

Yangon City Development Committee

## Summary Report

Republic of the Union of Myanmar

Verification Survey with the Private Sector  
for Disseminating Japanese Technologies  
for Improvement of Water Environment  
By Utilizing Johkasou  
As an Appropriate Technology

October 2017

Japan International Cooperation Agency

DAIGO SANGYO CO., LTD.



## 1. BACKGROUND

In Yangon City, installation of sewage management system consisting of the sewer pipe network and Sewage Treatment Plant (STP) has not been implemented due to huge investment costs and budgetary constraints, although there is a great need for appropriate sewage management because of the rapid urbanization in the City triggering a deterioration of water environment. On the other hand, installation of Johkasou, which is an on-site sewerage treatment equipment complementing conventional sewage treatment system, is promoted especially for some households and large-scale polluters such as commercial establishment and condominiums under the direction of Yangon City Development Committee (YCDC). YCDC has however, not yet established design calculation for Johkasou and has been developing operation and maintenance (O&M) and inspection of Johkasou. The Johkasou installed in Yangon City has not been properly functioning.

The JICA survey team revealed that the Johkasou installed in Yangon City was neither well-designed nor properly operated and maintained in line with the Feasibility Survey with the Private Sector for Utilizing Japanese Technologies in ODA Project for Water Environment by Utilizing Johkasou as an Appropriate Technology in Myanmar. Hence, the Survey team subsequently proposes that there is a need for a Verification Survey, aimed at establishing appropriate O&M framework in YCDC and thus disseminate Johkasou O&M system in Yangon City, through such activities as On-the-Job training, formulation of related guidelines and environmental education.

## 2. OUTLINE OF THE SURVEY

### (1) Purpose

The purpose of the survey is (i) to transfer O&M skills of the Johkasou through On-the-Job training to the counterpart in order to establish sustainable O&M framework of Johkasou in Yangon City, and (ii) to develop guidelines for installation, inspection and O&M in order to disseminate Johkasou in Yangon City.

### (2) Activities

Outputs of the Survey were enumerated below.

Output 1: Effluent water quality of existing Johkasou is improved through the transfer of appropriate O&M skills of Johkasou to YCDC.

Output 2: YCDC's capacity for installation, supervision and O&M of Johkasou is developed.

Output 3: Understanding of Johkasou among related officials is promoted.

Activities to achieve the Outputs are itemized as follows.

#### ➤ Activities for Output 1

1-1: Selection of existing Johkasou to be utilized for the On-the-Job training

1-2: Installation of new Johkasou in the public toilets in Maha Bandula Park and Kan Taw Min Lake Park

1-3: On-the-Job training for O&M of Johkasou including operating, cleaning and inspection, targeting the staff of YCDC. Johkasou utilized in the activity consists of existing Johkasou selected in “Activity of 1-1” and Johkasou newly installed in the “Activity of 1-2”.

1-4: O&M of Johkasou carried out by the staff of YCDC, utilizing the skills acquired during the course of the On-the-Job training

1-5: Water quality monitoring to verify effectiveness of appropriate Johkasou O&M skills and framework. This activity includes baseline survey on the present sanitary condition in Yangon City to verify effectiveness of Johkasou.

➤ Activities for Output 2

2-1: Formulation of draft guideline covering capacity calculation, installation, supervision and O&M of Johkasou. The guideline also covers management plan for disposal of sludge produced in Johkasou.

2-2: Establishment of draft ledger of Johkasou as well as systematic and phased O&M plan of Johkasou, based on the draft guideline.

2-3: Training course for O&M of Johkasou, implemented in Japan from 5<sup>th</sup> to 11<sup>th</sup> February, 2017.

➤ Activities for Output 3

3-1: Developing materials on environmental education including utilization of Johkasou in collaboration with YCDC

3-2: Holding seminars on “Johkasou, as an appropriate technology for water environment improvement” in collaboration with YCDC.

