Needs Survey under the Governmental Commission on the Projects for ODA Overseas Economic Cooperation in FY2015

Summary Report

Federal Democratic Republic of Ethiopia

Needs Survey on Agriculture (including Food/Food Products), Environment/Energy/Waste Management, and Vocational Training/Industrial Development

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The content of this report is a summary of the Needs Survey under the Governmental Commission on the Projects for ODA Overseas Economic Cooperation in FY2015, which is commissioned by the Ministry of Foreign Affairs of Japan in the FY 2015 and was carried out by myclimate Japan Co., Ltd. It does not represent the official view of the Ministry of Foreign Affairs of Japan.

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Introduction

This survey was conducted to identify the needs for products and technologies of Japanese small and medium enterprises to be promoted through Official Development Assistance (ODA) by Japan in Federal Democratic Republic of Ethiopia. The following three sectors were selected as survey target – Agriculture Sector, Energy and Environment Sector, and Vocational Training and Industrial Development Sector.

Chapter 1 – General Statement

Ethiopia is located in eastern Africa, called "Horn of Africa", which is surrounded by the Indian Ocean and the Red Sea. It is the oldest independent country that has continued since the ancient era. Its population is estimated as 96,9 million, ranked as 13th in the world and 2nd in the sub-Saharan Africa following Nigeria. Its land area, 1 million km^2, is three times as large as Japan. Between 4,630m -120 m height, there are mountainous lands, flat tablelands and deep valleys. Areas higher than 1,500m, which covers 45% of the country, are regarded as Highlands. The climate, population distribution, agriculture, economic activities, and lifestyles of these areas are different from that of Lowlands, which are lower than 1,500m.

From 2003 to 2008, GDP net growth rate of Ethiopia has maintained above 10%. This figure is much higher than the average of sub-Saharan African countries' during the same period. Despite high economic growth rate, the industrial structure of Ethiopia, which heavily depends on agriculture, has not changed. Diversification of the industrial structure and expansion of private sectors remain as critical development issues.

To deal with the above development issues, the Ethiopian government created the 5 year national development plan called Growth and Transformation Plan (GTP) in September 2010. The GTP has three basic policies – "Industrialization lead by agricultural development", "Development of export-oriented industry", and "Development of labor intensive industry". Following this, in November 2015, a new national 5 year plan from 2016 to 2020 called GTP II, is created. In this plan, the government is not only focusing on "Industrialization lead by agricultural development", but also "Investment in renewable energy projects including hydro, solar, wind, geothermal, and bio fuel", to make use of abundant natural resources to meet the increasing domestic energy demand due to rapid economic growth.

Chapter 2 – Agriculture Sector (including Food/Food Products)

I. Description of the current situation and development needs of the concerned development issues in the surveyed sectors

In Ethiopia, the majority of population are farmers, of which 90% are small-scale farmers relying on traditional agriculture, such as rain-fed and plowing by cows. Agriculture is the main industry

of Ethiopia which has two important roles – food self-sufficiency and acquisition of foreign currency. Essential development issues are identified as (1) improving the agricultural productivity and (2) promotion of market economy. Development of the agricultural sector is set as one of the priority areas in the Country Assistance Policy of Japan, and development issues (1) and (2) selected in this study are consistent with the policy. According to this policy, Japan plans to support the improvement of agricultural productivity for small-scale farmers, promotion of rural market economy, development of human resources in water related fields.

II. Sectoral analysis on the effectiveness of the products and technologies developed by the Japanese Small and Medium-sized Enterprises (SMEs)

The study team hypothesized and verified that effective solutions for (1) improving the agricultural productivity are small irrigation technology and organic fertilizer manufacturing equipment, which increase crop yield with limited land, and for (2) promotion of market economy, packaging machines and food processing machines.

From the field survey, the study team found out that small-scale farmers, who account for the majority of the country's agricultural production, employ ineffective traditional methods which cause low agricultural productivity, such as rain-fed farming, plowing cows and threshing by livestock, insufficient usage of fertilizer, and at the same time, dependence on chemical fertilizer is causing severe soil degradation. On the other hand, the study team identified lack of packaging technology as an obstacle in promotion of market economy, apart from lack of transport logistics, lack of storage technology, and lack of market information access.

