliers in Bangladesh.

Suppose the number of existing freezing, refrigerated and insulated vans is going to increase by 10% per year for the following five years, the number of such vans increases by 1,221 from 2,000.

The investment needs for the new purchase of freezing, refrigerated and insulated vans is then estimated to be USD 43.1 million.

Investment needs for equipment replacement

As mentioned above, it was estimated that the number of existing freezing, refrigerated

and insulated vans is 2,000 and the unit cost is USD 35,000. Then, the estimated total investment cost of existing freezing, refrigerated and insulated vans is calculated as USD 70.7 million.

As the existing freezing, refrigerated and insulated vans depreciate by 20% per year, the total amount of depreciation for the following five years will be USD 47.5 million. The amount of investment needs for equipment replacement is therefore estimated to be USD 47.5 million.

Table 173 Estimated depreciation amount of existing freezing, refrigerated and insulated vans

Estimated investment cost of existing vans	USD 70.7 million USD
Estimated value after five years	USD 23.2 million = USD 70.7 million x (0.8) ⁵
Amount of depreciation	USD 47.5 million USD

Source: Estimate of the Survey Team

9) Estimation of the investment needs by retail industries (including supermarkets)

Investments needs for freezers or refrigerators in new outlets

Most of the retail businesses in Bangladesh are small sized as Economic Census (2013) reported that the number of medium sized establishments was 27 and small and micro sized was 28,634. In addition, there are a few major supermarket chains, such as Shwapno (129 outlets), Agora (17 outlets) or Meena Bazar (13 outlets).

Normally, one supermarket outlet has five to seven units of freezers or refrigerators for storage or display purposes and the investment cost of one freezer or refrigerator is about BDT 1.0 million (USD 11,800). Frozen items are delivered by suppliers to supermarket outlets, and thus such supermarket chains do not own their own freezing, refrigerated and insulated vans or cold storage facilities in their distributions centers.

The number of freezers or refrigerators of a medium, small or micro sized shops are not very clear, but it is assumed that one medium sized shop has two units of freezers or refrigerators and one out of ten small sized shops has one unit, based on the information collected in the field survey.

The number of supermarket outlets, which is reported to have increased by 15% per year⁹⁷, is assumed to further increase by 7.2% per year for the following five years, following the expected growth rate of packaged food market.

The number of new retail outlets to be established in the following five years is then estimated to be 14,918 and the number of freezers or refrigerators to be installed in new outlets is estimated to be 2,004 as described in the following table.

⁹⁷ Source: <https://www.thedailystar.net/business/news/rising-middleclass-brings-cheers-supermarkets-1635838>

Table 174 Investment needs for new outlets (for freezers or refrigerators)

Type of enterprises	Number of outlets	Estimated increase in outlets	Number of freezers or refrigerators per outlet	Estimated increase in freezers or refrigerators
Large	159	82	6	494
Medium	27	14	2	28
Small and Micro	28,634	14,822	0.1	1,482
Total	28,820	14,918		2,004

Source: Estimate of the Survey Team based on Economic Census (2013) and websites of supermarket chains

As the unit investment cost of a freezer or refrigerator is assumed to be USD 11,800, the total investment cost of freezers and refrigerators for new outlets is estimated to be USD 23.6 million.

Investment needs for equipment replacement

The number of existing freezers and refrigerators owned by retail industries is estimated to be 3,871, based on the estimated number of existing outlets shown above. As the unit investment cost of a freezer or refrigerator is assumed as USD 11,800, the total investment cost of the existing freezers and refrigerators is estimated to be USD 45.6 million.

Table 175 Estimated number of freezers and refrigerators in existing retail outlets

	Number of outlets	Number of freezers or refrigerators per outlet	Number of existing freezers or refrigerators
Large	159	6	954
Medium	27	2	54
Small and Micro	28,634	0.1	2,863
Total	28,820		3,871

Source: Estimate of the Survey Team based on Economic Census (2013) and websites of supermarket chains

As the existing freezers and refrigerators depreciate by 20% per year, the total amount of depreciation for the following five years will be USD 30.7 million. The amount of investment needs for equipment replacement is therefore estimated to be USD 30.7 million.

Table 176 Estimated depreciation amount of existing freezers and refrigerators in existing retail outlets

Estimated investment cost of existing facilities	45.6 million USD
Estimated value after five years	14.9 million USD = 45.6 million USD x (0.8) ⁵
Amount of depreciation	30.7 million USD

Source: Estimate of the Survey Team

(2) Estimation of funding needs

1) Funding needs for mango processing

As explained above, it was estimated that the investment needs for mango processing was USD 67.8 million. This is going to be divided into categories of companies, such as large, medium, small, micro and cottage industries.

Companies in Bangladesh are categorized by amounts of investment and numbers of employees, following the definitions by Ministry of Industries. Based on the definition of companies, the average investment amounts of medium, small, micro and cottage enterprises are assumed to be the medians of investment amounts of each category. The average investment amount of large enterprises is assumed to be BDT 1,500 million based on the information collected in the field survey.

Table 177 Definition of the category of manufacturing companies by Ministry of Industries and the medians of investment amount

	Definition of enterprise size		Median of Investment amount
	Amount of investment	Number of employees	
Large	BDT 500 million -	300 -	-
Medium	BDT 150 - 500 million	121 - 300	BDT 325 million
Small	BDT 7.5 - 150 million	31 - 120	BDT 78.75 million
Micro	BDT 1.0 - 7.5 million	16 - 30	BDT 4.25 million
Cottage	- BDT 1.0 million	15 -	BDT 0.5 million

Source: National Industrial Policy, 2016

Then, the number of enterprises of each category was estimated. In order to do so, the numbers of establishments of “1030 Processing and preserving of fruit and vegetables” industry

reported in Economic Census (2013) was adjusted by the economic growth rate since 2013 and also by the number of companies in the BAPA member list.

Based on the estimated numbers of enterprises and average investment amount of each category, the total amount of existing investment of “Processing and preserving of fruit and vegetables” industry was calculated as in the following table.

This table suggests that 63.7% of the existing investment amount is owned by large enterprises, while medium, small, micro and cottage enterprises own 33.7%, 2.2%, 0.3% and 0.1 % respectively. The amount of investment needs (USD 74.3 million) estimated in the previous section is then distributed according to this proportion.

Table 178 Estimated distribution of existing investment amount by category

	Number of enterprises	Existing investment amount per enterprise (million BDT)	Total amount of existing investment (million BDT)	Distribution of existing investment amount
Large	9	1,500	13,500	63.7%
Medium	22	325	7150	33.7%
Small	6	79	473	2.2%
Micro	13	4	55	0.3%
Cottage	29	0.5	15	0.1%

Source: Estimate of the Survey Team

Through interviews with BAPA member companies, it was confirmed that all interviewed food processing companies were willing to have bank loans for capital investments. Based on this interview result, it was assumed that all companies which are planning to make capital investments will apply for bank loans.

However, unlike larger companies, smaller companies do not have good access to financing. Based on the information provided by several stakeholders, including financial institutions, it was assumed that the proportions of large, medium, small and micro enterprises which have access to finance are 100%, 80%, 20% and 10% respectively⁹⁸.

The funding needs, calculated based on the information and assumptions above, are described in the following table. The amount of funding needs for mango processing is therefore

⁹⁸ In general, smaller companies have difficulties in preparing required documents for loan applications. Such as financial statement and legal documents. They do not have sufficient assets for collateral and profitability.

estimated to be USD 61.8 million.

Table 179 Estimated funding needs for mango processing

	Distribution of existing investment amount	Estimated investment needs (million USD)	Proportion of enterprises having access to finance	Funding needs (million USD)
Large	63.7%	43.2	100%	43.2
Medium	33.7%	22.9	80%	18.3
Small	2.2%	1.5	20%	0.3
Micro and cottage	0.4%	0.3	10%	0.0
Total	-	67.8	-	61.8

Source: Estimate of the Survey Team

2) Funding needs for tomato processing

The amount of investment needs for tomato processing was estimated to be USD 2.7 million and this is divided into categories of companies, using the same conditions explained in the previous section.

Table 180 Estimated funding needs for tomato processing

	Distribution of existing investment amount	Estimated investment needs (million USD)	Proportion of enterprises having access to finance	Funding needs (million USD)
Large	63.7%	1.7	100%	1.7
Medium	33.7%	0.9	80%	0.7
Small	2.2%	0.1	20%	0.0
Micro and cottage	0.4%	0.0	10%	0.0
Total	-	2.7	-	2.4

Source: Estimate of the Survey Team

The estimated funding needs for tomato processing, which were calculated based on the estimated proportion of enterprises having access to finance, is USD 2.4 million.

3) Funding needs for potato processing

The amount of investment needs for potato processing was estimated to be USD 54.1

million and this is divided into categories of companies, using the same conditions explained in the previous section.

Table 181 Estimated funding needs for potato processing

	Distribution of existing investment amount	Estimated investment needs (million USD)	Proportion of enterprises having access to finance	Funding needs (million USD)
Large	63.7%	34.5	100%	34.5
Medium	33.7%	18.2	80%	14.6
Small	2.2%	1.2	20%	0.2
Micro and cottage	0.4%	0.2	10%	0.0
Total	-	54.1	-	49.3

Source: Estimate of the Survey Team

The amount of estimated funding needs for potato processing, which were calculated based on the estimated proportion of enterprises having access to finance, is USD 49.3 million.

4) Funding needs for spice processing

The amount of investment needs for spice processing was estimated to be USD 67.4 million and this is divided into categories of companies, using the same conditions explained in the previous section.

Table 182 Estimated funding needs for spice processing

	Distribution of existing investment amount	Estimated investment needs (million USD)	Proportion of enterprises having access to finance	Funding needs (million USD)
Large	63.7%	42.9	100%	42.9
Medium	33.7%	22.7	80%	18.2
Small	2.2%	1.5	20%	0.3
Micro and cottage	0.4%	0.3	10%	0.0
Total	-	67.4	-	61.4

Source: Estimate of the Survey Team

The amount of estimated funding needs for potato processing, which were calculated based on the estimated proportion of enterprises having access to finance, is USD 61.4 million.

5) Funding needs for wheat processing

The amount of investment needs for wheat processing, which do not include grain mills, was estimated to be USD 15.2 million and this is divided into categories of companies according to the proportions of existing investments, calculated by the numbers of enterprises and estimated investment amount per enterprise.

Then, the number of enterprises of each category was estimated from the numbers of establishments of “1071 Manufacture of bakery products” industry reported in Economic Census (2013). This was adjusted by the economic growth rate since 2013 and also by the number of companies in the BAPA member list.

The total amount of existing investment of “Manufacture of bakery products” was calculated as in the following table. This table suggests that 8.9% of the existing investment amount is owned by large enterprises, while medium, small, micro and cottage enterprises own 6.1%, 76.1%, 7.7% and 1.2 % respectively.

Table 183 Estimated distribution of existing investment amount by category

	Number of enterprises	Existing investment amount per enterprise (million BDT)	Total amount of existing investment (million BDT)	Distribution of existing investment amount
Large	5	1,500	7,500	8.9%
Medium	16	325	5,200	6.1%
Small	818	79	64,418	76.1%
Micro	1,539	4	6,541	7.7%
Cottage	2,043	0.5	1,022	1.2%

Source: Estimate of the Survey Team

The funding needs, calculated based on the information and assumptions above, are described in the following table. The amount of funding needs for wheat processing is therefore estimated to be USD 4.6 million.

