

The United Republic of Tanzania

Preparatory Survey on BOP business on the
Introduction of Japanese Food Drying
Technology for Value Addition to Agricultural
Produce and Developing an Export Industry

Final Report (Summary)

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Japan International Cooperation Agency(JICA)

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1 Overview

1.1 Background

Semi-dried sweet potato is a popular natural snack in Japan. These days, as more Japanese look for healthier diets, the popularity of semi-dried sweet potato has increased. Through a process of saccharifying (storing sweet potatoes at a cool temperature to enhance sweetness), steaming, peeling, slicing and drying, sweet potatoes change into a unique, soft and tasty food. This food has been made since the 18th century in Japan and has been popular both as a highly-nutritious preserved food and as a light snack. Its annual production exceeds 10,000 metric tons, with a production value over \$7 billion (USD) in Japan.

On the other hand, as the population ages the number of farmers continues to decrease resulting in a reduced harvest of sweet potatoes suitable for making these products.

Since the annual production of sweet potatoes in Tanzania (3,345,000 metric tons in 2014) exceeds that of Japan (887,000 metric tons in 2014), there is great potential for semi-dried sweet potato processing in Tanzania.

1.2 Purpose

This preparatory survey was carried out for the following purposes:

1. To build a business model to manufacture and sell semi-dried sweet potatoes in Tanzania
2. To create a concrete business plan through a pilot operation
3. To verify the environmental and social impact
4. To verify the development impact as a BOP business
5. To consider the possibility of working with JICA

1.3 Survey Method

After collecting information on the investment and business environment, the survey team established a local company and conducted a pilot business operation to collect practical information. The pilot operation covered the activities of procurement, processing, packaging, logistics, sales and collection of receivables.

1.4 Survey Period

Starting from April 2014, the survey team visited Tanzania nine times by the time the survey ended in May 2016. As a member of the survey team moved to Dodoma in April 2015, other activities were carried out in Tanzania separate from the above visits.

1.5 Survey Team

The survey teams consisted of the four organizations below which are private companies in Japan.

- Organic Solutions Japan LTD (agriculture and food processing in East Africa)
- Terunuma Katsuichi Shoten Co., Ltd. (semi-dried sweet potato manufacturer)
- Sanshu Sangyo Co., Ltd. (food drier manufacturer)
- E-Square Inc. (consulting)

2 Survey result

2.1 Business Feasibility

The survey team has found the food processing business, in particular the manufacturing of semi-dried sweet potatoes, to be feasible. Sweet potato crisps and dried mango along with semi-dried sweet potatoes were successfully made during the pilot operation and were sold in the domestic market. These products have a good chance to be exported not only to neighboring countries in Africa, but also to developed countries, including Japan.

Based on the pilot operation during the survey, the local company (Matoborwa Co. Ltd.) established by the survey team will scale up the operation in 2016 and move to export its products from 2017 and beyond.

2.2 Results of the Business Model Verification

2.2.1 Specification of the Food Drier

The food drier was modified taking into account the environment of the pilot factory. Based on the existing model of Sanshu Sangyo Co., Ltd. (a food drier manufacturer in Japan), the power supply unit, fuel source and material of the machine were changed considering the unstable power supply in Tanzania.

2.2.2 Specifications of the Storage Facility

The survey team visited sweet potato storage facilities in Japan and researched conventional storage methods in Tanzania. Based on the results, the survey team reached the conclusion that a refrigeration facility modified from a used reefer container or a prefabricated refrigerator should be installed in the factory while farmers store sweet potatoes in their improved underground storage facilities before shipping the produce.

2.2.3 Verification of the Business Model for the Domestic Market

The survey team procured sweet potatoes and mangoes, made semi-dried sweet potatoes (Matoborwa), sweet potato crisps (Vitamu) and dried mango, and sold the products in the domestic market. Although the quality of the sweet potato crisps and dried mango were satisfactory and well-received by the market, it was difficult to make good semi-dried sweet potatoes and the production and sales were carried out on a very limited scale. The reaction from the market regarding semi-dried sweet potatoes was also good.

(1) Procurement of Raw Materials

As the sweet potato for making semi-dried sweet potatoes needs a high level of quality and only specific varieties are good for processing, procurement from the market is currently not possible in Tanzania. Procurement through direct trade with farmers, contract farming or directly managed farms will be the most realistic options for obtaining qualified sweet potatoes.