The study team confirmed that Ethiopian government acknowledges the abovementioned factors as development challenges, and has been adopting countermeasures such as dissemination of small-scale irrigation systems, promotion of agricultural mechanization policy, soil conservation and effective use of organic fertilizers, as well as promotion of processing and export industries.

III. Possible applicability of the SMEs' products and technologies to the future ODA projects in the surveyed sectors

In this survey, small irrigation pumps, organic fertilizer production equipment, and small agricultural machinery (cultivator, threshing machine) are selected as Japanese small and medium-sized enterprises' technology that will contribute to the agricultural productivity improvement, and packaging machinery for contribution in promotion of market economy. Ethiopian government and private companies are highly interested in these machines. Meanwhile, there are Japanese small and medium-sized enterprises with small agricultural machinery and related technology which are interested in overseas market. However, since these machines are not widespread in local Ethiopian market, further investigations are required to clarify the

adaptability and maintainability of these machines in the local environment.

In order to disseminate these machines in Ethiopia, optimization in accordance with the local environment (climate, geology, etc.), capacity building of machine users, and technology transfer is required. To achieve this, the study team proposes the utilization of ODA-related schemes by JICA, namely "Feasibility Survey with the Private Sector for Utilizing Japanese Technologies in ODA Project" and "Verification Survey with the Private Sector for Disseminating Japanese Technologies".

IV. Possibility of business development by utilizing the SMEs' products and technologies in the surveyed sectors

Business development for respective Japanese technologies are expected to be as follows:

(1) Small irrigation pumps – Under management of Small Irrigation Directorate, which is under jurisdiction of Ministry of Agriculture and Natural Resource, small irrigation pumps are expected to be introduced among small scale farmers who are dependent on rain-fed farming.
(2) Organic fertilizer production equipment – Under management of Ministry of Agriculture and Natural Resource, organic fertilizer production equipment is expected to be introduced among small scale farmers who are dependent on chemical fertilizers.
(3) Small agricultural machinery – Under management of Mechanization Directorate, which is under jurisdiction of Ministry of Agriculture and Natural Resource, small agricultural machinery is expected to be introduced among small scale farmers who are dependent on traditional plowing cows and threshing by livestock.
(4) Packaging machinery – Under management of Food, Beverage and Pharmaceutical Industry Development Institute (FBPIDI), packaging machinery is expected to be introduced among local food processing plants and training institutions.

As for (1) – (3), cooperation from local research and development institutes such as Ethiopian Institute of Agricultural Research (EIAR) and Agricultural Transformation Agency (ATA) are also expected, in terms of information collection, technology verification and dissemination activities.

Chapter 3 – Environment/Energy/Waste Management Sector

I. Description of the current situation and development needs of the concerned development issues in the surveyed sectors

In Ethiopia, deforestation has been progressing due to fuel wood needs and farmland development for energy use. To deal with this issue, forest conservation is set as one of the important development issues of the country. This development issue is consistent with Country Assistance Policy of Japan. In the plan, climate change is a field to which Japan is much expected by

Ethiopian government to contribute, and support plan in forest conservation such as REDD+ is considered. Natural resource management programs such as "Sustainable Natural Resources Management Project through the Farmer Field School in Oromia Rift Valley Region" are implemented, which prevents unplanned deforestation and conserves forest resources, through establishing an appropriate forest resource management and afforestation system.

II. Sectoral analysis on the effectiveness of the products and technologies developed by the Japanese Small and Medium-sized Enterprises (SMEs)

Currently in Ethiopia, 92.1% of the energy consumption is from biomass, and firewood used for cooking occupies a large proportion. It is important to reduce firewood consumption to prevent deforestation. There are two approaches to reduce the consumption of firewood – (1) Efficient use of wood, and (2) Development of alternative fuel. The study team hypothesized and verified that effective solutions are high-efficiency home cooking stove and unused biomass utilization technology, such as pelletizer.

From the investigation, the study team found out that from the point of view of (1), an inefficient method called *Fuseyaki*, which consumes large amount of firewood, is currently widely used in Ethiopia to make charcoal. To deal with the issue, the government has been working on the excavation, selection and dissemination of a more efficient carbonization equipment, and is highly interested in Japanese technologies. One of the solutions being high-efficiency home cooking stoves, of which international organizations and NGOs have implemented dissemination programs. In addition to this technology, gasification stoves and ethanol stoves, which are not so popular in Japan, are expected to be introduced in the future. Therefore, the possibility of business expansion for Japanese small and medium-sized enterprises in this field is limited.