Table 184 Estimated funding needs for wheat processing

	Distribution of existing investment amount	Estimated investment needs (million USD)	Proportion of enterprises having access to finance	Funding needs (million USD)
Large	8.9%	1.4	100%	1.4
Medium	6.1%	0.9	80%	0.7
Small	76.1%	11.6	20%	2.3
Micro and cottage	8.9%	1.4	10%	0.1
Total	-	15.2	-	4.6

Source: Estimate of the Survey Team

6) Funding needs for edible oil production

The amount of investment needs for edible oil production was estimated to be USD 25.6 million and this is divided into categories of companies according to the proportions of existing investments, calculated by the numbers of enterprises and estimated investment amount per enterprise.

Then, the number of enterprises of each category was estimated from the numbers of establishments of “1040 Manufacture of vegetable and animal oils and fats” industry reported in Economic Census (2013). This was adjusted by the economic growth rate since 2013 and also by the number of companies in the BAPA member list.

The total amount of existing investment of “Manufacture of vegetable and animal oils and fats” was calculated as in the following table. This table suggests that 14.6% of the existing investment amount is owned by large enterprises, while medium, small, micro and cottage enterprises own 1.6%, 71.7%, 9.6% and 2.5% respectively.

Table 185 Estimated distribution of existing investment amount by category

	Number of enterprises	Existing investment amount per enterprise (million BDT)	Total amount of existing investment (million BDT)	Distribution of existing investment amount
Large	4	1,500	6,000	14.6%
Medium	2	325	650	1.6%
Small	374	79	29,453	71.7%
Micro	923	4	3,923	9.6%
Cottage	2,055	0.5	1,028	2.5%

Source: Estimate of the Survey Team

The funding needs, calculated based on the information and assumptions above, are described in the following table. The amount of funding needs for edible oil production is therefore estimated to be USD 8.0 million.

Table 186 Estimated funding needs for edible oil production

	Distribution of existing investment amount	Estimated investment needs (million USD)	Proportion of enterprises having access to finance	Funding needs (million USD)
Large	14.6%	3.7	100%	3.7
Medium	1.6%	0.4	80%	0.3
Small	71.7%	18.3	20%	3.7
Micro and cottage	12.1%	3.1	10%	0.3
Total	-	25.6	-	8.0

Source: Estimate of the Survey Team

7) Funding needs for organic fertilizer production

The amount of investment needs for organic fertilizer production was estimated to be USD 8.3 million. Out of this, USD 5.9 million is the investment needs by the medium sized producers supplying to ACI and the remaining USD 2.4 million is those of small producers.

It is assumed that there are 25 medium sized suppliers and the investment cost of one production facility is USD 236,000 as explained in the previous section.

The number of small producers is assumed to be 300, based on the information provided

by several financial institutions. The investment cost for one production facility of small producers is USD 8,000.

The amount of funding needs for organic fertilizer production, calculated by the investments needs per producer and the proportions of enterprises having access to finance, is USD 5.2 million.

Table 187 Estimated funding needs for organic fertilizer production

	Estimated number of organic fertilizer producers	Investment needs per producer (thousand USD)	Proportion of enterprises having access to finance	Funding needs (million USD)
Large	-	-	100%	-
Medium	25	236	80%	4.7
Small	300	8	20%	0.5
Micro and cottage	-	-	10%	-
Total	-	-	-	5.2

Source: Estimate of the Survey Team

8) Funding needs for cold storage facilities

In the previous section, it was estimated that the amounts of investment needs for conventional cold storage facilities and multipurpose cold storage are USD 75.0 million and USD 20.6 million respectively. The amount of investment needs for equipment renewal was also estimated to be USD 554.3 million.

However, because several financial institutions reported that conventional cold storage facilities are not bankable in many cases as the investment payback periods of such conventional cold storage facilities are more than ten years, it is assumed that only the owners of multipurpose cold storage facilities have access to bank loans.

Based on the assumption that most of the multipurpose cold storage facilities owners are medium sized enterprises, the amount of funding needs for multipurpose cold storage facilities is estimated to be USD 16.5 million, which is calculated as the 80% of the investment needs (USD 20.6 million).

9) Funding needs for freezing, refrigerated and insulated vans

It was estimated in the previous section that the investment needs for the new purchases and replacements of freezing, refrigerated and insulated vans are USD 43.1 million and USD 47.5

million respectively, and the amount of total investment needs is USD 90.6 million.

As such freezing, refrigerated and insulated vans are owned and operated by large companies, which produce and supply frozen items directly to retail outlets, the funding needs for freezing, refrigerated and insulated vans is also estimated to be USD 90.6 million, or 100% of investment needs.

10) Funding needs of retails industries (including supermarkets)

The amounts of investment needs for freezing and refrigerating equipment for new outlets and equipment replacement by retail industries were estimated to be USD 23.6 million and USD 30.7 million respectively, as explained in the previous section.

These were then divided into categories of enterprises based on the estimated numbers of freezing and refrigerating equipment also estimated in the previous section.

The estimated funding needs of retail industries, calculated by the estimated investment needs and proportions of enterprises having access to finance, is USD 22.0 million.

Table 188 Estimated funding needs of retail industries for freezing and refrigerating equipment

	Estimated investment needs for new outlets (million USD)	Estimated investment needs for replacement (million USD)	Estimated investment needs (million USD)	Proportion of enterprises having access to finance	Funding needs (million USD)
Large	5.8	7.6	13.4	100%	13.4
Medium	0.3	0.4	0.8	80%	0.6
Small	17.5	22.7	40.2	20%	8.0
Micro and cottage	23.6	30.7	54.4	-	22.0

Source: Estimate of the Survey Team

(3) Summary of investment needs and funding needs

The investment needs and funding needs estimated above were summarized as in the following table. The total amount of the new investment needs for business expansion, including import substitution and export promotion, was estimated to be USD 265.4 million and the investment needs for equipment replacement was estimated to be USD 769.3 million. The total amount of estimated investment needs was USD 1,034.6 million, which is equivalent to JPY

113,396 million⁹⁹.

The amount of funding needs estimated based on the amount of investment needs was USD 321.9 million or JPY 35,269 million.

It was also estimated that 71.9% (USD 231.4 million) of the funding needs is by large enterprises and the remaining 28.1% (USD 90.5 million) is by medium, small, and micro enterprises.

Table 189 Summary of investment needs and funding needs (million USD)

	Investment needs			Funding needs			
	Business Expansion	Replacement	Total	Large	Medium	Small / micro	Total
Mango processing	27.3	40.6	67.8	43.2	18.3	0.3	61.8
Tomato processing	0.9	1.8	2.7	1.7	0.7	0.0	2.4
Potato processing	28.9	25.2	54.1	34.5	14.6	0.3	49.3
Spice processing	22.1	45.3	67.4	42.9	18.2	0.3	61.4
Wheat processing	8.1	5.8	14.0	1.4	0.7	2.5	4.6
Edible oil production	9.9	15.7	25.6	3.7	0.3	4.0	8.0
Organic fertilizer production	5.9	2.4	8.3	0.0	4.7	0.5	5.2
Cold storage facilities	95.6	554.3	649.9	0	16.5	0.0	16.5
Freezing, refrigerated and insulated vans	43.1	47.5	90.6	90.6	0.0	0.0	90.6
Retail industries	23.6	30.7	54.4	13.4	0.6	8.0	22.0
Total	265.4	769.3	1,034.6	231.4	74.7	15.9	321.9

Source: Estimate of the Survey Team

5.5.2. Project cost

The previous section estimated that the amount of investment needs of agribusiness and food processing industries in Bangladesh for the following five years was JPY 113,396 million and the amount of funding needs is JPY 35,269,074 million.

The proposed amount of sub-projects under the proposed Project is JPY 12,000 million. Out of this, up to 90% (JPY 10,800 million) can be financed by the TSL funds and the remaining 10% (JPY 1,200 million) is to be contributed by end-borrowers.

The total project cost, which is calculated by the adding the proposed consulting service

⁹⁹ Calculated based on the exchange rate by Mitsubishi UFJ Bank as of the end of November 2019. USD 1 is equivalent to JPY 109.56.

costs to the sub-project amount is as following table.

Table 190 Proposed project cost

(Unit: million JPY)

Item	Amount
1. Sub-projects	12,000
JICA ODA loan	10,800
Contributions by end-borrowers	1,200
2. Consulting services	418
3. Total project cost (1 + 2)	12,418
of which ODA loan portion	(10,800)

Source: Estimate of the Survey Team

The proposed disbursement period is five years from November 2021. Annual financing plan is as described in the following table.

Table 191 Annual financing plan

Item	2020	2021	2022	2023	2024	2025	2026	Total
1. Sub-projects	0	393	2,361	2,361	2,361	2,361	2,164	12,000
JICA ODA loan	0	354	2,125	2,125	2,125	2,125	1,948	10,800
Contributions by end-borrowers	0	39	236	236	236	236	216	1,200
2. Consulting services	0	60	82	87	80	63	45	418
3. Total project cost (1 + 2)	0	454	2,443	2,448	2,441	2,424	2,209	12,418
of which ODA loan portion	0	354	2,125	2,125	2,125	2,125	1,948	10,800

Source: Estimate of the Survey Team

5.6. Implementation Schedule of the Project

A proposal of the implementation schedule of the Project is summarized in the following table.

Table 192 Implementation Schedule of the Project

Pledge	March 2020
Loan Agreement	August 2020
Effectuation of the L/A	October 2020
Selection of Consultant for PIU	October 2020 to November 2021
Consulting Services for PIU	November 2021 to November 2026
Provision of Funds to end-borrowers	November 2021 to November 2026
Project completion date	November 2026

Source: The Survey Team

The consulting service will continue for five years because repayments from end-borrowers will be accumulated in the Revolving Fund Account from the third year since the start of the disbursement and the Project Consultants will support the management of the Revolving Fund from the third to fifth year.

Similarly, On-Lending Loans will be provided to end-borrowers for five years because there are great demands for the fund from agribusiness and food processing industries according to interviews with industries and financial institutions but it will be uncertain how many industries will apply and be approved.

It in general requires more than nine months to appoint project consultants for a TSL project, so the Implementing Agency should make advance preparations for the procurement so as to smoothly implement the Project.

5.7. Performance Monitoring Indicator

Performance monitoring indicators to assess quantitative and qualitative effect of the Project are summarized in the following tables.

5.7.1. Quantitative Effect

- i) Outcome (Operation and Effect Indicators)

Table 193 Operation and Effect Indicators to Assess Quantitative Effect

Indicator	Unit	Data source	Frequency of acquisition
Total amount of On-Lending Loans	Million JPY	GOB or Implementing	Every year since the

approved		Agency	Project starts
Annual sales of the end-borrowers	Million BDT	Financial statements of end-borrowers	Every year, since the year of the On- Lending Loan approval
Annual profit of the end-borrowers	Million BDT		
Capital productivity of the end-borrowers (=Operating or gross profit / Tangible fixed assets)	%		
Capital-labor ratio of the end-borrowers (=Tangible fixed assets / number of employees)	BDT		
Number of suppliers of the end-borrowers	(Number)	Interview with end-borrowers	Twice (The year of the On-Lending Loan approval and two years after the commencement of commercial operation)
Number of customers of the end-borrowers	(Number)		
Number of certifications and licenses related to food safety (e.g. HACCP, ISO) the end-borrowers receive	(Number)		
Amount of purchases of agricultural products of the end-borrowers	Thousand BDT	Interview with end-borrowers (or the financial statements)	
Amount of purchases from their contract farmers by the end-borrowers	Thousand BDT	Interview with end-borrowers	

Source: The Survey Team

Annual profit of the end-borrowers and capital-labor ratio of the end-borrowers denote the achievement of the Project as indicators of the amounts of sub-loans provided by the Project and of fixed assets invested through the sub-loans. Annual sales/profit and capital productivity of the end-borrowers assess whether the Project can intensify the value added of products manufactured by the end-borrowers of the Project. Number of suppliers and customers of the end-borrowers will increase if the Project can strengthen the food value chain successfully.