**(3) Information of Product/ Technology to be Provided**

The technology to be provided is well-established O&M skills for Johkasou, acquired by Daigo Sangyo Co., Ltd. Group, through their activities in order to meet the most stringent water quality standard in Japan, which is posed to Lake Biwa basin in Shiga Prefecture.

**(4) Counterpart Organization**

Yangon City Development Committee, YCDC

**(5) Target Area and Beneficiaries**

Target Area: Yangon City  
Beneficiaries: Residents in Yangon City

(6) Duration

From March 2016 to December 2017

(7) Progress Schedule

		FY2015	FY2016										FY2017										
		2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	
Kick-off Meeting																							
<b>Activities for Output 1</b>																							
1-1: Selection of existing Jobkassou to be utilized for the On-the-Job training	(1) Set up of Jobkassou O&M framework																						
	(2) Selection of existing Jobkassou for on-the-job training																						
1-2: Installation of new Jobkassou in the public toilet in Maha Banzhla Park and Kan Taw Min Lake Park	(1) Installation of Jobkassou in Maha Banzhla Park (1 (rf)-5 units)																						
	(2) Installation of Jobkassou in Kan Taw Min Park (80(rf)-1 unit)																						
1-3: On-the-Job training for O&M of Jobkassou including operating, cleaning and inspection, targeting the staff of YCDC	(1) Lectures on operating, cleaning and inspection of Jobkassou																						
	(2) On-the-job training on operating, cleaning and inspection of Jobkassou																						
1-4: O&M of Jobkassou carried on by the staff of YCDC, utilizing the skills acquired during the course of the On-the-Job training	(1) O&M of Jobkassou carried on by the staff of YCDC, under support of Japanese experts																						
1-5: Water quality monitoring to verify effectiveness of appropriate Jobkassou O&M skills and framework	(1) Water quality monitoring for newly installed Jobkassou																						
	(2) Water quality monitoring for existing Jobkassou																						
<b>Activities for Output 2</b>																							
2-1: Formulation of draft guideline covering capacity calculation, installation, supervision and O&M of Jobkassou	(1) Consultation with YCDC on methodologies of formulation of draft guideline																						
	(2) Consultation with YCDC on draft guideline																						
	(3) Review of the guideline based on activities of 1-3 and 1-4																						
	(4) Consultation with YCDC on finalization of guideline																						
	(5) Consultation with YCDC on strategy for sludge management																						
2-2: Establishment of draft ledger of Jobkassou as well as systematic and phased O&M plan of Jobkassou, based on the draft guideline	(1) Data collection of existing Jobkassou (including data of Jobkassou provided by Wamim)																						
	(2) Consultation with YCDC on strategy for establishing ledger of Jobkassou, based on draft guideline																						
	(3) Assistance for formulating form of ledger of Jobkassou																						
	(4) Review of ledger based on the contents of guideline																						
	(5) Consultation with YCDC on strategy for formulating O&M plan of Jobkassou																						
	(6) Assistance for formulating form of O&M plan of Jobkassou																						
2-3: Training course for O&M of Jobkassou, organized in Japan	(1) Training course for O&M of Jobkassou in Japan (lecture/site survey)																						
<b>Activities for Output 3</b>																							
3-1: Creating materials on environmental education including utility of Jobkassou in collaboration with YCDC	(1) Creation of and consultation on materials on environmental education																						
3-2: Holding seminar on "Jobkassou, as an appropriate technology for water environment improvement" in collaboration with YCDC	(1) Consultation with YCDC on agenda and schedule of seminar																						
	(2) Holding Seminar																						
<b>Business Promotion</b>																							
1. Strategy for business promotion	(1) Analysis of strategy and consultation																						
	(2) Consultation of collaboration																						
2. Marketing strategy	(1) Analysis of O&M cost based on outputs 1 and 2																						
	(2) Consultation with YCDC on O&M cost																						
3. Distribution planning	(1) Distribution planning for Jobkassou																						
4. Profit planning	(1) Profit planning for sales and O&M of Jobkassou																						