The sweet potatoes for making sweet potato crisps should be sourced by the above approaches as well since other specific varieties are needed and freshness is crucial for product quality.

Fresh mangoes should ideally be bought from contract farmers. However, these can be bought from traders and markets if the varieties are suitable.

(2) Processing

Although this project was initiated to commercialize sweet potatoes, the survey team found that making quality semi-dried sweet potatoes in Tanzania was rather difficult because of the lack of suitable sweet potato varieties and the lack of knowledge and facilities to efficiently saccharify the local sweet potatoes.

On the other hand, sweet potato crisps and dried mango can be made more easily. Thus, the survey team reached the conclusion that sweet potato crisps and dried mango should first be commercialized while importation of suitable sweet potato varieties for making semi-dried sweet potatoes is promoted.

(3) Sales

To verify the marketability of the products, the survey team sold its products (mainly sweet potato crisps and dried mango) at outlets in Dar es Salaam, Morogoro and Dodoma for ten months. Average monthly sales per outlet were Tsh 90,000 for small-sized kiosks and Tsh 270,000 for middle to large-sized supermarkets.

Sweet potato crisps (product name: Vitamu) are a traditional Japanese snack which was modified to cater to the Tanzanian palate. The wholesale and retail prices are listed below.



Figure 1 Package of Vitamu

Table 1 Price of sweet potato crisps (Tsh)

Product name	Content	Pcs in one box	Packing	Wholesale price	Retail price
Vitamu	45g	48	Box	28,800 (@600)	700 - 1,000
Vitamu	90g	24	Box	30,000 (@1,250)	1,600 - 2,000
Vitamu	185g	12	Box	28,800 (@2,400)	2,900 - 3,500

Dried mango (product name: Matoborwa –Dried Mango–) is processed without any sugar or additives using after-ripened mangoes of Keitt or Kent varieties. The wholesale and retail prices are listed below.

Table 2 Price of dried mango (Tsh)

Product name	Content	Pcs in one box	Packing	Wholesale price	Retail price
Dried Mango	90g	18	Box	63,000 (@3,500)	4,000 - 5,500

The company is still in a trial and error stage to establish a method to make good semi-dried sweet potatoes as it is struggling to obtain satisfactory raw materials and identify an acceptable way to saccharify them before processing.

2. 2. 4 Verification of the Possibility to Export the Products

The survey team verified the possibility to export semi-dried sweet potatoes to Japan, sweet potato crisps to Kenya and Botswana and dried mango to Denmark. It was revealed that for semi-dried sweet potatoes, the quality of raw materials (sweet potatoes) needed to be improved by introducing suitable varieties and a saccharifying facility from Japan. For sweet potato crisps and dried mango, the products can be exported upon receipt of TFDA (Tanzania Food and Drugs Authority) certificates and the certificate of origin if the right market is found. Negotiations are currently underway with some traders to export these products.

2. 3 Business Plan

2. 3. 1 Business model

Quality, inexpensive farm produce (sweet potatoes, mangoes, pineapples, bananas, etc.) are processed with Japanese technology to make delicious, nutritious and healthy food products in Tanzania. The major product categories of the local company will be semi-dried sweet potato, sweet potato crisps and dried fruits.

The high season for sweet potatoes is from May to August, from December to March for mangoes and pineapples and bananas may be procured throughout the year. By using seasonal produce, the utilization level of the factory is maximized.

After exploiting the domestic market in Tanzania, the aim is to export the products to Japan from 2017. Raw sweet potatoes will mainly be procured directly from contract farmers. So as to encourage the farmers to produce quality crops collaborations with NGOs and agricultural institutions are being created to provide extension services to them. Farmers can increase their income by securing a stable marketing outlet through the processing factory.