From the point of view of (2), though Ethiopia has abundant biomass resources, most of them are currently left unused. Converting these unused biomass resources to solid fuel and disseminating them as an alternative to firewood, is identified as an effective method to reduce firewood consumption. In fact, some private companies generating fuel from unused biomass, which are in the early stage of business, have emerged in Ethiopia, and are searching for technology transfer and financial support from Japan. In addition, Ethiopian government is also interested in fuel generation from coffee grounds, sawdust, alien species Prosopis juliflora, which are currently not utilized efficiently.

III. Possible applicability of the SMEs' products and technologies to the future ODA projects in the surveyed sectors

The study team identified equipment converting unused biomass to fuel such as small high-efficiency carbide devices, pelletizers, and large carbonization furnaces, as Japanese technologies

expected to resolve issues related to forest conservation in Ethiopia.

Small carbide devices operate without external power supply such as electricity and fossil fuels, easy to use and low cost. As for pelletizers and large carbide furnaces, further investigations are required to clarify their adaptability to biomass available in Ethiopia. It is also important to expand and build awareness regarding the technology, since there are few existing projects in Ethiopia.

When introducing the abovementioned technologies in Ethiopia, it is advised to modify the machines to adapt to materials available at the site. In addition, technology transfer related to machine usage and maintenance is necessary, assuming the lack of local human resources who are skilled in handling said machines.

To achieve this, the study team proposes utilization of ODA-related schemes by JICA, namely "Feasibility Survey with the Private Sector for Utilizing Japanese Technologies in ODA Project" and "Verification Survey with the Private Sector for Disseminating Japanese Technologies".

IV. Possibility of business development by utilizing the SMEs' products and technologies in the surveyed sectors

Business development for respective Japanese technologies are expected to be as follows:

(1) Small carbide devices – Under cooperation with Ethiopian Alternative Energy Development Center, small carbide devices are expected to be introduced among local communities who live by collection and fuel processing of forest resources.

(2) Pelletizers – Under cooperation with Oromia Forestry and Wildlife Enterprise and Jimma University, pelletizers which utilize unused biomass (such as coffee grounds) are expected to be introduced among local communities who live by collection and fuel processing of forest resources.

(3) Large carbonization furnaces – Under cooperation with respective local public institutions (such as Horn of Africa for Prosopis juliflora, Oromia Forestry and Wildlife Enterprise and Jimma University for coffee grounds), large carbonization furnaces which utilize unused biomass are expected to be introduced among local communities who live by collation and fuel processing of forest resources.

Chapter 4 – Vocational Training/Industrial Development Sector

I. Description of the current situation and development needs of the concerned development issues in the surveyed sectors

Ethiopia is focusing on the industrial structural transformation from agriculture to main industry, and the development of light manufacturing industry is set as one of the development issues. On the other hand, Country Assistance Policy of Japan includes "Support for food security and industrialization", which is consistent the development issue of Ethiopia. In this policy, Japan

plans to contribute through implementation of industrial policy dialogue and development support of the private sector. Considering the GDP contribution rate of each field from 1990 to 2014, there has been little progress in structural transformation from agriculture to light manufacturing industry. To find a solution to boost the development of light manufacturing industry, the study team attempted to identify suitable industries where Japanese small and medium-sized enterprises are able to expand business.

Firstly, as one of the key development industries listed by the Ethiopian government, business expansion possibilities in the textile industry, leather industry, wood products industry are investigated. Through the field survey, the team found out that for the textile industry, Ethiopian government expects investments from large scale factories, and in the leather industry, the government focuses on the production and export of the finished leather and final products. On the other hand, in the wood products industry, the government has a keen interest in "effective use of bamboo". Although the country has abundant bamboo resources, due to the lack of technology and knowledge, industrialization of the bamboo sector has made little progress.