Plan  
Actual

## (8) Manning Schedule

Assignment	Name	Company	Plan/Actual	FY2015		FY2016										FY2017										Total			
				2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	Plan/Actual	Survey in Myanmar	Domestic Works		
Project Manager /Assistant of Formulation of Ledger	Hideji KAMIYANAGI	Daigo Sangyo Co., Ltd.	Plan																								Plan	8.50	1.10
			Actual																									Actual	5.60
Project Manager /Assistant of Formulation of Ledger	Kenji Numura (Shift from KAMIYANAGI)	Daigo Sangyo Co., Ltd.	Plan																								Plan	0.00	0.00
			Actual																									Actual	2.70
Johkasou Installation Management /Water Monitoring	Ryobei SHIMNOKAWA	Moriyama Kansei Co., Ltd.	Plan																								Plan	10.50	1.10
			Actual																									Actual	10.50
Chief Advisor	Hitoshi SHIMOKOCHI	CTI Engineering International Co., Ltd.	Plan																								Plan	1.00	0.00
			Actual																									Actual	0.47
ガイドライン作成1	Atsuki HORII	Moriyama Kansei Co., Ltd.	Plan																								Plan	0.93	1.00
			Actual																									Actual	0.93
ガイドライン作成2	Noriatsu MIYAGI	Kusatsu City	Plan																								Plan	0.93	1.00
			Actual																									Actual	0.93
O&M of Johkasou 1	Hiroyuki ISHIDA	Okumura Kogyo Co., Ltd.	Plan																								Plan	2.00	0.25
			Actual																									Actual	0.50
O&M of Johkasou 2	Junichi INOBUCHI	Ritto Sogo Sangyo Co., Ltd.	Plan																								Plan	2.00	0.25
			Actual																									Actual	0.50
O&M of Johkasou 2	Sozohi HIRAYAMA (Shift from Inoguchi)	Ritto Sogo Sangyo Co., Ltd.	Plan																								Plan	0.00	0.00
			Actual																									Actual	0.50
Sludge Management /Assistance of O&M Plan作成補助	Tsuoyoshi KAWAMOTO	CTI Engineering International Co., Ltd.	Plan																								Plan	2.00	1.00
			Actual																									Actual	2.10
Business Promotion	Katsunori NOBUSAWA	Geo Brain Co., Ltd.	Plan																								Plan	1.50	1.00
			Actual																									Actual	1.50
Environmental Education	Hiroyuki MIYORISHI	CTI Engineering International Co., Ltd.	Plan																								Plan	1.00	1.25
			Actual																									Actual	1.25

## (9) Implementation System

Japanese Side: Daigo Sangyo Co., Ltd.

Myanmar Side: YCDC

Japanese side consists of the following members.

Table 1 Implementation System

	Members	Responsibility
Prime company	Daigo Sangyo Co., Ltd.	• To manage the Survey and transfer technical skills for installation and O&M for Johkasou
	Moriyama Kansei Co., Ltd.	• To transfer technical skills for installation and O&M for Johkasou and implement monitoring survey including water quality monitoring • To draft guideline for installation and O&M for Johkasou
Personnel from other companies	Okumura Kogyo Co., Ltd.	• To conduct on-the-job training of installation and O&M for Johkasou, assisting Japanese expert of prime company
	Ritto Sogo Sangyo Co., Ltd.	• To conduct on-the-job training of installation and O&M for Johkasou, assisting Japanese expert of prime company
	Kusatsu City	• To draft and finalize guideline for installation and O&M for Johkasou
	CTI Engineering International Co., Ltd.	• To provide technical advice to formulate the guideline, propose sludge treatment plan, produce materials for environmental education and finalize final report

Members	Responsibility
GeoBrain corp.	<ul style="list-style-type: none"> <li>To formulate business plan for disseminating Johkasou and O&amp;M skills for Johkasou</li> </ul>

