添付資料（Summary Report）

Yaoundé City council/
University of Yaoundé I

Summary Report

Republic of Cameroon

Verification Survey with the Private Sector for Disseminating Japanese technologies for Construction of public toilet system without sewerage system by utilizing biological toilet

December, 2018

Japan International Cooperation Agency

TMT. Japan Ltd.

1. BACKGROUND

Sewerage systems have not been sufficiently developed in the Republic of Cameroon. As for toilets, vault toilets and pit toilets are commonly used, and some problems have been seen, for example, sewerage pipes are clogged or vault toilets are not regularly collected. In the capital city, Yaoundé, public toilets have been placed in several locations such as parks and markets, but there remains a significant shortage. Such an unhygienic environment is considered as one of the reasons to increase the risks of spreading or causing various diseases, including diarrhea and typhoid fever, which could be fatal in countries where health systems are relatively underdeveloped.

The government of Cameroon announced the "National Sanitation Strategy" in 2011, and established a policy to put in place simple toilets which do not require large investments. Development partners, including international organizations, have so far built vault toilets, but been looking for more appropriate approaches reducing burden on the environment.

Under such circumstances, in 2015, TMT. Japan Ltd. conducted the Feasibility Survey for construction of public toilet system without sewerage system by utilizing bio-toilets, and introduced the system with bio-toilets, which drew a high level of interest from relevant ministries (environment, public health, education and local governments). The results of Feasibility Survey showed that, in urban areas in Cameroon, where even water supply systems have not been installed, bio-toilets are suitable as there is no need to flush or collect wastes. At the same time, the Survey confirmed the necessity to verify bio-toilets' effectiveness and applicability under the particular conditions in Cameroon (including weather, frequency of use, status of infrastructure, and laws and regulation).

In this Verification Survey, TMT. Japan Ltd. installs bio-toilets in public spaces agreed with Yaoundé City to verify the effectiveness and operation, aiming at the dissemination of the product in Cameroon and to neighboring countries in the near future.

2. OUTLINE OF THE PILOT SURVEY FOR DISSEMINATING SME'S TECHNOLOGIES

(1) Purpose

In order to contribute to improvement of sanitary environment, verification of "Biomikalet" (bio-toilet) should be conducted to enhance applicability in Cameroon, and the approaches to disseminate bio-toilet will be examined.

Expected outputs:

- ✓ Output 1: The effectiveness of public toilet system adopting the bio-toilet technology is verified at public agencies.
- ✓ Output 2: A plan to disseminate the bio-toilets is formulated.

(2) Activities

- ✓ Activities related to Output 1

1-1 Examine approaches for implementation and operations of bio-toilets (including consent from the counterparts)
1-2 Produce bio-toilets in Japan, transport to Cameroon, and install
1-3 Develop an operation manual and educational posters
1-4 Conduct practical training on operation and maintenance for counterparts
1-5 Monitor the status of bio-toilets utilization
1-6 Identify the status of use, convenience and issues by interviews
1-7 Analyze advantages, disadvantages and benefits of the system

- ✓ Activities related to Output 2

2-1 Conduct promotion activities of public toilet system adopting the bio-toilet technology through events, seminars and visits for relevant organizations
2-2 Analyze the profitability of the fee-collection system
2-3 Analyze business risks
2-4 Conduct a survey on business partners
2-5 Examine approaches for production of bio-toilets in Cameroon
2-6 Formulate a plan for dissemination

(3) Information of Product/ Technology to be Provided

Sixteen units of electric bio-toilet (“Biomikalet”) with the following specs will be installed in this project. Four more units may be installed if exempted from custom duty.

- ✓ Capacity　40 times/day
- ✓ Weight　550kg（including a shed）
- ✓ Size
  Width:1,000mm　Depth:2,270mm　Height: 2,800mm
- ✓ Power Consumption　100V・650W/h ※Use transformer

The proposed product in this survey, the "Biomikalet", uses the same microorganisms

present in the human body to decompose human waste. The advantageous feature of this product is that it doesn't require water nor manual sorting/scooping. The advantage of the proposed product when compared with bio-toilets of the major manufacturers in Japan is that, it can decrease the frequency of excess moisture state better than other products do because of solid-liquid separation carried out within the cistern unit. Within Japan, the proposed product has been introduced not only in scenic spots, also in construction sites and so on. For overseas, they have been introduced to scenic spots in Peru under an ODA project.

