

Kingdom of Bhutan

**Preparatory Survey on BOP Business for
Improving Rural Livelihoods by Skill
Transferring Japanese Organic
Mushroom Production Method
Final Report
(Summary)**

April, 2016

**Japan International Cooperation Agency (JICA)
Haruka International Ltd.
Alliance Forum Foundation
Orinus Partners Ltd.**

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1 Survey Overview

1.1 Background and Objective of the Survey

1.1.1 Survey Background

This proposed project which plans to cultivate organic mushrooms in Kingdom of Bhutan (hereinafter “Bhutan”) aims to 1) improve living standard of small-scale farmers in Bhutan by introducing income crops and 2) offer Japanese consumers safe and secure foods in stable price by supplying organic foods which are produced in Bhutan to Japanese market. It also examines other foreign markets, such as India which is neighboring country, as sale destinations.

Bhutan faces an urging issue, that is to help small-scale farmers (in this survey, it is defined as farmers whose annual income is below 3,000 US dollars) who are left behind the economic growth, especially female farmers who bear farming since male farmers go to cities for a paid job. The government of Bhutan seeks to solve the problem by introducing and expanding cash crops including mushrooms. The production method of organic mushrooms which Haruka International Ltd. (hereinafter “Haruka”) developed is low-cost and highly productive. Introduction of the production method will contribute not only to increase income of farmers but also to empower women as it is lighter work than rice cultivation or other major agriculture in Bhutan. The organic mushrooms made in Bhutan by the technology transfer will be distributed within Bhutan and be shipped to foreign countries including Japan as well, which will lead to stable income for Bhutanese farmers. At the same time, it contributes to solve a recent problem of food safety and security in Japanese market, as mushrooms imported from China which have this problem are dominant. The Prime Minister Tobgay and the Minister Dorji of Agriculture and Forest of Bhutan expressed full support on this project.

1.1.2 Survey Objective

The objective of the survey is to assess feasibility of organic mushroom production by Haruka in Bhutan. Bhutan has particularly high potential for mushroom production and it is excellent with Haruka’s organic mushroom production since it has the rich natural environment including clean water and air, the climate which can keep between 15 to 25 degrees Celsius, the range which is suitable for mushroom bed cultivation of Haruka, and the possibility of procurement of mushroom bed materials. In that sense, very high feasibility is expected. However, when it comes to establish the business in practice, it is essential to manage sustainably by accumulating and effectively combining human resources, organization, facilities, land, materials, and capital. Furthermore, it is important to fully understand demand for mushrooms and social development challenges through literature and field study, design the business which will lead to solve the problems essentially, and build local partnership.

2 Summary of the Survey

2.1 Summary of the Survey

2.1.1 Outcome of the Survey and Its Evaluation for Commercialization

This survey was undertaken by investigating and determining following items: 1) market survey, 2) pilot production, 3) business planning, 4) development impact, and 5) potential collaboration with JICA. In the market survey, potential demand in mushroom market is examined from the situation of mushroom farmers and the market in Bhutan as well as the situation of organic mushroom markets in Japan and overseas. At the same time, feasibility of production including procurement of raw materials and feasibility of logistics are examined. Then, the study team determined business plan, development impact, and potential collaboration with JICA.

Based on the results of survey, Haruka made a decision to go forward with its commercialization. It adopts a business model which imports original fungus from Japan and cultivates locally. It transfers technology to mushroom farmers and cultivates organic mushrooms. While it satisfies demand of local market, it also exports mushrooms to international markets by purchasing them from the farmers.

The details of commercialization processes are remained as future challenges, and the discussion is ongoing with Druk Holdings and Investments (hereinafter “DHI”), which is a local partner. Haruka plans to start the business after designing its local operation in Bhutan in 2016. The completion of training for the farmers and mushroom cultivation and harvesting is estimated in year 2017.

2.1.2 Evaluation for Production

To investigate feasibility of production of mushrooms in Bhutan, the pilot production was implemented. Training for the local staff was provided since February 2015, and the pilot production begun in May. On one hand, the man-hour was beyond estimation as executives and engineers of Haruka stayed on local site for the training and cultivation multiple times. On the other hand, result of the production was successful as it had similar output in quality and quantity¹ than the production in Japan, which proved that the production technology of Haruka is possible to be deployed in Bhutan.