The Project is designed to encourage the end-borrowers to obtain certifications and licenses related to food safety such as HACCP and ISO through food safety seminars provided as a component of the Consulting Service of the Project with the end-borrowers. The Project is also

assumed to benefit farmers directly and indirectly through the enhancement of the productivity of agribusiness and food processing companies generated by its TSLs and capacity buildings since it will increase the amount of the purchases of agricultural products. Training programs for end-borrowers provided through the Consulting Service will encourage them to work out direct contract with farmers, which will increase the amount of purchases from the contract farmers by them.

5.7.2. Qualitative Effect

Table 194 Items to Assess Qualitative Effect

Item	Data source	Frequency of acquisition
Improvement in the food safety management of end-borrowers	Interview with end-borrowers	Twice (The year of the On-Lending Loan approval and two years after the commencement of commercial operation)
Diversification of products manufactured by end-borrowers		
Improvement of the Implementing Agency's screening capacity for agribusiness and food processing industries	Self-assessment undertaken by the Implementing Agency	Twice (At the commencement of the Project and two years after the completion of the Project)

Source: The Survey Team

Officers in the Monitoring Unit at PIU will comprehensively assess improvement in the food safety management of end-borrowers at the year of the sub-loan approval and two years after the commencement of the commercial operation in respect of machineries and equipment, raw materials and operational management such as risk management, customer management, human resource management and certification/licenses of end-borrowers. The officers in the Monitoring Unit are supposed to take a training on food safety management provided as part of the Consulting Service of the Project.

The officers in the Monitoring Unit will also evaluate diversification of products manufactured by end-borrowers at the year of the sub-loan approval and two years after the commencement of the commercial operation in respect of changes in the number of items of their products and agricultural inputs.

6. Environmental and Social Considerations

6.1. Current Environmental and Social Considerations in Bangladesh

6.1.1. Environmental Pollution

(1) Air pollution

Air quality standards in Bangladesh are shown in the table below:

Table 195 Air quality standards

Pollutant	Averaging period	Bangladesh standard
CO ($\mu\text{g}/\text{m}^3$)	1 hour	40,000
	1 hour	40,000
Pb ($\mu\text{g}/\text{m}^3$)	1 year	0.5
NOx ($\mu\text{g}/\text{m}^3$)	1 year	100
PM ₁₀ ($\mu\text{g}/\text{m}^3$)	1 year	50
	24 hours	150
PM ₂₅ ($\mu\text{g}/\text{m}^3$)	1 year	15
	24 hours	65
O ₃ ($\mu\text{g}/\text{m}^3$)	8 hours	157
SO ₂ ($\mu\text{g}/\text{m}^3$)	24 hours	365

Source: JICA (2012) Profile on Environmental and Social Considerations in Bangladesh

The air quality standards of Bangladesh are less restrictive than those set by the World Health Organization (WHO). For example, the Bangladesh standard of PM₁₀ is 50 $\mu\text{g}/\text{m}^3$ (one year) compared with 20 $\mu\text{g}/\text{m}^3$ at WHO. Moreover, the SO₂ standard is set at 365 $\mu\text{g}/\text{m}^3$ (24 hours) in Bangladesh, while WHO has set it at 20 $\mu\text{g}/\text{m}^3$ (24 hours).

In Bangladesh, the Air Quality Index (AQI)¹⁰⁰ was established by the Department of Environment (DoE) through the Clean Air and Sustainable Environment (CASE) project¹⁰¹. The AQI is calculated based on PM₁₀, PM_{2.5}, NO₂, CO, and O₃, and DoE releases it every day. As of December 11th, 2019, except for Sylet (Caution) and the areas where data were not available, the AQIs were “Unhealthy” or “Very Unhealthy” (Table 196). Notably, the AQI of Mymensingh was 291, and that of Chattogram was 282. The AQIs are close to the category, “Extremely Unhealthy,” which is set at 301 and above. Therefore, the air at Mymensingh and Chattogram is severely polluted.

¹⁰⁰ 0-50: Good, 51-100: Moderate, 101-150: Caution, 151-200: Unhealthy, 201-300: Very Unhealthy, 301-500: Extremely Unhealthy (http://case.doe.gov.bd/index.php?option=com_content&view=article&id=9&Itemid=31)

¹⁰¹ <http://case.doe.gov.bd/>

Table 196 Air Quality Index (As of December 11th, 2019)

Location	AQI category	Air Quality Index
Dhaka	Very Unhealthy	263
Gazipur	-	-
Naryaganj	Very Unhealthy	267
Chattogram	Very Unhealthy	282
Sylhet	Caution	148
Khulna	Unhealthy	180
Rajshahi	Unhealthy	180
Barishal	-	-
Savar	-	-
Mymensingh	Very Unhealthy	291
Rangpur	-	-
Cumilla	Very Unhealthy	235
Narsingdi	Very Unhealthy	233

-:Data not available

Source: CASE Website

(http://case.doe.gov.bd/index.php?option=com_content&view=article&id=29&Itemid=7)

(2) Water pollution

Sewage discharge standards in Bangladesh are shown in the table below:

Table 197 Sewage discharge standards

Parameter	Bangladesh standard
Biochemical Oxygen Demand (BOD) (Milligram/l)	40
Nitrate	250
Phosphate	35
Suspended Solids (SS)	100
Temperature (Degree Centigrade)	30
Coliform (Number per 100ml)	1,000

Source: DoE (1997) E.C.R.1997

The sewage discharge from an industrial unit or project may have a significant impact on the quality of river water that is used for agriculture, drinking water, industrial water, and others. Moreover, the river water quality impacts on the natural environment in Bangladesh. According to the Surface and Ground Water Quality Report (2016)¹⁰², the Biochemical Oxygen Demand (BOD), the Chemical Oxygen Demand (COD), and the Dissolved Oxygen (DO) parameters of the river water flowing around Dhaka city are significantly beyond the limits. For example, the

¹⁰² DoE has been monitoring the quality of surface and ground water from 1973.

BOD of Buriganga River that flows in the south-east suburbs of Dhaka is often beyond the limits, even though the pH and DO are within the limits¹⁰³.

Table 198 Level of different parameters of Buriganga River during 2014-2016

Location	Year	Season	pH	DO	BOD
Buriganga River	2014	Dry	7.24	0.61	24.97
		Wet	7.27	2.58	10.29
	2015	Dry	7.54	0.14	17.09
		Wet	7.22	2.96	7.42
	2016	Dry	7.54	0.17	17.09
		Wet	7.05	2.98	6.53
Standard for fisheries			6.5-8.5	≥ 5mg/l	≥ 6mg/l

Source: The Surface and Ground Water Quality Report (2016)

(3) Noise pollution

Noise quality standards in Bangladesh are shown in the table below:

Table 199 Noise quality standards

Location	Bangladesh standard (dB)	
	Day (6am-9pm)	Night (9pm-6am)
Silent	50	40
Residential	55	45
Commercial	70	60
Industrial	75	70

Source: JICA (2012) Profile on Environmental and Social Considerations in Bangladesh

There are minor differences between the Bangladesh standards and the WB standards. For instance, the former sets a standard for the area classed as “Silent,” while the latter does not. According to the survey conducted by DoE, there are some areas of which noise quality standards are beyond the limits of the Bangladesh standard, especially in Dhaka. There are 70 areas in Dhaka where the noise exceeds the quality standards, and some parts recorded 130.2dB in the daytime and 65.7dB in the nighttime.

¹⁰³ Turbidity and Total Dissolved Solids (TDS) are also beyond the limits.

Table 200 Places beyond the noise standard limit

City	Chattogram	Sylhet	Khulna	Barishal	Rangpur	Mymensingh	Dhaka	Rajshahi
Places beyond the limitation	41	20	20	15	15	15	70	10

Source: <https://www.dhakatribune.com/bangladesh/nation/2019/01/06/sound-pollution-beyond-permissible-levels-in-all-divisions>

6.1.2. Current Situation of the Natural Environment

(1) Protected Area

“Protected Area” in Bangladesh refers to sanctuaries, national parks, community conservation areas, safari parks, eco-parks, botanical gardens, special biodiversity conservation areas, and others. In total, there are 45 Protected Areas in Bangladesh, and the overall size is 636,390 hectares, which accounts for 4.31% area of Bangladesh. As shown in Figure 68, the Protected Areas are located throughout the country.



*●: Protected area

Source: <http://www.bforest.gov.bd/site/page/5430ce33-561e-44f6-9827-ea1ebaa2c00d/->

Figure 68 Protected Area

(2) Ecological Critical Areas

The Ministry of Environment and Forestry (MoEF) has declared 13 areas as Ecological Critical Areas (ECAs) in Bangladesh. ECAs refer to areas fit for human habitation, ancient monuments, national parks, presence of wild animals, forest areas, biodiversity, and others. In ECAs, MoEF prohibits industrial activities that harm the natural environment or biodiversity.

The latest list of ECAs is shown in the table below:

Table 201 Ecological Critical Areas

No.	Name of ECA	Type of ecosystem	Location	Areas (ha)	Year of declaration
1	Cox's Bazar-Teknaf Peninsula	Coastal-Marine	Cox's Bazar	20,373	1999
2	Sundarbans (10km landward periphery)	Coastal-Marine	Barnerhat, Khulna Barguna. Priojpur and Satkhira	292,926	1999
3	St. Martin's Island	Marine Island with coral reefs	Teknaf upazila, Cox's Bazar	1,214	1999
4	Hakaluki Haor	Inland Freshwater Wetland	Sylhet and Moulvibazar	40,466	1999
5	Sonadia Island	Marine Island	Moheshkhali, Cox's Bazar	10,298	1999
6	Tanguar Hanor	Inland Freshwater Wetland	Tahirpur, Sunamaganj	9,727	1999
7	Marjat Baor	Oxbow Lake	Kaliganj Upazila of Jhenaidah and Chaugacha Upazila of Jessore	325	1999
8	Gulshan-Baridhara Lake	Urban Wetland	Dhaka city	101	2001
9	Buriganga	River	Around Dhaka	1,336	2009
10	Turag	River	Around Dhaka	1,184	2009
11	Sitalakhya	River	Around Dhaka	3,771	2009
12	Balu including Tongi canal	River	Around Dhaka	1,315	2009
13	Haflong-Dawki	River	Jaflong, Sylhet	1,493	2015

Source: IUCN (2015) Community Based Ecosystem Conservation and Adaptation in Ecologically Critical Areas of Bangladesh: Responding to Nature and Changing Climate

6.1.3. Current Situation of the Social Environment

(1) Cultural and natural heritage

The United Nations Educational, Scientific, and Cultural Organization (UNESCO) designated two locations as a cultural heritage, one as a natural heritage, and placed five sites on a tentative list.