### 3. ACHIEVEMENT OF THE SURVEY

#### (1) Outputs and Outcomes of the Survey

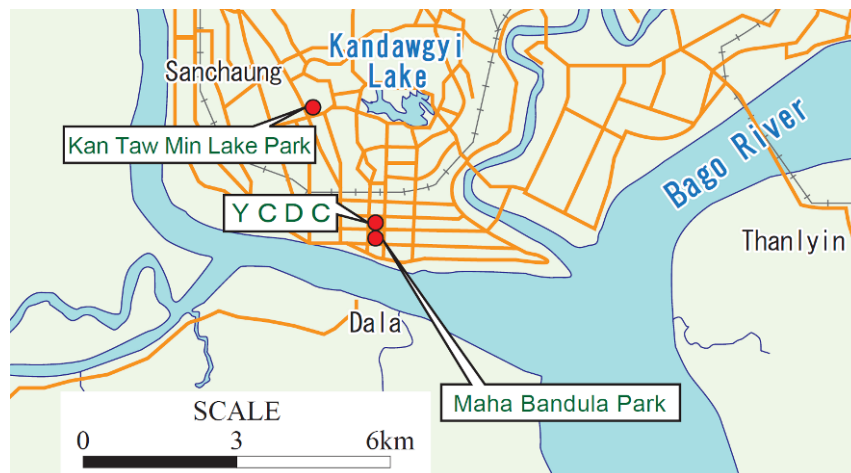
##### a) Verification Survey

##### Output 1

- Following Johkasous were installed in Maha Bandula park and Kan Taw Min park.

Maha Bandula: 1m<sup>3</sup>/day, 5units

Kan Taw Min park: 80 m<sup>3</sup>/day, 1unit



Kan Taw Min Park



Maha Bandula Park

Figure 1 Location of Johkasou installation

- Staff in the Sewerage Division in YCDC were trained Johkasou maintenance technique concerning maintenance, inspection, desludging and legal inspection for about one (1) year from August 2016 to August 2017. At the beginning, YCDC staff's maintenance technique through learned in lecture had not been enhanced up to practical technique. Because of continuous

training, YCDC staff acquired maintenance technique to manipulate equipment of Johkasou depending on the observed data on site and adjust the Johkasou in favorable condition.

Table 2 Contents of Johkasou Maintenance Training

Category	Item	Contents	Training time (hr)		
			Lecture	OJT	Total
General Statement of Johkasou	General statement	About Johkasou	3	0	3
		Summary	9	0	9
	Johkasou administration	Role, guideline	60	0	60
	Structure and Function	Structure	6	3	9
		Basic manner of control and Adjustment	3	12	15
Safety Control	Safety Control	3	3	6	
Installation work	Installation work	Installation manner and precaution	3	0	3
Maintenance Inspection	Inspection manner	Outline of inspection	9	21	30
		Item of inspection	3	3	6
		Inspection manner	3	6	9
	Advanced manner of control and adjustment	nitrification / denitrification	3	0	3
		Emergency response	6	8	14
	Water quality management	BOD test	15	46	61
Effluent standard		3	0	3	
Desludging	Desludging	Item and manner of desludging	3	9	12
Legal inspection	Legal inspection	Item and manner of legal inspection	9	24	33
		Summary	3	3	6
Johkasou Ledger	Johkasou Ledger	Manner of describe and update	3	3	6
Evaluation Test	Evaluation Test	Evaluation Test	3	0	3
Total			150	141	291

### Output 2

- The Guidelines (Johkasou Guideline, Outsourcing Guideline and Forms) were formulated by YCDC in collaboration with JICA survey team, and were approved by the head of Water and Sanitation Department in YCDC on June 2017.
- Johkasou ledger and management plan were developed by YCDC in collaboration with JICA survey team, and JICA survey team gave guidance to YCDC staff on their manner of operation.



- Four (4) staff of YCDC participated in the study tour in Japan from 5<sup>th</sup> to 11<sup>th</sup> February 2017, to learn the roles of government for Johkasou management and maintenance work by private companies.