2.1.3 Partnerships with Local Partners

Through this survey, partnerships with potential local partners was built, and organization design for commercialization in Bhutan was established. Main partners are the Ministry of Agriculture and Forests including National Mushroom Center (hereinafter “NMC”), DHI, local mushroom farmers’ union, and farmers. The pilot production was conducted at current NMC site, and its staff was trained and executed production. Through this process, Haruka’s production method was comprehended and technology was partially transferred. As NMC has a mission to grow mushroom industry as well as to improve mushroom farmers’ living, it is expected to be in charge of training for farmers,

¹ 0.5kg per one mushroom bed

recommendation and support for selection of potential farmers. DHI, governmental investment arm under the Ministry of Finance, is expected to promote this business through investment and management support. In the survey, DHI played important roles as a local partner including local arrangements, pilot production supervision, and logistical supports such as issuance of visas. Haruka and DHI is in discussion for establishment of local joint company. In the company, DHI is expected to be responsible for investment and management. Through the survey, relationship with the mushroom farmers' union and individual farmers who will be production practitioners was proactively created. The survey group has visited farmers, conducted discussions, shared the pilot production progress, and received their requests for early commercialization. Fourteen farmers have participated in a debriefing session of the pilot production result, and they expressed strong interests on Haruka's business launch.

2.1.4 Result of Market Survey

The market survey proved marketability and growth potential of organic mushrooms. Demand for safe and secure organic mushrooms is high both domestically and internationally. Within Bhutan, there is strong demand for high quality mushroom in hotels and restaurants which serve for foreign tourists. In addition, Bhutanese households have custom to eat mushrooms which lead to market demand. Currently, it is difficult for the households to purchase mushroom produced in Bhutan as supply is not enough, and is not affordable. Mushrooms are imported from India in low price under free trade agreement between Bhutan and India. However, the quality is not high, and there is a concern in its safety as formalin is overused during the cultivation. Therefore, demand for safe and secure domestic mushrooms is strong since domestic products are highly trusted.

The result of pilot sales of the mushrooms (Shiitake, Oyster, and Wood ear) harvested in the pilot production showed high potential for Haruka's high quality organic mushrooms. Consumers in Bhutan showed strong interest, and the mushrooms are sold in higher prices than the average market price.

In international markets, the growth of demand for organic mushrooms is confirmed. Worldwide organic food market in 2014 is 84.2 billion US dollars, and it has grown at a 9.4% annual rate between 2010 till 2014². Although an organized statistical data on organic mushroom market does not exist, according to a survey conducted by Haruka, the price of organic mushrooms is very high in European Union. For example, dried oyster mushrooms are 15 euro for 35 grams at retail price according to the logistic company with whom Haruka does business. In Dubai in the Middle East, the price is in a similar range. In Japan, imported mushrooms from China dominates more than 90 percent of the market, but the number of imports is decreasing rapidly as chemicals beyond standard are detected in 2008. On the contrary, the price continues to increase, so it is predicted that demand for safe mushrooms is high. Furthermore, in Japan, the possibility of expansion is high because Haruka can

² Report Linker (<http://www.reportlinker.com/p0188829-summary/Organic-Food-Global-Industry-Guide.html>)

utilize its existing sales channels. In the proposed project, exports to the international markets will be started after sales channels in Bhutan are exploited.

2.2 Area of Potential Cooperation with JICA

2.2.1 Necessity of Cooperation

Haruka has been planning to implement business to promote organic mushroom production technology in Bhutan. However, Haruka found two major obstacles through the survey; (1) lack of organic mushroom producer and human resource for guidance on production technology in terms of number, knowledge and ability, and (2) Thimpu metropolitan area is not always appropriate for all kinds of mushroom production. Haruka plans to conduct human resource development program at their farm in Japan and model farm in Bhutan by utilizing JICA scheme of “Verification Survey with the Private Sector Dissemination Japanese Technologies”.

2.2.2 Potential Collaboration with JICA

Haruka applied to JICA’s competitive scheme of “Verification Survey with the Private Sector for Disseminating Japanese Technologies”, and its proposal was approved at the end of January, 2016. Objective of the “Verification Survey with the Private Sector for Disseminating Japanese technologies” is to implement verification and dissemination project in order to verify whether products and technologies of the selected Small and Medium Enterprises in Japan are useful for solving development issues of the targeted developing country, and to develop dissemination strategy of them. The reasons why Haruka considered that the scheme matches with its objective are, (1) the scheme is appropriate for the business phase of Haruka to conduct dissemination verification of their technology for future business expansion by utilizing the study results of the present “Preparatory Survey for BOP Business Promotion”, and (2) exit of the scheme is SMEs’ business expansion in developing countries, which is appropriate for organic mushroom production business of Haruka in Bhutan.