Table 202 Cultural and natural heritage sites in Bangladesh

Location	Status	Year of registration
Historic Mosque City of Bagerhat	Cultural heritage	1985
Ruins of the Buddhist Vihara at Paharpur	Cultural heritage	1985
The Sundarbans	Natural heritage	1997
Mahansthanagarh and its environs	Tentative list	1999
The Lalmai-Mainamati group of monuments	Tentative list	1999
Lalbagh Fort	Tentative list	1999
Halud Vihara	Tentative list	1999
Jaggadala Vihara	Tentative list	1999

Source: <https://whc.unesco.org/en/statesparties/bd>

The International Union for Conservation of Nature (IUCN) recommended placing the Sundarbans on the “List of World Heritage in Danger¹⁰⁴.” Not only are the coal-fired power plants and industrial units run near the Sundarbans, but there is also a plan to establish two additional coal-fired power plants nearby. In 2016, the World Heritage Committee suggested that the Rampal power plant project, which would also be developed near the Sundarbans, should be canceled and relocated; however, the project has not stopped.

(2) Minority ethnic groups

According to the 2011 national census, the ethnic minority population in Bangladesh is approximately 1,586,141, accounting for 1.8% of the total population. As shown below, more than 54.92% of ethnic minorities live in the Chattogram Division, and 16.46% live in the Rajshahi Division.

Table 203 Distribution of ethnic minority population and sex ratio by division

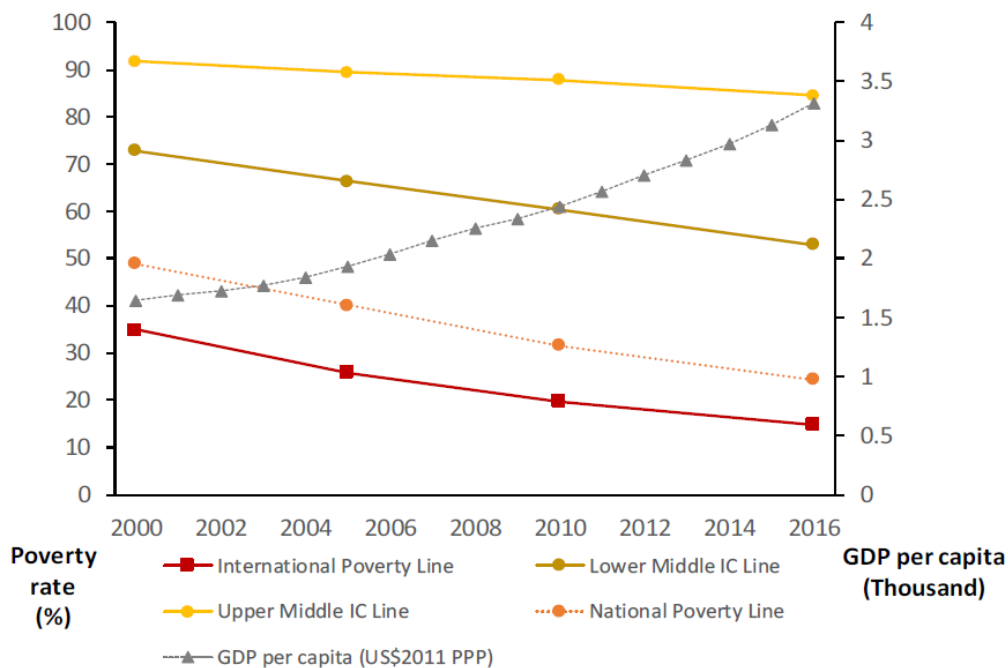
Location National/ Division	Ethnic household		Ethnic population in 2011					
	Household	%	Sex	%	Male	%	Female	%
Bangladesh	356,175	100	1,586,141	100	797,477	100	788,664	100
Barishal	754	0.21	2,757	0.17	1,385	0.17	1,372	0.17
Chattogram	195,596	54.92	897,871	56.61	455,257	57.09	442,614	56.12
Dhaka	35,795	10.05	149,007	9.39	74,439	9.33	74,568	9.45
Khulna	8,937	2.51	40,530	2.56	20,231	2.54	20,299	2.57
Rajshahi	58,617	16.46	245,015	15.45	121,209	15.20	123,806	15.70
Rangpur	24,693	6.93	102,001	6.43	50,505	6.33	51,496	6.53

Source: Bangladesh Bureau of Statistics (2015). Bangladesh Population and Housing Census 2011

(3) Poverty

As shown below, the poverty rate of Bangladesh has continued to decline since 2000.

¹⁰⁴ IUCN (2019) “IUCN advises “in danger” status for three World Heritage sites” <https://www.iucn.org/news/iucn-43whc/201906/iucn-advises-danger-status-three-world-heritage-sites>



Source: WB (2019) Poverty & Equity Brief South Asia Bangladesh April 2019

Figure 69 Poverty headcount rates (2000-2016)

The poverty statistics in Bangladesh showed that 24.3% of the population are living under the upper poverty line, and 12.9% are living under the extreme poverty line. According to the Poverty & Equity Brief issued by WB, the pace of poverty reduction is slower than before, even though GDP in Bangladesh has been increasing. Furthermore, the welfare gap has widened between the eastern and western sides of Bangladesh due to the east side of Bangladesh having more business opportunities than the west side.

6.2. Policies and Regulations, and Organizations for Environmental and Social Considerations in Bangladesh

6.2.1. Policies and Regulations for Natural Environment

(1) Major policies and regulations for the natural environment

Major policies and regulations for natural environment are shown in the table below:

Table 204 Major policies and regulations for natural environment

Environmental policies and regulations	Key features
National Environment Policy (1992) (NEP)	The policy that set the basic framework for environmental action, and the guidelines for various sectors.
National Environment Management Action Plan (1995)	The broader environmental management activity plan that is built based on the statement of NEP.
Environmental Conservation Act (1995) (ECA) (Revised 2000, 2002, 2010)	The environmental act that includes environmental protection, environmental standards, pollution prevention, and mitigation. It indicates the necessity of obtaining an Environmental Clearance Certificate (ECC) when the project starts.
Environment Conservation Rules (1997) (ECR)	The environmental protection rules that were enacted based on ECA. It specified the procedure for obtaining an ECC, and the emission standards that cause environmental pollution

Source: KS Consultant Ltd and EQMS Consulting Limited (2017) Environment Impact Assessment of the Dhaka Mass Road Transit Development Project (Line 5 From Vatara to Hemayetpur)

Section 12 of Environmental Conservation Act (ECA) states that “No industrial unit or project shall be established or undertaken without obtaining, in the manner prescribed by the rules, an Environmental Clearance Certificate (ECC) from the Director General” (DoE, 1995). All industrial units or projects must have an ECC before operation in Bangladesh, while non-industrial businesses, such as wholesalers, retailers, and distributors, are not required to obtain an ECC.

(2) Environmental Clearance Certificate (ECC)

1) Procedure for obtaining ECC

The procedures for obtaining ECC are the following¹⁰⁵:

- (a) Categorization: A proposer, who plans to start an industrial project, should check its environmental category (Green, Orange-A, Orange-B, or Red) on Schedule 1 of Environment Conservation Rules (ECR). In case the proposed project is not listed on Schedule 1 of ECR, the proposer needs to discuss it with a DoE officer in a district office¹⁰⁶.
- (b) Submit an application form with supporting documents: Submit the application form (Form-3 of ECR) and supporting documents to a DoE officer in a district office. The required documents for an ECC are different for each category. (See Appendix 7)
- (c) Verification: A DoE officer in a district office verifies the application form and supporting documents.

¹⁰⁵ Environmental Clearance Procedure (2010) and results from an interview with a DoE officer

¹⁰⁶ In the case a DoE officer cannot determine the environmental category, the decision will be forwarded to the DoE headquarters. The committee make a final judgment within one month (through the DoE officer).

- (d) Inspection: A DoE officer inspects all documents or reports submitted by the proposer. Only projects in the Green and Orange-A category can obtain an ECC after an investigation without further procedures.
- (e) Meeting with the Environmental Clearance Committee: The Environmental Clearance Committee is held for the project classified as Orange B and Red to determine whether DoE issues an ECC or not.
- (f) Decision: The proposer of projects in the Orange-B and Red categories receives an ECC from the DoE in case the Environmental Clearance Committee confirms.

2) Renewal of the ECC

The validity period of ECCs are different between the various ECC categories; projects in the Green category are valid for three years, and those in the Orange-A, Orange-B, and Red categories are valid for one year. Industrial units or projects must renew ECCs at least 30 days before the expiry dates. When industrial units or projects renew their ECCs, a DoE officer visits the site, and checks the environmental parameters, such as water quality, air quality, and noise levels. The parameters monitored are different for each industry or project. The DoE issues a new ECC within 15 days for those in the Green and Orange A categories, and within 30 days for those in the Orange B and Red categories.

6.2.2. Policies and Regulations for Social Environment

(1) Major policies and regulations for social environment

The major policies and regulations for social environment are shown in the table below:

Table 205 Major policies and regulations for social environment

Social policies and regulations	Key features
Bangladesh Labor Act 2006 (Revised 2018)	The law stipulates the liability of employers, the right for compensation of workers for accidents and injuries incurred during working hours, and it bans working under 14 years of age.
Factory Act, 1965	The law regulates the working conditions at factories, including wages, health, hygiene, safety, welfare, working hours, leave and holidays, and penalties for workers and employers who have been non-compliant.
The Employees State Insurance Act, 1994	The law stipulates insurances for health, injury, and sickness of the workers.

Source: KS Consultant Ltd and EQMS Consulting Limited (2017) Environment Impact Assessment of the Dhaka Mass Road Transit Development Project (Line 5 From Vatarā to Hemayetpur) and http://en.banglapedia.org/index.php?title=Factories_Act_1965

The Department of Inspection for Factories and Establishments (DIFE) is responsible for

ensuring that a company complies with the Bangladesh Labor Act, and for protecting the factory worker's health, safety, and welfare. DIFE also guarantees the working environment for factory workers by the issuance/renewal of factory licenses, and through on-site inspections once a factory is in operation.

(2) Factory licenses

1) Procedures of obtaining a factory license¹⁰⁷

All factories¹⁰⁸ in Bangladesh must obtain a factory license issued by DIFE before a factory owner can hire any workers or begin its operations. The procedures for obtaining a factory license are as follows:

Source: <http://103.48.16.55/apply>

Figure 70 Web page for applying for licenses

(a) Applicants enter the necessary information and send the required documents through the DIFE website¹⁰⁹. They also submit a machinery layout plan as a hard copy to the district office. The machinery layout plan includes location maps, structure maps, and material flow charts.

(b) The DIFE conducts an on-site inspection at the company that submitted the machinery layout plan. The DIFE conducts such inspections according to a checklist, and checks safety issues and the working environment, such as the machinery layouts, working space available to laborers¹¹⁰, fire equipment, and electricity facilities.

(c) After the DIFE determines that there is no problem, applicants send Form 75 to the DIFE to obtain the layout approval.

(d) After applicants obtain the layout approval, they can apply for a factory license¹¹¹. After they acquire the factory license, they can employ laborers.

¹⁰⁷ Information about the procedure is from a DIFE officer.

¹⁰⁸ Excludes factories with less than five employees (applicable if the factory employs more than five employees in a single day).

¹⁰⁹ <http://103.48.16.55/apply>

¹¹⁰ 9.5m³ is the necessary working space per works (DIFE officer).

¹¹¹ Applicants can apply for a factory license and a layout approval at the same time.

2) Monitoring of the working environment

According to a DIFE officer, the DIFE conducts an on-site inspection within six months after an approved factory has started its operations. According to two food processing companies, and one organic fertilizer company, the DIFE regularly conducts on-site inspections at their factories; however, one biopesticide company stated that the DIFE does not conduct on-site inspections at their facilities because the company does not use large equipment. An officer of an edible oils producing company said that the DIFE usually conducts on-site inspections at least once every two months, and sometimes conducts an on-site inspection without prior notice.