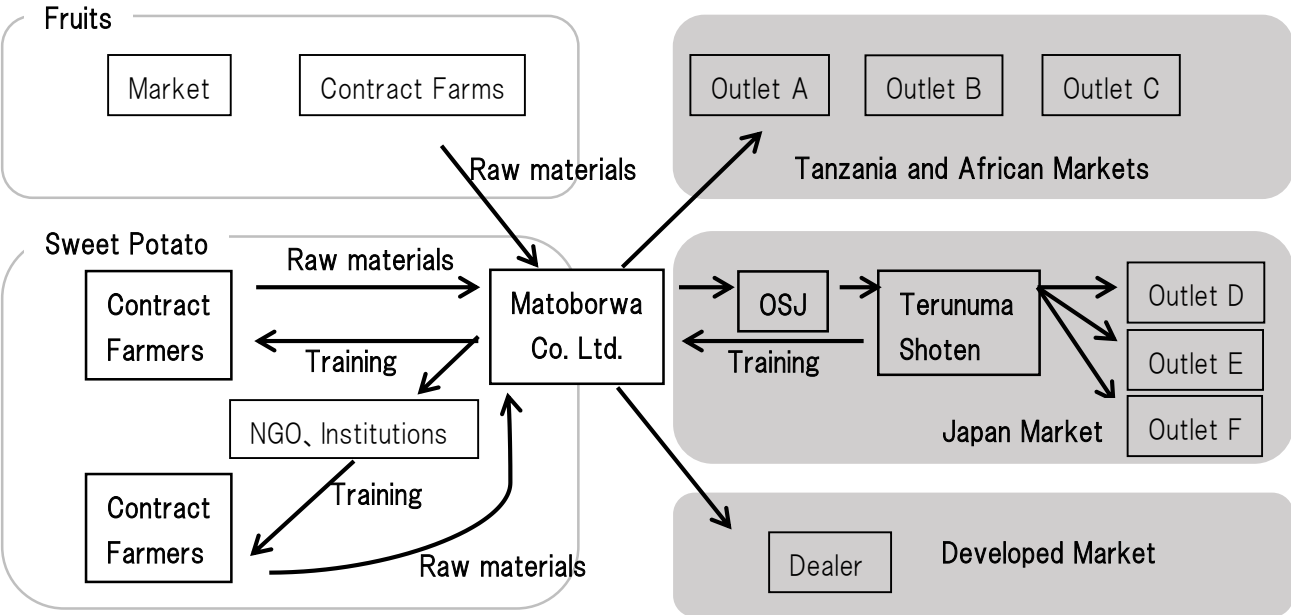


Figure 2 Business model

2. 3. 2 Schedule

The business development schedule from 2016 to 2018 is described below

Table 3 Business Development Schedule

	2016	2017	2018
Sweet potato procurement	<ul style="list-style-type: none"> • Introduction of Japanese varieties • Research on storage methods 	<ul style="list-style-type: none"> • Test of Japanese varieties • Training of farmers 	<ul style="list-style-type: none"> • Registration of Japanese varieties • Strengthen extension service
Production and product development	<ul style="list-style-type: none"> • Semi-dried sweet potatoes for domestic market • Dried fruits • Sweet potato crisps 	<ul style="list-style-type: none"> • Semi-dried sweet potatoes for export market 	<ul style="list-style-type: none"> • Construction of a new processing factory
Marketing and sales	<ul style="list-style-type: none"> • Export products to African markets 	<ul style="list-style-type: none"> • Export products to Japan 	<ul style="list-style-type: none"> • Expand sales in Japan
Management	<ul style="list-style-type: none"> • Financing for new equipment • Introduction of new equipment 	<ul style="list-style-type: none"> • Briefing to investors 	<ul style="list-style-type: none"> • Raise capital

2.3.3 Challenges and countermeasures

The biggest challenges for this project are establishing the quality of semi-dried sweet potatoes for export market and securing quality sweet potatoes as raw materials. Countermeasures to these challenges are as follows:

1. Introduction of Japanese sweet potato varieties which are developed for food processing
2. Introduction of better facilities for saccharifying and storing sweet potatoes
3. Provision of extension and training services to contract farmers

2.4 Operation plan

2.4.1 Product development plan

While Matoborwa Company develops products for the domestic market and improves the quality of these, it prepares to export semi-dried sweet potatoes to the Japanese market. By increasing product varieties, sales per outlet increase, resulting in the improvement of distribution efficiency and profitability.



Figure 3 Package designs

Table 4 Schedule for product launch

Product	Variety	2016 (1 st)	2016 (2 nd)	2017 (1 st)	2017 (2 nd)
Matoborwa	Plain				
Vitamu	Honey				
	Salt garlic				
	Sesame ginger				
Dried fruits	Mango				
	Pineapple				
	Banana				
	Jackfruit				
	Coconut				

2. 4. 2 Sales and distribution plan

(1) Sales

Based on the pilot operation and the product development plan, the survey team has made the following sales plan for the domestic and export markets.