II. Sectoral analysis on the effectiveness of the products and technologies developed by the Japanese Small and Medium-sized Enterprises (SMEs)

The study team identified “effective use of bamboo” as suitable manufacturing and processing technologies for vocational training and industrial development which Japanese small and medium-sized enterprises are familiar with. According to interviews with local government officials, severe lack of animal fodder and soil degradation due to chemical fertilizers are occurring. As some bamboo contain abundant lactic acid bacteria in the stem, it may be possible to resolve the country's fodder shortage and soil degradation issues by utilizing bamboo.

Regarding the bamboo powder manufacturing technology and bamboo powder fodder and fertilizer making technology, research and development have been active in Japan in recent years. Considering that Ministry of Agriculture, Forestry and Fisheries in Japan supports demonstration projects of bamboo powder, the Japanese government expects dissemination of the technology. Since Japanese bamboo powder manufacturing technology is easy to operate, adaptable to a wide range of bamboo size, technologically reliable, the study team confirmed that the technology is suitable to transfer to Ethiopia.

III. Possible applicability of the SMEs' products and technologies to the future ODA projects in the surveyed sectors

Further investigation is required to optimize the bamboo powder manufacturing technology and bamboo powder fodder and fertilizer making technology to be adaptable to the local environment, and technology transfer is required for human resource development of the local Base-of-Pyramid

(BOP), who live by collection and processing of bamboo resources. To achieve this, the study team proposes ODA-related schemes by JICA, namely “Feasibility Survey with the Private Sector for Utilizing Japanese Technologies in ODA Project”, “Verification Survey with the Private Sector for Disseminating Japanese Technologies”, or “Grant Assistance for Grass-Roots Human Security Projects”. Implementation of these schemes is expected to solve the shortage of fodder and soil degradation issues in Ethiopia, as well as contribute to job creation and income increase of the local BOP.

IV. Possibility of business development by utilizing the SMEs' products and technologies in the surveyed sectors

Under cooperation with related government bodies on management of bamboo resources (such as Ministry of Agriculture and Natural Resources, Ministry of Environment, Forest and Climate Change) as well as research institute (such as International Network for Bamboo and Rattan Ethiopia Office), bamboo powder manufacturing technology and bamboo powder fodder and fertilizer making technology are expected to be introduced in bamboo processing factories owned by said government bodies. The government bodies are expected to acquire the technologies through capacity building, and in turn conduct technology transfer towards local communities who live by collection and processing of bamboo resources.

Ethiopia

Needs Survey on Agriculture (including Food/Food Products), Environment/Energy/Waste Management, and Vocational Training/Industrial Development

Research Company and Counterpart Organization

- Name of Research Company： myclimate Japan Co.,Ltd.
- Survey Site・Counterpart Organization：： Addis Ababa、Jimma・MoA ,Ethiopian Alternative Energy Development Center, Oromia Forest and Wildlife Enterprise, Jimma Universiy, Horn of Africa, MoEPF, etc.

Concerned Development Issues

- Agriculture: Productivity Improvement, Market Economy
- Environment・Energy・Waste Treatment: Forest Conservation
- Industrial Development・Vocational Training: Development of Light industry

Products, Technologies, etc. of SMEs, etc.

- Agriculture: Small irrigation pump, Organic fertilizer production equipment, Small agricultural machinery, Packaging machine
- Environment・Energy・Waste Treatment: Small carbonization apparatus, Pelletizer, Large carbonization chamber
- Industrial Development・Vocational Training: Bamboo Powder production technology, Bamboo Powder feed・fertilizer technology

Proposed ODA Projects and Expected Impact

- Agriculture: Feasibility and Verification Survey on Small irrigation pump, Organic fertilizer production equipment, Small agricultural machinery, Packaging machine. Expected impact is farmers' income increase due to productivity improvement and added value.
- Environment・Energy・Waste Treatment: Feasibility and Verification Survey on Small carbonization apparatus, Pelletizer, Large carbonization chamber utilizing biomass. Expected impact is deforestation mitigation by utilizing biomass fuel.
- Industrial Development・Vocational Training: Feasibility and Verification Survey on Bamboo Powder production technology, Bamboo Powder feed/fertilizer technology. Expected impact is to solve problems of lack of feed and poor soil, and job creation and income increase for local BOP.

Future Business Development of SMEs, etc.

① Further market expansion
② Establishment of local production facilities
③ Development in similar African countries