Usually, on-site inspections are conducted against an inspection checklist, which the DIFE developed. There are more than 20 pages and 100 questions in some inspection check lists. Those inspection checklists cover the necessary confirmation items relating to the working environment, such as working hours, minimum wages, factory hygiene, maternity leave, and the availability of a daycare center. In the case a company does not meet the DIFE standards of the working environment, the company cannot renew its factory license¹¹². The types of inspection checklists¹¹³ are as follows:

- Readymade garment (RMG) Factory Inspection Checklist;
- Non RMG Factory Inspection Checklist;
- SME Factory Inspection Checklist¹¹⁴;
- Ship Breaking & Ship Yard Inspection Checklist;
- Establishment Inspection Checklist;
- Shop Inspection Checklist; and
- Construction Sector Inspection Checklist.

6.2.3. Gaps of Environmental and Social Framework between Government of Bangladesh and JICA

JICA has an environmental and social guideline, called “Guidelines for Environmental and Social Considerations (2010)” (JICA Guidelines). There are some differences between JICA Guidelines and the Bangladesh environmental and social policies and regulations, such as those relating to ECA and ECR. The significant differences are shown below:

¹¹² From the results of interview with a DIFE officer, factory licenses must renew annually (<https://www.fmcibd.com/services-licensing/how-to-register-factories-and-establishments-in-bangladesh>)

¹¹³ <http://dife.portal.gov.bd/site/page/d60953be-00d2-4325-9637-f81d5a35f6e3#>

¹¹⁴ Non RMG Factory Inspection Checklist is 21 pages, while SME Factory Inspection Checklist is 12 pages.

(1) Categorization

JICA refers to the results of screening by the JICA Screening Format, and classifies proposed projects into four categories based on the basis of the extent of the impact to the natural and social environment, as follows:

- Category A: Proposed projects are classified as Category A if they are likely to have significant adverse impacts on the environment and society. Projects with complicated or unprecedented impacts that are difficult to assess, or projects with a wide range of impacts or irreversible impacts, are also classified as Category A;
- Category B: Proposed projects are classified as Category B if their potential adverse impacts on the environment and society are less adverse than those of Category A projects;
- Category C: Proposed projects are classified as Category C if they are likely to have a minimal or little adverse impact on the environment and society; and
- Category FI: Proposed projects are classified as Category FI if they satisfy all of the following requirements: JICA's funding of projects is provided to a financial intermediary or executing agency; the selection and appraisal of the sub-projects is substantially undertaken by such an institution only after JICA's approval of the funding, so that the sub-projects cannot be specified prior to JICA's approval of funding (or project appraisal); and those sub-projects are expected to have a potential impact on the environment.

Compared to JICA Guidelines, ECR classifies industrial units and projects into four categories: Green, Orange-A, Orange-B, and Red. Table 206 shows classification comparisons on the necessity of the Initial Environment Examination (IEE) and the Environmental Impact Assessment (EIA) between JICA Guidelines and ECR.

Table 206 Classification comparison

Guideline/Institution	Comparison of categories			
JICA Guidelines	Category C		Category B	Category A
ECR (Bangladesh)	Green	Orange-A	Orange-B	Red
IEE/EIA	NA	NA	IEE	EIA

Source: The Survey Team

Projects in the JICA Category A or the Red categories require an EIA, while those under JICA Category B or the Orange-B category need to conduct an IEE. Meanwhile, the projects under JICA Category C, or the Orange-A, or Green categories do not need to carry out an IEE or EIA.

(2) Operational framework

There are some differences between the JICA Guidelines and ECR with regards to the operational framework for environmental and social considerations. The major differences are shown below:

Table 207 Major differences in operational frameworks between JICA Guidelines and ECA/ECR

Operational framework	JICA Guidelines	ECA/ECR
Alternatives	Environmental impact must be assessed and examined from the earliest possible planning stage. Alternatives studies shall be made to avoid or minimize adverse impact must be considered and incorporated into the project plan	ECA and ECR do not clearly ask for identification and assessment of alternatives.
Consultation	In case the projects have adverse effects on the natural and social environment, the information on projects needs to be opened at an early stage. The result of the consultation needs to be considered in projects.	No public disclosure is required as per ECR.
Disclosure of EIA report	EIA report must be disclosed to the countries in which the project be implemented. Moreover, local people, stakeholders can access reports all the time.	There is no regulation referring to EIA disclosure.

Source: KS Consultant Ltd and EQMS Consulting Limited (2017) Environment Impact Assessment of the Dhaka Mass Road Transit Development Project (Line 5 From Vatarā to Hemayetpur)

One of the major differences is the “alternative” part. The JICA Guidelines require a study of alternatives to avoid or minimize environmental and social negative impacts caused by projects, while the ECA/ECR does not.

6.2.4. Government Organizations Related to Environmental and Social Considerations

The major government organizations involved in environmental and social considerations in Bangladesh are listed below.

Table 208 Major government organizations involved in environmental and social considerations

Natural environment	Social environment
Ministry of Environment and Forest: Department of Environment	Ministry of Labor and Employment: Department of Inspection for Factories and Establishments
Ministry of Water Resources	Ministry of Land
Ministry of Agriculture	Ministry of Cultural Affairs
Ministry of Fisheries and Livestock	Ministry of Women and Children Affairs

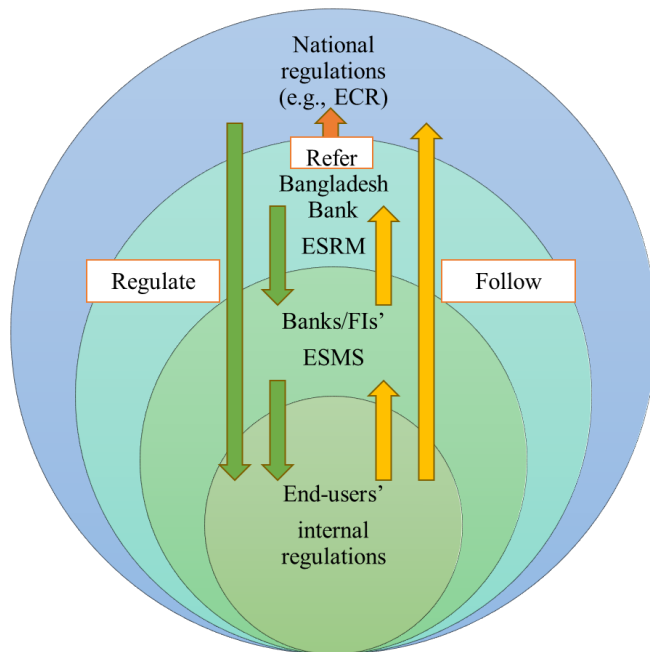
Ministry Power, Energy, and Mineral Resources	Ministry of Chattogram Hill Tracts Affairs
Ministry of Health and Family Welfare	Others
Ministry of Disaster Management and Relief	Bangladesh Bureau of Statistics

Source: The Survey Team

6.2.5. Environmental and Social Management System (ESMS) of Banks/FIs in Bangladesh

(1) Environmental and social management structures in Bangladesh financial sector

Banks/FIs in Bangladesh need to consider the environmental and social impacts on their loan procedures. The Bangladesh Bank (BB) has “Guidelines on Environmental & Social Risk Management (ESRM) for Banks and Financial Institutions in Bangladesh” (2017)¹¹⁵. It requires all Banks/FIs in Bangladesh to establish their Environmental and Social Management System (ESMS) to identify, monitor, and manage the environmental and social risks inflicted on their end-borrowers.



Source: The Survey Team

Figure 71 Environmental and social management structure

The environmental and social management structure of the financial sector is indicated in Figure 71. BB refers to ECA, ECR, and other national environmental and social institutions for the establishment of ESRM. All Banks/FIs establish their own ESMS following ESRM. End-borrowers follow the ESMS of Banks/FIs. In other words, the concerned parties (BB, Banks/FIs, and end-borrowers) comply with the national environmental and social regulations. End-borrowers who need ECCs for their business are regulated not only by ESMS of Banks/FIs, but also by national regulations of the DoE directly.

(2) Environmental and Social Management System (ESMS)

ESMS is defined in ESRM as “An E&S Management System is a set of policies,

¹¹⁵ The updated version of “Environmental Risk Management” (2011).

procedures, tools and internal capacity to identify, monitor and manage a Bank/FI's exposure to the E&S risks of its clients." The system of ESMS is shown in Appendix 8. BB also indicates the following advantages of setting up an ESMS:

- Identify environmental and social risks;
- Assess and manage environmental and social risks systematically;
- Implement the necessary steps including documentation and recordkeeping;
- Monitor client compliance with national environmental and social institutions;
- Require the client to implement mitigation activities for identified risks;
- Identify environmental and social business opportunities; and
- Develop a good reputation from clients and investors.

All Banks/FIs¹¹⁶ that the Survey Team visited have ESMS. Some Banks/FIs set higher ESMS performance standards than required by ESRM. For example, BIFFL stipulated the Environmental and Social Monitoring Framework (ESMF), IDLC Finance and Dutch Bangla Bank developed a new Environmental and Social Due Diligence (ESDD) Checklist supported by the Financierings-Maatschappij voor Ontwikkelingslanden (FMO), and BRAC Bank have 75 guidance notes as a reference to conduct ESDD.

(3) Environmental and Social Due Diligence (ESDD)

1) Overview of ESDD

ESRM obligates all Banks/FIs in Bangladesh to conduct ESDD to analyze the environmental and social risks of sub-projects. Banks/FIs conduct ESDD after they exclude the sub-projects listed on their exclusion lists, and confirm their ECC categories. According to ESRM, ESDD should include the following components:

- Review the project's compliance with applicable national environmental and social regulations;
- Review the project sponsors' track record on environmental and social issues, in terms of potential non-compliance with national regulations or negative publicity;
- Review the project's compliance against international standards or industry best practice regarding environmental and social issues; and
- Documenting all the required information. Every loan file should have a fully completed

¹¹⁶ BIFFL, Dutch Bangla Bank, IPDC Finance, IDLC Limited, Dhaka Bank, BRAC Bank, Eastern Bank, United Finance, SBAC Bank

E&S checklist, copies of all permits, clearances (DoE clearance certificate, fire license, buyer’s audit report), ESAP, E&S Covenants in loan agreement and after disbursement subsequent supervision reports.

2) ESDD checklist

(a) ESDD checklist of Bangladesh Bank

All Banks/FIs use an ESDD checklist to analyze environmental and social risks (High, Medium¹¹⁷, Low) when they conduct ESDD. BB provides the ESDD checklist developed by BB (the BB ESDD checklist) to Banks/FIs in Microsoft Office Excel format¹¹⁸. After Banks/FIs input their general information about sub-projects (e.g. category of ECC), and answer the following inquiries, the environmental and social risks of the sub-projects are calculated automatically.

Table 209 BB ESDD checklist (Generic)

General risks	
1.1	Are there any legal issues associated with the client’s E&S performance?
1.2	Have operations ever been affected by local stakeholder grievances, media or non-governmental organization (NGO) campaigns over E&S issues? Is project site and/or its routing likely to have impacts on ecological sensitivity present on project site and/or within an area of 5 km radius surrounding project site?
1.3	Does the client have robust/ adequate Environmental and Social Management system (ESMS)?
1.4	Is there any evidence of air and noise pollution due to client’s operation?
Environmental health and risks	
2.1	Is there any evidence of air and noise pollution due to client’s operation?
2.2	Is there any evidence of water pollution due to client’s operation?
2.3	Is there any evidence of land pollution and lack of waste handling mechanism in the project operation?
2.4	Are there any Climate Change related risks (flood, drought, cyclone etc.) and opportunities (GHG emission reduction) associated with the client’s operation?
Social risks	
3.1	Is there any evidence of occupational health & safety (OHS) risk?