Table 3 List of trainees

氏名	所属	役職
Mr. Wai Lwin	YCDC Engineering Department (Water and Sanitation)	Assistance Chief Engineer
Mr. Phoe Lone		Executive Engineer
Ms. Khin Aye Myint		Executive Engineer
Mr. Thet Aung Swe		Sub Assistance Engineer

Table 4 Training Schedule

Days	Data	Activity	
1	5-Feb,2017	AM	Arrive at Kansai Airport
		PM	Orientation of training tour
2	6-Feb	AM	Lecture on administrative challenge of water environmental protection
		PM	Inspection tour on river
3	7-Feb	AM	Site Survey of water quality in lake Biwa
		PM	Inspection tour on Lake Biwa Museum and lecture on water purification in Lake Biwa
4	8-Feb	AM	Lecture on Johkasou, rural sewerage system
		PM	Inspection tour on Johkasou, rural sewerage system
5	9-Feb	AM	Lecture on septage treatment system
		PM	Inspection tour on septage treatment system
6	10-Feb	AM	Visit to Lake Biwa Museum
		PM	Debriefing session
7	11-Feb	AM	Departure from Kansai airport
		PM	

### Output 3

- Public awareness materials to disseminate the Johkasou were prepared by YCDC in collaboration with JICA survey team.

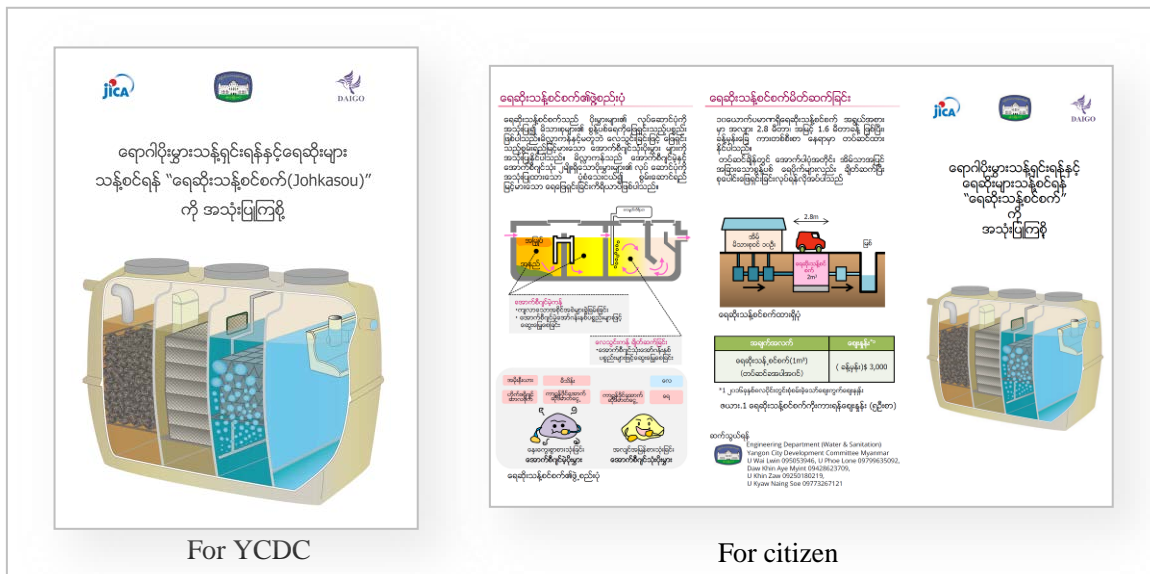


Figure 2 Public Awareness Materials

- Seminars were held twice, the 1<sup>st</sup> on 8<sup>th</sup> August 2016 and the 2<sup>nd</sup> on 24<sup>th</sup> July 2017, to disseminate Johkasou as an appropriate technology for improvement of the water environment

b) Business Development Plan

- Based on the cost and maintenance frequency defined in the guideline and the number of Johkasou described in ledger, income and expenditure plan was formulated.