Table 5 Sales plan (USD)

	2016	2017	2018	2019
Domestic sales	43,200	185,600	200,000	300,000
Export sales	0	60,000	720,000	1,080,000
Total	43,200	245,600	920,000	1,380,000

(2) Distribution

Matoborwa Company will deliver its products for the domestic market itself, without using outside distributors, while it works together with exporters for the African market. The company will use reefer containers to export its semi-dried sweet potatoes from Dar es Salaam port to Yokohama port in Japan. Once Terunuma Katsuichi Shoten Co., Ltd. (one of the survey members) has received the consignments, it will package the products after ensuring the quality.

2. 4. 3 Procurement Plan for Raw Materials and Plant Equipment

The procurement plan for raw materials and plant equipment is described below.

Table 6 Production plan (ton/year)

	2016	2017	2018	2019
Semi-dried sweet potato (Matoborwa)	1.1	10.8	122.8	184.0
Sweet potato crisp (Vitamu)	2.6	4.8	8.0	12.0
Dried mango	0.6	4.8	4.3	6.5
Other dried fruits	0.8	6.0	4.3	6.5

Table 7 Procurement plan for sweet potato (ton/year)

	2016	2017	2018	2019
Sweet potato for Matoborwa	7	72	819	1,227
Sweet potato for Vitamu	4	8	13	20
Total	11	80	832	1,247

Table 8 Procurement plan for mango (ton/year)

	2016	2017	2018	2019
Mango for dried fruits	9	75	67	102

As the biggest challenge is expected to be the unstable supply of quality sweet potatoes, these will be procured through several means, including direct trade with contract farmers as well as sourcing from our own farms.

While mangoes will be sourced from contract farmers, other fruits will be procured from the market.

Table 9 Production capacity plan (ton/four months)

	2016	2017	2018	2019
Semi-dried sweet potato	3.6	10.8	36.0	72.0
Sweet potato crisp	4.8	4.8	9.6	9.6
Dried mango	1.6	4.8	16.0	32.0
Other dried fruits	2.0	6.0	20.0	40.0

The company will increase the capacity of the drying facility by three times in 2017 and by 30 times in 2018 compared with 2016. The capacity for the production of Vitamu will double in 2017 and quintuple in 2018 compared with 2016.

The company will import major equipment from Japan and source other equipment locally.

Table 10 Annual Production Schedule

	1	2	3	4	5	6	7	8	9	10	11	12
Semi-dried sweet potato					▶							
Dried mango / pineapple	▶											▶
Dried banana				▶					▶			

2.5 Resource Plan

2.5.1 Organization Structure of Matoborwa Company

Matoborwa Company was established in 2014 with a capital of USD 96,000, where Terunuma Katsuichi Shoten Co., Ltd. invested USD 30,000, E-Square Inc. USD 30,000, Organic Solutions Japan LTD. USD 30,000, Mr. Chrispin Sukwa USD 1,000 and a private investor USD 5,000.

The organizational structure of Matoborwa Company is described below.

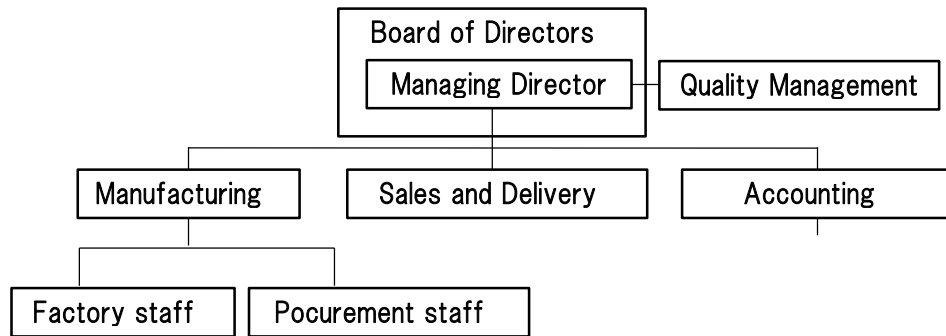


Figure 4 Organizational structure of Matoborwa Company

The plan for human resources is as follows.

Table 11 Human resource plan (persons)

	2015	2016	2017	2018	2019
Accounting	1	1	1	1	1
Sales and Delivery	1	1	3	4	5
Procurement	1	1	4	5	6
Manufacturing	3	6	12	18	24
Total	6	9	20	28	36

2.5.2 P/L plan

The profit and loss planning for Matoborwa Company is as follows.