¹¹⁷ BIFFL uses “Moderate” instead of “Medium.”

¹¹⁸ According to BB ESDD checklist, BB developed a Generic ESDD checklist and 10 sector-specific ESDD checklists. But the sector-specific ESDD checklists are not disclosed on the web.

3.2	Are the labor and working conditions poor and breaching local regulations / standards?
3.3	Does the project pose a threat to Community Health, Safety and Security?
3.4	Is there any evidence of community consultation with key stakeholders including indigenous people?

Source: BB ESDD checklist

There are explanations in each question. For example, when Banks/FIs answer the “1.1 Are there any legal issues associated with the client’s E&S performance?”, they must confirm the validity periods of the ECC and fire licenses. Banks/FIs choose answers from those multiple-choice questions in Table 209.

‘a’ would normally mean that every criterion is met;

‘b’ would mean that criteria has been mostly met and further action underway for rest

‘c’ would mean that some of the criteria has not been met and no concrete action identified; or

‘d’ would mean “not applicable.”

After Banks/FIs insert their answers for each question, the sub-project is automatically categorized into High, Medium, or Low. In case the BB ESDD checklist classifies the sub-project as High or Medium risk, the sub-project owner must make an Environmental Social Action Plan (ESAP)¹¹⁹, and include environment and social contracts in the loan document.

(b) Pattern of utilization of ESDD checklists in each Banks/FIs

Some Banks/FIs use the BB ESDD checklist, and others use their own ESDD checklists. For example, IPDC Finance, SBAC Bank, and Dhaka Bank use the BB ESDD checklist, while BRAC Bank, United Finance, and Eastern Bank use BB ESDD checklist and a sector-specific guidance note together. BIFFL, IDLC Limited, and Dutch Bangla Bank use their original ESDD checklists for analyzing environmental and social risks.

<Pattern A> BB ESDD checklist and a sector-specific guidance note

BRAC Bank, United Finance, and Eastern Bank conduct ESDD by using the BB ESDD checklist and a sector-specific guidance note. BRAC Bank has 75 sector-specific guidance notes, including guidance notes for the food processing sector. United Finance has such guidance notes in its internal guidelines. United Finance’s guidance note for the food processing sector requires confirmation to an officer on items such as “Compliance with BSTI,” “Hygiene factor in the food

¹¹⁹ ESAP is used for monitoring purposes.

processing process”, “Use of appropriate materials”, “Cleanliness of premise”, and “Proper sewerage and waste disposal system”. Eastern Bank has a matrix type analytical tool. Eastern Bank set evaluation criteria for more than 100 sub-sectors to analyze each environmental and social risk.

<Pattern B> Original ESDD checklist

BIFFL, IDLC, and Dutch Bangla Bank use their original ESDD checklists to analyze environmental and social risks.

i) BIFFL

BIFFL checks not only critical environmental and social issues (e.g. validity periods of ECCs, involuntary resettlement), but also checks the environmental and social capacity of end-users with its original ESDD checklist (BIFFL ESDD checklist), such as internal structure, environmental and social policy, and systems for environmental, health and safety.

While the BIFFL ESDD checklist can be applied to all types of sub-projects, it does not have sector-specific questions. An officer who conducts ESDD set such questions for each sub-project as required, otherwise, BIFFL develops a new sector-specific ESDD checklist for sub-projects to strengthen the ESDD process. For instance, the JICA Energy Efficiency and Conservation Promotion (EECP) Financing Project developed the “E&S Consideration Field Visit Checklist” as its sector-specific ESDD checklist. This checklist is composed of two sections - environmental considerations and social considerations - and it has related questions about energy efficiency¹²⁰.

¹²⁰ “Are alternative energy conservation practices adopted (solar energy),” “Do they have plans to use energy efficiency machine?” According to a local consultant of the JICA EECP Funding Project, the checklist has not yet been finalized.

Table 210 BIFFL ESDD Checklist

Sl. No	Environmental and Social Risk Rating Criteria	Yes	No
1.	For new projects i. Does the project have any pending compliance such as Location and Environmental Clearance based on its category (Red, Orange-A, Orange-B and Green), from the DOE? For refinancing projects ii. Does the project have a pending DOE Clearance or pending necessary operating licenses and permits on EHS from respective regulatory authorities?		
2.	Is the project located in the immediate vicinity (likely to cause adverse impact) of environmentally critical areas (national parks, wetlands, wildlife habitats, important bird areas, and protected areas)? Ref: Environmentally Critical Areas Rules, 2010		
3.	Does the project construction and/or operation lead to environmental impacts that are diverse, irreversible and / or Unprecedented in nature? Refer to IEE/EIA reports if available or Environmental Due Diligence (EDD) during site visit, to answer this question		
4.	Does the project require involuntary resettlement that results in loss of land or livelihoods or physically displaces more than 200 persons?		
5.	Is the project site on or in immediate vicinity of socially vulnerable or Indigenous People owned or occupied land and has the potential to cause an adverse impact on their culture and identity?		
6.	Is the project vulnerable to climate change related impacts?		
	E&S Capacity of the Borrower		
7.	Does the Borrower have a documented Policy on Environmental and Social Performance?		
8.	Does the Borrower have dedicated human resources to address Environmental and Social performance?		
9.	Has the Borrower established and implemented Environmental, Health & Safety Management Systems and Social Accountability Systems for the Project SPV or in the parent company?		

Source: BIFFL (2014) ESMF

ii) Dutch Bangla Bank, IDLC Finance¹²¹

Dutch Bangla Bank and IDLC Finance have one generic ESDD checklist, and 22 sector-specific ESDD checklists. An ESDD checklist for food is included in the 22 sector-specific ESDD checklists. Regarding the ESDD checklist for food, it covers not only environment, society, and health issues, but also covers issues on food safety and the treatment of wastewater (e.g. Effluent

¹²¹ Both Dutch Bangla Bank and IDLC Finance have received supports from FMO. The ESDD checklists of food that they use are almost the same, as are other sector-specific ESDD checklists. Thus, they probably use the same ESDD checklist.

Treatment Plant (ETP)).

Table 211 ESDD checklists for food (Dutch Bangla Bank)

Item	No	Subitems	Parts / components
Environmental and social management, compliance, and labor practice	1	Environmental Clearance	Availability of ECC
	2	Environmental Clearance	Category of ECC
	3	Commitment	Commitment of the owner
	4	Manpower	(Structure) Correspondence of environmental issue
	5	Skills	(Technology) Correspondence of environmental issue
	6	Climate change	Influence on climate change
	7	Labor/Social issues	Child labor, minimum wage, health, hygiene
Environment	8	Produce contamination and hygiene	Compliance with food safety
	9	Land location/site	Consideration of vulnerability, claims
	10	Wastewater/ETP	Set up ETP
	11	Solid waste	Way of waste disposal
Occupational health and safety	12	Protective equipment	Providing safety equipment
	13	Training	Training for the environment, health, and safety
	14	Housekeeping	Keep hygiene standard
Fire safety	15	Fire safety and training	Fire-extinguisher system, safety exercise

Source: The Survey Team

6.3. Sub-project Selection Standards and Procedures in Environmental and Social Considerations

6.3.1. Potential Impacts from Sub-projects

(1) Results of the scoping for food processing companies

Eligible sectors are food-processing (fruit processing industry, vegetable processing industry, spice processing industry, rice, wheat, and bean processing industries, and the edible oils producing industry), seed manufacturer, organic fertilizer producers, biopesticide producers, logistic industries, wholesalers and transport industries, and retailers. In ECR, seed manufacturers, organic fertilizer producers, and biopesticide producers are in the Green category¹²². The Green category is comparable to the JICA Category C, and is not expected that such projects have severe

¹²² Organic fertilizer is not listed on the Schedule 1 of ECR, though a DoE officer suggested such categorization. Cold storage had been classified as Orange-B, but, currently, cold storage is Green. Biopesticide and organic pesticides are not listed on the Schedule 1 of ECR, while the company that produces biological pesticide was categorized Green by the ECC.

negative impacts on the natural and social environment. Logistic industries, wholesalers and transport industries, and retailer industries (except for cold storage) do not need ECC. Meanwhile, the food processing industry¹²³, which is the main target of the Project, is in the Orange-B category. It is expected that an Orange B project, which is comparable to the JICA Category B, has some negative impacts on the natural and social environment. A project categorized as Orange B is required to conduct IEE. Potential impacts on the natural and social environment were assessed during the field visits to 12 food processing companies.

Table 212 Results and Reasons for the scoping (case: food processing companies)

Potential impact food processing companies (in operation) [Bangladesh category: Orange-B , JICA Category: Category B]				
	No.	Impacted items on JICA Guidelines	Rating	Reason of the rating
Pollution	1	Air pollution	B-	Negative impacts on air quality are expected due to emissions from the boiler system using diesel, natural gas, or coal.
	2	Water pollution	B-	Negative impacts on water quality are expected due to discharging wastewater. Some industrial units have ETP to treat discharged wastewater, but some do not. Also, one of the ETPs does not treat wastewater well, and releases it without any additional treatment.
	3	Waste	D	Few impacts are expected due to the generation of food scraps and garbage, but this waste is not hazardous.
	4	Soil contamination	D	No impacts are expected since the food processing industry does generate hazardous or chemical waste.
	5	Noise	D	Few impacts are expected due to the noise caused by machines, motors, and compressors, but most of this noise is inside the factory, and may be within the noise standards when outside.
	6	Ground subsidence	D	Some food processing companies use groundwater but they do not use large amounts.
	7	Odor	B-	Food scraps, especially slaughter waste, causes a significant odor if they are not appropriately treated.
Natural environment	8	Protected area	D	No impacts are expected in operation. This should be assessed during the construction phase.
	9	Ecosystem	D	- as above
	10	Hydrology	D	- as above

¹²³ “Bakery” is classified as Green or Orange B, based on the industrial scale.

	11	Topography and geology	D	- as above
Social environment	13	Involuntary resettlement	D	- as above
	14	The Poor	B+	Positive impacts on the poor due to the creation of employment opportunities.
	15	Indigenous and ethnic group	D	No impacts are expected in the operation phase. Should be assessed during the construction phase.
	16	Local economies such as employment and livelihood	B+	Positive impact on the local economy due to the creation of a new industry in the area and employment opportunities for residents.
	17	Land use and utilization of local resources	C	The extent of the impact is unknown, and the impact depends on the scale of the industry.
	18	Water usage	B-	Negative impacts on drinking water are expected due to the pollution of surface water if an industry discharges wastewater without proper treatment.
	19	Existing social infrastructures and services	C	Few impacts are expected since food processing companies may develop or improve roads around their factories for better transportation.
	20	Social institutions such as social infrastructure and local decision-making institutions	D	No impacts are expected since social institutions abide by their decisions.
	21	Misdistribution of benefit and damage	D	No impacts are expected since the social institutions monitor the misdistribution of benefits.
	22	Local conflict of interest	D	No impacts are expected since the misdistribution of benefits may not occur.
	23	Culture heritage	D	No impacts are expected in operation. This should be assessed during the construction phase.
	24	Landscape	D	- do
	25	Gender	D	Negative impacts specified for women are not expected.
	26	Child rights	D	Negative impacts specified for children, such as child labor, are not expected.
	27	Infectious diseases such as HIV/AIDS	D	Food processing activities are not expected to cause infectious diseases.
	28	Labor environment	B-	Negative impacts are expected due to the production process, e.g. hearing loss and injuries.
	29	Accidents	D	Few impacts are expected since the transportation of processed food, and raw materials may increase road traffic.