(2) Self-reliant and Continual Activities to be Conducted by Counterpart Organization

It is expected to implement the following activities at the initiative of Water and Sanitation Department of YCDC,

- To follow an administrative procedure for the guidelines agreed with YCDC and JICA survey team to operate promptly.
- To organize Johkasou management, maintain the one installed in Yangon city and update the guidelines and Johkasou ledger accordingly.
- To accumulate know-how on the maintenance technique utilizing provided Johkasou and widely get the improvement of the water environment by Johkasou.
- To widely disseminate the improvement of water environment by the Johkasou to administrative officials and citizens

#### **4. FUTURE PROSPECTS**

##### **(1) Impact and Effect on the Concerned Development Issues through Business**

###### **Development of the Product/ Technology in the Surveyed Country**

Following five (5) development effects are obtainable through business development. Business development, however, presupposes that guideline is early and appropriately operated.

- ① Efficiently improving the water quality and controlling environmental pollution through appropriate selection, installation, and maintenance of Johkasou.
- ② Improving a hygienic and living environment as a result of the maintenance of Johkasou is carried out continuously and maintenance institution is organized.
- ③ Improving awareness raising of government in Myanmar for the environment and water quality, and promoting public awareness for the environment initiative.
- ④ Creating employment by a variety of businesses such as manufacturing, installation work, maintenance work, water analysis work through appropriate Johkasou management based on the guidelines.
- ⑤ Realizing the improvement of water quality and hygienic environment in the whole area of Myanmar through horizontal expansion of Yangon model to Mandalay, Naypyidaw and other uninstalled area as a result of formulation of Johkasou system which involves a series of selection, installation and maintenance etc. of Johkasou.

##### **(2) Lessons Learned and Recommendation through the Survey**

- To manage Johkasou appropriately from its installation to maintenance, should be based on the guidelines.
- To train human resource related to the Johkasou maintenance, and to involve the establishment of the training institution.
- To introduce septage treatment facilities and treat septage and Johkasou sludge properly.
- To collaborate with relevant departments in YCDC as well as water and sanitation department, to have common view in which promotion of Johkasou is positioned in Sewerage Master plan.
- To promote protection of water environment utilizing Johkasou, and to visually show the effect of the Johkasou to the citizen.

- To hold an event and create awareness in order to change the public mindset for water environment using Johkasou installed by JICA survey team.
- To enhance public-health preparedness effort such as securing a disinfectant product.

ATTACHMENT: OUTLINE OF THE SURVEY

## Republic of the Union of Myanmar

### Verification Survey with the Private Sector for Disseminating Japanese technologies for Improvement of Water Environment by utilizing Johkasou as an appropriate Technology Daigo Sangyo Co., Ltd., Shiga Prefecture, Japan

#### Concerned Development Issues in Myanmar

- Rapid economic growth and insufficient infrastructures
- Deterioration of environment due to rapid urbanization
- Deterioration of water environment especially due to domestic wastewater

#### Implemented Activities in the Survey

- Installation of new Johkasou in the government office of YCDC and Kan Taw Min Lake Park
- On-the-Job training for O&M of Johkasou including operating, cleaning and inspection, targeting the staff of YCDC
- Formulation of draft guideline covering capacity calculation, installation, supervision and O&M of Johkasou
- Creating material on environmental education and holding seminar on Johkasou

#### Proposed Products/Technologies



- Johkasou
- O&M skill for Johkasou

#### Survey Overview

Name of Counterpart: Yangon City Development Committee (YCDC)  
Survey duration: 23 months  
Survey Area: Yangon City

#### Impact on the Concerned Development Issues in Myanmar

- Water environment and living condition in Yangon City is improved.
- Sewage management work will be facilitated

#### Outputs and Outcomes of the Survey

- **Output 1:** Effluent water quality of existing Johkasou is improved through the transfer of appropriate O&M skills of Johkasou to YCDC.
- **Output 2:** YCDC's capacity for installation supervision and O&M of Johkasou is developed.
- **Output 3:** Understanding of JOHKASOU among related officials and ordinary people is promoted.