As conceivable business scheme for collaboration in addition to “Verification Survey with the Private Sector for Disseminating Japanese Technologies”, first of all, JICA “Private-sector partnership volunteer program” can be utilized. Ministry of Agriculture and Forests in Bhutan and NMC have requested the study team to dispatch human resource who is capable to proceed technical dissemination. Secondly, collaboration with JICA’s “Horticulture Research and Development Project” can be realized. In this project, the project team conducted technical transfer to their counterparts, and the counterparts conducted technical transfer to farmers. Then, those farmers become model farmer, and they conduct technical transfer to their neighboring farmers, which can be regarded as precedent for technical transfer that organic mushroom business in Bhutan by Haruka. At present, JICA’s “Integrated Horticulture Promotion Project in the West Central Region” is ongoing with project period from 2016 to 2020. Field visit to their project sites and interviews with stakeholders involved in the

project can be continuously organized and conducted for future collaboration with the proposed mushroom business by Haruka.

2.3 Development Impact

Organic Mushroom Cultivation business in Bhutan by Haruka is an important step for increasing income of farmers and fostering organic mushroom industry as needs at Bhutan side. At the same time, for Haruka, technical dissemination of their mushroom production would (1) lead to the increase sales of their mother spawns, material and equipment required for their mushroom production methodology, (2) contribute to increase and stabilization of procurement amount of harvested mushroom for their exporting mushroom to foreign countries. Therefore, Haruka has been designing this business with recognition and resolution, and maintain and expand it in a sustainable manner.

2.3.1 Situations of the BOPs and Development Issues

In this survey, the study team conducted questionnaire survey as a baseline survey targeting 10 households of typical small-scale farmers in the target areas, Thimphu and Paro. NMC selected 10 households of typical small-scale mushroom farmers in response to the letter from study team to DHI and NMC prior to their field survey.

Budget situation of targeted small-scale farmers												8 months (January–August 2015)		
Aggregate results of 10 sample farmers households														
Unit: Nu	Farmer 1	Farmer 2	Farmer 3	Farmer 4	Farmer 5	Farmer 6	Farmer 7	Farmer 8	Farmer 9	Farmer 10	Average			
Income	Mushroom	96,000	125,000	300,000	250,000	22,000	23,000	24,000	100,000	210,000	16,000	116,600		
	Apple			400,000	280,000									
	Asparagus			250,000	150,000									
	Chili						25,000							
	Cabbage						15,000							
	Other products				30,000									
	Wage work						240,000	144,000						
	Debt													
	Others			512,000		240,000								
	Sum	96,000	125,000	1,462,000	710,000	262,000	303,000	168,000	100,000	210,000	16,000	345,200		
Expense	Agriculture	52,000		75,000	30,000		2,400	150,000	800,000					
	Life						120,000	80,000		32,000	400,000			
	Repayment		204,000	440,000		120,000	500,000	52,800	152,000		40,000			
	Others													
	Sum	52,000	204,000	515,000	30,000	120,000	622,400	282,800	952,000	32,000	440,000	325,020		
Revenue	44,000	-79,000	947,000	680,000	142,000	-319,400	-114,800	-852,000	178,000	-424,000	20,180			

(Source: Questionnaire survey by the study team)

Table 1: Budget situation of targeted small-scale farmers (2015)

Table 1 shows incomes and expenses that the study team aggregated from results of baseline survey. Average income among surveyed households between January-August 2015 was 345,200 Bhutan Ngultrum (hereinafter “Nu”) (equivalent to 629, 000 Japanese Yen (Hereinafter “Yen”))

approximately), and average expense of the said period was 325,020 Nu (equivalent to 592,400 Yen approximately), and average revenue as gap between income and expense was 20,180 Nu (equivalent to 36,800 Yen approximately) per year, resulting in a small amount of profit. However, if we look at the results for each household individually, we can observe present situation that half households of the targeted famers were making profit and the rest are not. The reason behind this is because harvest efficiency of mushroom per log is low in the wood log cultivation applied in the target areas. Lack of technology in mushroom cultivation, which is to be considered as the cause, is one of the issues to be solved for the purpose of income improvement of small-scale farmers in Bhutan.

In addition, farmers suffering from a certain amount of monthly repayment are seen here and there as another aspect that attention should be paid for. The reason of this is considered that, first investment amount is incredibly high for a large numbers of logs, their transportation, and their labors in the wood log cultivation in the target areas.