Others	30	Cross-boundary impacts and climate change	D-	Greenhouse gas around the food companies may increase through the usage of a boiler system, and wastewater flows into international rivers.
--------	----	---	----	---

Rating: A+/-: Serious positive/negative impacts are expected. B+/-: Some positive/negative impacts are expected. C: Some extent of the impact is unknown (serious impacts are not expected, but survey and analysis should be done). D: Few positive/negative impacts are expected. A detailed quantitative review is not necessary.

* Impacted items refer to JICA Guidelines.

Source: The Survey Team

(2) Impact on the natural environment (food processing company)

As shown in Table 212, it is expected that food processing companies cause some extent of environmental and social problems. One of the most serious issues is water pollution through the discharge of wastewater. Food processing companies that discharge wastewater need to install an ETP, but some companies fail to do so. Moreover, after installation, an ETP often does not work properly. For example, one of the company’s surveyed by the Survey Team appeared to have a broken ETP, so untreated wastewater was being discharged into a pond. According to a person in charge of the environment and society sector at the Dutch Bangla Bank, the installation and conditions of an ETP are critical points when determining the disbursement available to food processing companies. He also mentioned that, even though a company reported to him that the ETP worked properly, he found that the same ETP did not work when he conducted an on-site inspection. In conclusion, in the Project, an environmental and social officer should confirm whether an ETP is installed, and if it works properly or not.



Source: The Survey Team

Photo 26 Current situation of wastewater discharge

(3) Impact on social environment (food processing company)

With respect to the social environment, food safety is one of the important issues in the food processing sector. The International Finance Cooperation (IFC) introduced the “Environmental, Health, and Safety Guidelines (EHSG)” to a sub-project, and the WB Group involves itself. EHSG has various sector-specific guidelines, one of which is “EHSG Food and Beverage Processing.” This sector-specific EHSG stresses that food safety is one of the important items to be assessed. This includes sanitation, Good Manufacturing Practice (GMP), pest control, chemical control, staff hygiene and education, customer complaints mechanism, and traceability. During the field visits to food processing companies, it appeared that large/medium size food processing companies, which obtain HACCP, take food safety issues seriously, while medium/small size food processing companies pay little to no attention to them.

	
<p>Cleanliness (Large-sized company)</p>	<p>Pasteurizer (Large-sized company)</p>
	
<p>Corroded trestle (Small-sized company)</p>	<p>Tarnished manufacturing equipment (Small-sized company)</p>

Source: The Survey Team

Photo 27 Current situations of food safety

6.3.2. Sub-project Selection Standards

(1) Sub-project selection standards

Sub-project selection standards on environmental and social aspects are as follows:

- (a) Exclusion from the Red category of ECR and JICA Category A;
- (b) Exclusion for sectors listed on the exclusion lists of ESRM and ESMS; and
- (c) Having valid ECC¹²⁴, factory licenses, and fire licenses

Reasons to set up the above selection standards are as follows:¹²⁵

- Red Category (ECR) and JICA category A projects should be excluded from the Project, as they might have the same level of negative impacts on the environment and society, and are both required to conduct an EIA;
- The exclusion lists of ESRM and ESMS comply with IFC, and other international donors' standards. Thus, by using these exclusion lists, BIFFL can exclude sectors that have severe negative impacts on the natural and social environment; and
- Issuance of ECC and a factory license could be used as evidence that a sub-project complies with national natural and social environment standards. Most food processing companies use fire for their operations, risking accidental fires that may cause severe negative impacts on the environment and society. Thus, obtaining a fire license is mandatory.

The ECR and JICA Categories of eligible sectors in the Project are shown in the table below. Not all eligible sectors are comparable to the Red category of ECR or JICA Category A. The food processing sector, which is the main target of the Project, is in the Orange-B category of ECR and JICA Category B.

¹²⁴ Exclusions for the project/industry are those that do not require an ECC, such as wholesalers, transport and retailers.

¹²⁵ At the stage of selecting eligible sectors, the sectors that may be under JICA Category A or the Red category of ECR have been excluded.

Table 213 Categorization of eligible sectors

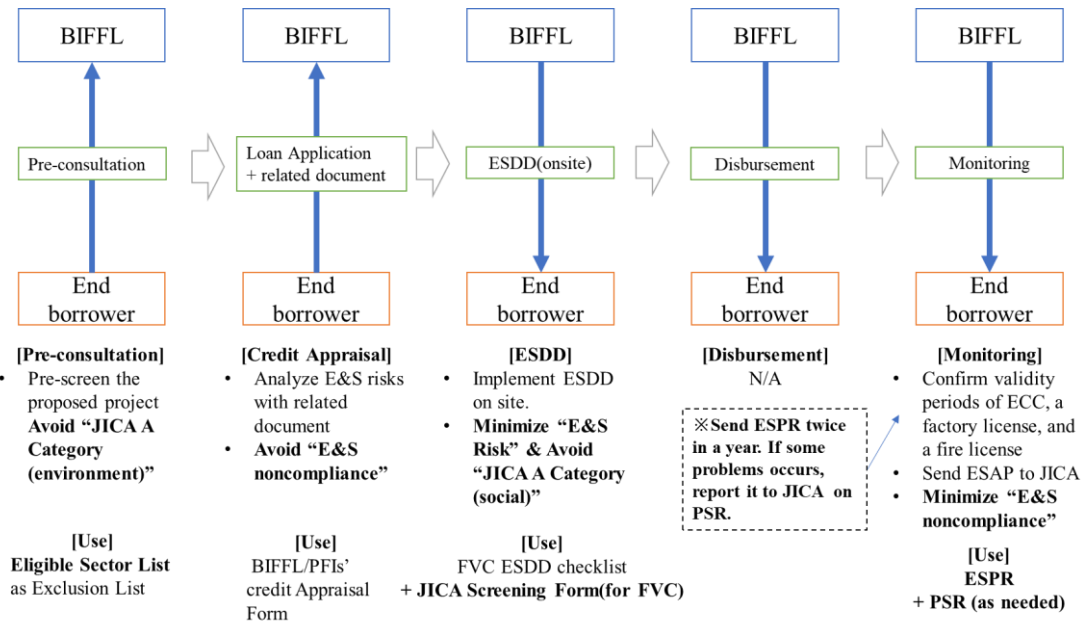
Bangladesh category	Eligible sectors	ECR	JICA Guideline
Green	Organic fertilizer producers*	Organic fertilizer manufacture	C
	Seed processing industry	Seed producer	C
	Biopesticide producers*	Pesticide (Biopesticide)	C
	Logistic industries, wholesalers and transport industries (incl. cold storage)	Cold storage	C
	Retail industries (including supermarkets) (incl. cold storage)	Cold storage	C
Orange A	Spice processing industry	Grinding husking of wheat, rice, turmeric, pepper, pulses (up to 20 Horse Power)	C
	Rice, wheat, and bean processing industry	Factory for production of biscuit and bread (capital up to five hundred thousand Taka)	C
Orange B	Edible oil-producing industry	Edible oil	B
	Fruit processing industry, vegetable processing industry,	Processing and bottling of drinking water and carbonated drinks	B
	Fruit processing industry, vegetable processing industry, spice processing industry, rice, wheat, and bean processing industry	Processing fish, meat, food	B
	Vegetable processing industry,	Starch and glucose	B
	Spice processing industry	Grinding husking of wheat, rice, turmeric, pepper, pulses- above 20 Horse Power	B
	Rice, wheat, and bean processing industry	Biscuit and bread factory, above 5 (five hundred thousand Taka)	B
	Logistic industries, wholesalers, and transport industries	—	—
Retail industries (including supermarkets)			

* Not on the list. A DoE officer or the company determined the category

Source: The Survey Team

6.3.3. Selection and Monitoring Sub-projects

The flowchart of the sub-project selection procedure and the monitoring methods are stated below.



Source: The Survey Team

Figure 72 Flowchart of environmental and social considerations

- Pre-consultation: Exclude JICA Category A and the Red category of ECR projects through the use of the eligible sectors list. Sectors that may be categorized into JICA Category A (environmental aspect) or the Red category of ECR will not be eligible. Thus, BIFFL excludes sub-projects that have severe potential environmental and social risks.
- Loan application and related documents: Confirm components of a sub-project on a loan application form, and the status of the required documents (e.g. validity periods of an ECC). Through this confirmation process, BIFFL excludes the possibility to disburse sub-projects that do not comply with national regulations.
- ESDD: Conduct ESDD by using the Screening Form for FVC (Annex 5 of the Operational Guidelines (Appendix 5)) and the ESDD checklist (Annex 6 and 7 of the Operational Guidelines). BIFFL minimizes the environmental and social risks of sub-projects, and it excludes the sub-projects to be regarded as JICA Category A (social aspect). Even though sub-projects that might be classified as JICA Category A have already been excluded in process (a), BIFFL cannot check "social aspects" from the eligibility list, such as land acquires and complaints from residents living in the vicinity of the sub-projects. Thus, BIFFL uses the "Screening Form for FVC" when it conducts ESDD to exclude sub-projects that have negative impacts on society.

- (d) **Monitoring:** Monitor sub-projects' compliance with environmental and social regulations through confirming validity periods of ECCs, factory licenses, and fire licenses. Additionally, BIFFL reports biannually on such validity to JICA through the JICA Environmental Social Performance Report (ESPR) (Annex 8, I-(6) of the Operational Guidelines (Appendix 5)). In case a sub-project causes any environmental and social problems, BIFFL reports it to JICA on PSR.

6.4. Capacity Building of BIFFL in Environmental and Social Considerations

6.4.1. Evaluation of the Capacity of BIFFL's Environmental and Social Considerations

(1) Overview and evaluation of ESMS

BIFFL has an original ESMS, called "Environmental Social Monitoring Framework" (ESMF). ESMF was established in 2014, and complies with international and national environmental and social standards. Evaluations of ESMF based on the "Checklist of Environmental and Social Management System of Financial Institutions (ESMS checklist)" (Appendix 9) are as follows:

1) Environmental and social consideration policy

BIFFL stipulated ESMF as ESMS. ESMF is well organized and works properly.

2) Procedure for environmental and social considerations

(a) ESDD for the food processing sector

BIFFL has neither a sector-specific ESDD checklist nor a guidance note for the food processing sector. Even though the BIFFL ESDD checklist is suitable for analyzing and evaluating general environmental and social risks, it cannot check food safety risks - one of the significant confirmation items in the food processing sector. The "E&S Consideration Field Visit Checklist" of the JICA EECF Financing Project is one of the sector-specific ESDD checklists in BIFFL, but it does not include food safety issues. Additionally, as BIFFL does not have enough experience of ESDD for the food processing sector, there is a concern regarding its implementation capacity of ESDD for the Project. Thus, the sector-specific ESDD checklist including the food safety issues for the Project shall be developed and the concerned BIFFL officer(s) are recommended to attend food safety training to conduct appropriate ESDD.