Table 12 P/L plan

	2015 (Actual)	2016 (Planned)	2017 (Planned)	2018 (Planned)	2019 (Planned)
Sales	7,612	43,200	245,600	920,000	1,380,000
Cost of production	1,761	15,180	113,382	344,110	471,583
Gross profit	5,850	28,020	132,218	575,890	908,417
Selling and general administrative expenses	20,208	38,605	133,596	300,476	443,036
Labor cost	10,560	14,160	54,960	78,720	114,480
Sales cost	381	4,320	37,580	92,000	138,000
Depreciation cost	7,000	17,000	17,000	52,000	87,000
Utilities cost	1,517	1,925	19,256	53,756	79,556
House rent	750	1,200	4,800	24,000	24,000
Operating profit (loss)	▲ 14,357	▲ 10,585	▲ 1,378	275,414	465,381
Non-operating income	0	0	0	0	0
Non-operating expense	0	0	0	0	0
Ordinary profit (loss)	▲ 14,357	▲ 10,585	▲ 1,378	275,414	465,381
Extraordinary income	0	0	0	0	0
Extraordinary expense	0	0	0	0	0
Pretax profit (loss)	▲ 14,357	▲ 10,585	▲ 1,378	275,414	465,381
Income tax	0	0	0	82,624	139,614
Net profit (loss)	▲ 14,357	▲ 10,585	▲ 1,378	192,790	325,767

2.6 Environmental and Social Considerations

2.6.1 Environmental Considerations

The environmental impact of the business is not significant. Sweet potato skins will be discharged from the processing plant as waste and, as these can serve as very nutritious animal feed, farmers in the neighborhood are willing to take them. Other residues such as mango skins can be composted for use at the company's farm.

2.6.2 Social Considerations

Farmers can acquire sweet potato planting materials at minimal cost as these can be multiplied by the farmers themselves. No observations have been made of gender or religious constraints regarding the cultivation of sweet potatoes.

2.7 Development Impact

2.7.1 Beneficiaries of the Proposed Business

Small-scale sweet potato farmers are the most targeted beneficiaries of the proposed business. Sweet potato farmers in Tanzania face the following challenges:

- low productivity
- lack of bargaining power
- high volatility in trading price
- lack of appropriate storage facilities
- post harvest loss during transportation

-lack of market information

We will work with contract farmers to improve the productivity and quality of sweet potato production and will procure sweet potatoes directly and constantly from them. The income of the farmers will increase and become more stable through this collaboration.

Female workers will also benefit from the proposed business. Women have less job opportunities with inferior labor condition compared with men in Tanzania. Matoborwa Company will train and offer decent work to female workers.

People affected by vitamin A deficiency can also benefit if the company uses vitamin A-rich orange-fleshed sweet potatoes (OFSPs) as raw materials. 33% of children aged 6-59 months and 37% of women aged 15-49 years are estimated to be vitamin A deficient in Tanzania. OFSPs are promoted by various organizations including the Ministry of Agriculture, Livestock and Fisheries in Tanzania and the International Potato Center (CIP). The company will work with these organizations to further promote OFSPs.

2.8 Possible Collaborations with JICA

Collaboration with JICA is possible in the following areas:

(1) Introduction of sweet potato varieties which are suitable for food processing

This business will process sweet potatoes along with mangoes, pineapples and other fruits while only a few varieties suitable for food processing are introduced and cultivated in Tanzania. JICA can support the project by assisting with the introduction of Japanese sweet potato varieties which have been developed for food processing.

(2) Agricultural methods to improve yield and quality

Almost all of the sweet potatoes cultivated in Tanzania are for home consumption. The training of farmers to produce sweet potatoes of the right size and quality for food processing is necessary for sweet potato processing businesses to be profitable. JICA can support the training of farmers to improve sweet potato production.

(3) Introduction of saccharification and storage methods

While the climate of Tanzania is warm enough for sweet potato cultivation throughout the year, the production and availability of sweet potatoes significantly decreases in the dry season, resulting in higher prices. For the food processing industry, stable supplies and prices are preferable. On the other hand, sweet potatoes are not currently stored on a large scale in Tanzania. Moreover, to make quality, sweet semi-dried sweet potatoes, saccharifying sweet potatoes during the storage process is necessary. JICA can support the introduction of saccharification and storage methods from Japan.