On the other hand, development issues that small-scale farmers in the target area suffer from on mushroom cultivation are listed as below.

- (1) Weight per deciduous log necessary for the wood log cultivation is about 30 kg, and it is exceedingly heavy and rather hard for female farmers to carry them (4-5 responses out of 10).
- (2) Quality of spawns for mushroom cultivation provided by NMC with free of cost is low, and they are deteriorated with the years (4 responses out of 10). As a result of that, harvest amount and frequency of cultivation per year is low.
- (3) Logs being used for the wood log cultivation get sick, or are often infected by green mold, blue mold, etc. (3 responses out of 10).
- (4) Marketing of cultivated mushroom has been difficult as a result that sales competition has arisen with other mushroom farmers (3 responses out of 10)
- (5) It is difficult to obtain (straight) deciduous logs necessary for wood log cultivation (3 responses out of 10). Consequently, harvest amount of mushroom doesn't reach to possible amount to be realized.
- (6) Technical support for mushroom cultivation is lacking (3 responses out of 10).
- (7) It is difficult to obtain pine leaves necessary for wood log cultivation (2 responses out of 10).
- (8) Miscommunication with NMC staff has arose due to long distance between their house and NMC (1 response out of 10).

2.3.2 Development Impact Scenario and Indicators (Performance Index)

Out of eight development issues raised in 2.3.1, there are 4 issues to be solved by the proposed business, that is, (1) heavy labor of female farmers in the preparation process of mushroom cultivation,

(2) low quality of mushroom bed and its deterioration, (3) illness and occurrence of mold in the cultivation on withered tree logs, (4) difficulty of marketing in the competition with other mushroom farmers. This is because Haruka plans to import spawn for organic mushroom cultivation that they developed from Japan to Bhutan, to culture them locally in Bhutan, and sell them to farmers' cooperatives, small-scale famers, and training center. Although the conventional wood log cultivation needs heavy labors, female farmers can be actively involved in mushroom bed culture because each mushroom bed block used in the sawdust substrate cultivation are light. For small-scale farmers, by purchasing mother spawn for inoculation from Haruka, (1) they will be freed from heavy labor dealing with heavy deciduous logs in the wood log cultivation, (2) they will be able to utilize mushroom bed block instead of mushroom bed with low quality and quick deterioration that are presently distributed by NMC. Then, if technical transfer of organic mushroom production technology by Haruka proceeds, (3) they won't suffer from illness of logs and occurrence of mold, (4) improvement of sales and profit from organic mushroom selling can be expected. In addition, there is a large possibility that waste mushroom bed can be recycled contributing to diversification of income opportunity.

In addition, it becomes possible that small-scale farmers contribute to create new employment opportunities by their learning organic mushroom cultivation technology of Haruka, and foster young generation, especially female with high unemployment rate as supervisors or managers.

Through a series of activities above, this proposed business aims to generate development impacts including improvement of production efficiency by small-scale farmers, and contribute to income increase of the farmers.

Based on the Development Impact Scenario described above, the study team set development impact indicators as shown in Table 2 below.

No.	Indicators	Baseline Data	Tendency of change
(1) Female's heavy labor in the preparation process of mushroom cultivation			
1	Operation time in the preparation process	Labor time of preparation process in mushroom cultivation on logs	Labor time is decreased at midline and end line compared to that at baseline
2	Female labor population engaged in mushroom cultivation	Female labor population engaged in mushroom cultivation on logs	Female labor population is increased at midline and end line compared to that at baseline (Reference value) 98 persons (70% of 140 fostered farmers by this business)
(2) Low quality and deterioration of spawn			
3	Harvest amount/harvest times per month per mushroom block	Harvest amount/harvest times per month in mushroom cultivation on logs	Harvest amount/harvest times are increased at midline and end line compared to at baseline
(3) Illness and occurrence of mold in mushroom cultivation on logs			
4	Illness and occurrence of mold per month of mushroom bed block used in sawdust substrate cultivation of HI	Frequency of illness and occurrence of mold per month in mushroom cultivation on logs	Frequency of illness and occurrence of mold is decreased at midline and end line compared to those at baseline
(4) Difficulty of marketing in the competition with other mushroom farmers			
5	Sales and profit per year obtained from organic mushroom selling	Sales and profit per year obtained from present mushroom selling	Sales and profit are increased at midline and end line compared to those at baseline (Reference value) 14,097Nu(trial amount of improvement of annual income per farmer)

(Source: The study team)

Table 2: Baseline data of Development Impact