(b) Exclusion of JICA Category A

The exclusion list of ESMF complies with the IFC performance standards, the

Multilateral Investment Guarantee Agency (MIGA), ADB, and national regulations (e.g. ECR). However, JICA Category A is not included in the exclusion list. Thus, there is a possibility that BIFFL selects a sub-project that is classified as JICA Category A.

3) Organization and staff

(a) Shortage of officers in the Environmental and Social Unit of BIFFL (ESU)

There is only one permanent officer in the Environmental and Social Unit of BIFFL (ESU). BIFFL may provide financing to large numbers of SMEs through executing the Project. Therefore, it might be difficult for only one officer in ESU to manage ESU duties, such as conducting ESDD and monitoring validity periods of licenses. As of March 2020, recruitment for a new social expert is under the process.

(b) Lack of knowledge about food safety

One BIFFL officer in ESU has basic knowledge about environment and social considerations from taking the safeguard policy training provided by ADB. However, this officer has not received any training related to the food processing sector, and BIFFL does not have any food processing sector experts. Since it is expected that a disbursement to food processing companies will account for a large proportion of the Project, ESU will often conduct ESDD. In other words, an officer in ESU will confirm “food safety issues” when s/he conducts ESDD. There is a concern about the current level of knowledge and expertise regarding food processing and food safety amongst the present staff.

4) Monitoring and reporting

Depending on the nature of sub-projects, some companies send a monitoring report to BIFFL, and others do not. BIFFL collects ECCs, factory licenses, and fire licenses from all sub-projects to check their compliance. Through confirming validity periods of those licenses, BIFFL ensures that their sub-projects comply with national environmental and social regulations.

5) Experiences

BIFFL has never received any complaints about environmental and social issues. BIFFL has knowledge on working with international donors, including JICA.

6.4.2. Improvement Plans for BIFFL in Environmental and Social Considerations

Based on the results of the ESMS checklist, the following improvement plans are proposed for BIFFL.

(1) Environmental and social consideration policy

ESU will immediately inform changes to ESMF to JICA at least within one week (during the Project).

(2) Procedures for environmental and social considerations

(a) The BIFFL officer in ESU does not have enough expertise on the food processing sector, thus the ESDD checklist for the Project will be developed to conduct an appropriate ESDD (before the Project begins).

(b) ESU will use the Screening Form for FVC to avoid sub-projects in the JICA Category A (during the Project).

(3) Organization and staff

(a) BIFFL will increase human resources in ESU to manage the Project, because it is expected that disbursements increase and only one permanent officer in ESU cannot handle it properly (during the Project).

(b) The BIFFL officer will join food safety training to conduct an appropriate ESDD in the food processing sector (during the Project).

(4) Monitoring and reporting

(a) It is challenging to receive monitoring reports from all sub-projects because a large number of disbursements is expected. Instead, BIFFL checks validity periods of ECCs, factory licenses, and fire licenses to confirm compliance of the sub-projects (during the Project).

(b) BIFFL will submit ESPR (FVC) to JICA during the Project every six months. If any environment and social problems occur, BIFFL reports them to JICA on PSR (during the Project).

7. The Promotional Seminar

7.1. Seminar Program

With a view to disseminating the information on the Project to potential end-borrowers and to introduce food related machinery and equipment, the online promotional seminar was organized on 15th December, 2020.

The number of the participants in the seminar was 185 (the number of the registration was 278) and the composition of the participants was as follows;

- Participants from companies: 150 persons (103 companies)
- Participants from executing partners (e.g. BAPA, BSCIC and BFSa): 15 persons
- Participants from donor agencies (e.g. ADB, USAID and IFAD): 5 persons
- Participants from BIFFL: 15 persons

In addition, 24 persons in total participated in the seminar as speakers or for arrangement or for the arrangement. The composition was MoInd (3 persons), BAPA (1 person), BIFFL (6 persons), Japanese companies (5 persons from 4 companies), JICA (4 persons) and the Survey Team (5 persons).

The outline of the seminar program was as follows;

(1) Opening Remarks (10:00 - 10:15)

Upon the opening of the seminar, representatives from MoInd, BIFFL and JICA made the opening remarks. In the opening remarks, the representatives emphasized the necessity of the Project explaining the background of the Project formulation. The representatives made the opening remarks are as follows:

- Mr. K M Ali Azam, Secretary, MoInd
- Mr. Md. Selim Uddin, Additional Secretary, MoInd
- Mr. S. M. Anisuzzaman, CEO, BIFFL
- Mr. Akito Takahashi, Director, South Asia Division 4, South Asia Department, JICA

(2) Introduction of Agro-food Processing Industry Development Policy 2020 (10:15 - 10:30)

Mr. Md. Salim Ullah, Senior Assistant Secretary of MoInd, then explained the overview of the draft Agro-food Processing Industry Development Policy. In this presentation, he also explained the main targets of the draft Policy.

(3) Outline of the Project (10:30 - 10:40)

The Survey Team then explained the background, objectives, implementing mechanism of the Project. In this presentation, the Survey Team also explained the term and conditions of the TSL and also the overview of the capacity building programs to be provided in the Project.

(4) Challenges of FVC in Bangladesh, Needs and Impacts of Capital Investment (10:40 - 10:55)

The Survey Team also explained the overview of the food value chain analysis conducted in the Survey, referring to the issues identified in the food value chains of the major farm products in Bangladesh, such as potatoes and mangoes. The Survey Team also introduced the necessary capital investment to address such issues.

In this presentation, the Survey Team also explained the major issues in the food safety management and necessary capital investment.

(5) Eligibility of End-Borrowers (10:55 - 11:15)

BIFFL then explained the eligibility of TSL, referring to the eligible business types, eligible business sectors of borrowers, eligible raw materials and eligible products. BIFFL also explained the eligibility criteria of social and environmental aspects.

(6) Application Procedure for On-lending Loans (11:15 - 11:40)

BIFFL also explained the loan application procedures, mentioning the documents to be submitted by end-borrowers upon pre-screening and appraisal. BIFFL also explained the major points to be examined in the loan appraisal processes.

(7) Introduction of Japanese Food related Machinery and Equipment (11:40 - 12:40)

Japanese companies, Ishida, Mayekawa and Marubeni, then made presentations to introduce capital investment for the improvement of food value chain in Bangladesh.

Ishida explained its multi-head weighers, automatic wrappers and inspection systems, while Mayekawa introduces the food processing lines, compressors for cold storage and the design of multi-purpose cold storage. Marubeni then explained its operations in Bangladesh and potential of freeze dry products in Bangladesh.

In addition, Sojitz Machinery explained its business plan in Bangladesh.

(8) Q & A Session (12:40 - 13:10)

Questions received from participants upon registration and during the seminar were answered

by the Survey Team and BIFFL. See 7.2 for the major questions asked by participants and their answers made by the Survey Team and BIFFL

(9) Closing Remark (13:10 - 13:15)

As the closing remark, Mr. Syed Md. Shoaib Hasan, Vice President of BAPA, emphasized the necessity of the enhancement of food value chain in Bangladesh and financial access of SMEs, referring to the importance of this Project.

7.2. Questions and Answers

7.2.1. Questions by the participants and answers by BIFFL and the Survey Team

Questions were collected from the participants upon the registration and also during the seminar. Questions raised by the participants and answers made by BIFFL and the Survey Team are explained in this section. Questions are categorized into three categories, namely (1) Loan application process / conditions, (2) feasible sector / investment and (3) Technical Support / Information

(1) Loan application process / conditions

1) Does JICA invest in a new plant of an agribusiness and food processing company?

JICA does not make any investment in agribusiness and food processing companies in FVC Improvement Project. The Japanese ODA loan fund provided by JICA to the government of Bangladesh (Ministry of Finance) will be lent to BIFFL first. BIFFL will then use the loan fund for the loans to agribusiness and food processing companies.

2) What are the terms and conditions of the loans?

Please see presentation materials or the brochure. If more information needed, contact BIFFL.

3) Any securities needed for the loans?

Security requirements are different among businesses and projects. Such requirements are determined through the loan assessments by BIFFL. In case BIFFL recognizes large credit risk in a potential borrower, BIFFL may request additional loan security to the borrower.

4) When does BIFFL start accepting loan applications?

BIFFL starts accepting loan application from March 2021.

5) Is there any minimum limit for loan?

There is no minimum limit.

(2) Feasible sector /investment

1) Can small industries or new entrepreneurs take loans?

Any kind of industries, including small businesses and new entrepreneurs, can apply for loans if they meet eligibility criteria.

2) Is it possible to have loans for working capital?

Loan funds cannot be used for working capital. The loan fund is only for capital investment and technical know-how.

3) Is it possible to repay existing loans by the loan provided under this Project?

The loan fund cannot take over or refinance other loans.

4) Is there any preferential sector?

Eligible business sectors are i) Fruit processing industry, ii) vegetable processing industry, iii) Spice processing industry, iv) rice, wheat and bean processing industry, v) edible oil producing industry, vi) seed processing industry, vii) organic fertilizer producers / biological pesticide producers, viii) wholesalers and logistics industries including warehouse and transport industries and ix) retail industries (including super markets).

Dairy products, fish processing and meat processing are not eligible at the moment.

5) Is it possible to receive loans for farm products?

Farming and cultivation are not feasible for financing. Processing of farm products is basically feasible.

6) Is food processing equipment manufacturing eligible for financing?

Equipment manufacturing is not eligible for financing.

7) Can a company currently engaged in a non-eligible business sector take loans under this Project?

If a company currently engaged in a non-eligible business sector starts an eligible

business, it is eligible for financing.

8) Is the renovation of existing machinery or equipment eligible for financing?

Renovation or BMRE (balancing, modernization, rehabilitation and expansion) investment is eligible for financing.

(3) Technical Support provided under the Project

1) Do you have any plan to organize any training or seminars on food safety?

Yes, several capacity building activities or training seminar are to be organized in the Project. Such capacity building activities will cover i) business management, ii) food processing and iii) food safety management. The details of such capacity building activities are to be announced later.

2) Does the Project give food machinery demonstration?

The training seminars to be organized under the Project will explain what kind of equipment or machinery will be needed for enhancing food processing and food safety management. However, machinery demonstration is not planned at the moment.

3) What kind of technical supports are provided?

Several capacity development activities or training seminars are organized in the Project in the area of i) business management, ii) food processing and iii) food safety management.

A borrower can use the loan fund under the Project for obtaining technical know-how or receiving consulting services.

Technical supports for machinery operation or food processing technique should be asked to engineering companies or machinery suppliers.

4) Can we receive machinery information?

The training seminars organized in the Project will provide general information on food processing machinery or food safety equipment. However, the Project does not provide information of specific machinery or equipment. A potential borrower which requires information of specific machinery or equipment should contact engineering companies of suppliers.

7.2.2. Issues to be considered in the Project implementation

Several participants asked whether dairy processing and meat processing were eligible for

On-Lending Loans in the Project. It would be necessary to include these sub-sectors as eligible business sectors in case there is a certain demand for capital investment and the capital investment increases the value addition generated in these sub-sectors. It should be noted that the change in the eligible business sectors will be regarded as a revision of the Operational Guidelines, which is to be approved by the Project Working Committee with the concurrence of JICA.

Other participants also made comments that protected horticulture should be included in the eligible business sectors, as the protected horticulture would increase the quality of horticulture products and increase the value addition generated by the food value chain. Similarly, it would be necessary to consider including protected horticulture in the eligible business sectors in case a certain demand for On-Lending Loans is identified. It would be also necessary to confirm that the value addition of horticulture products in Bangladesh will increase as a result of the capital investment.

(End)