(4) Counterpart Organization

Yaoundé City council (CUY)/ University of Yaoundé I (UY1)

(5) Target Area and Beneficiaries

- ✓ Target areas：Public square in Yaoundé city/ University of Yaoundé I
- ✓ Beneficiaries: Citizens of Yaoundé/ Students of University of Yaoundé I

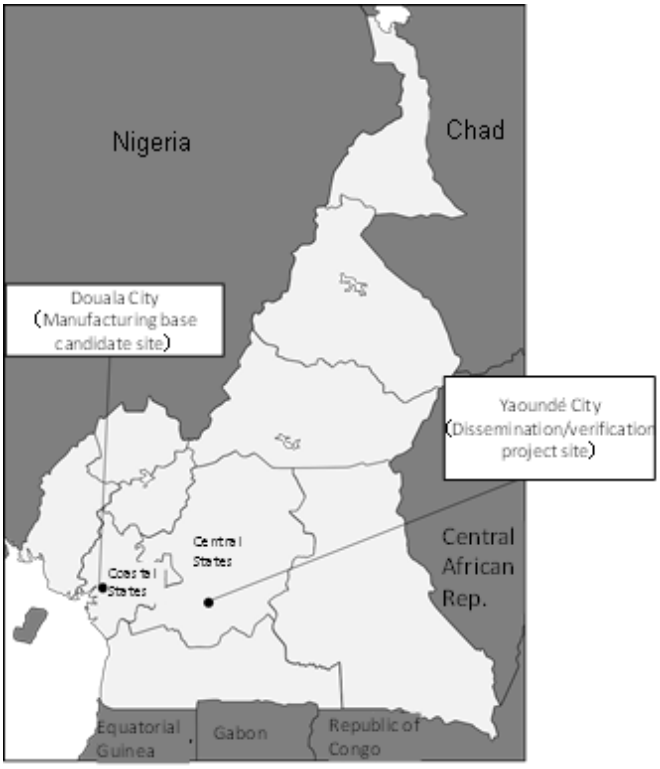

Figure 1: Project site map

(6) Duration

October , 2016 to February, 2019 (2 year and 4 months)

(7) Progress Schedule

Please see Appendix 2

(8) Manning Schedule

Please see Appendix 3

(9) Implementation System

The implementation system of the verification survey is as indicated below.

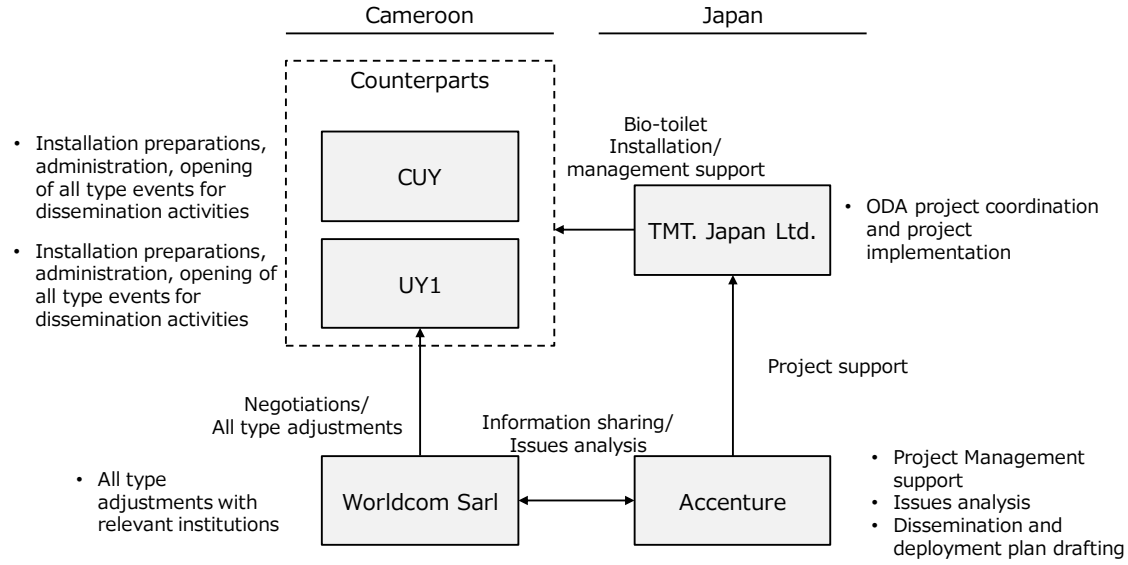

Figure 2: Implementation system

3. ACHIEVEMENT OF THE SURVEY

(1) Outputs and Outcomes of the Survey

✓ Outcome 1 Activities and Results

1-1 Examine approaches for implementation and operations of bio-toilets (including consent from the counterparts)

✧ From Nov. 2016, traveled to Cameroon and coordinated installation/ operation methods with CUY and UY1.

✧ Under CUY jurisdiction: Two toilets were installed at 2 sites (building front & back) for total of 4 toilets, 2 units in the 7th Commune, 1 unit at Longkak, and 1 at a road repair center. Overall, 8 units installed across 5 sites. CUY appointed 3 full-time custodians.

✧ Under UY1 jurisdiction: 4 units were installed at Leclerc, 4 units beside lecture halls for total of 8 toilets installed across 2 sites. TMT.Japan Ltd. hired 3 full-time custodians.

1-2 Produce bio-toilets in Japan, transport to Cameroon, and install

- ✧ Manufactured in Japan and shipped by sea to Cameroon.
- ✧ In Jul. 2017, completed installation of toilets at UY1 (2 sites, 8 units).
- ✧ At end of Nov. 2017, completed installation of toilets at CUY (5 sites, 8 units).


Figure 3: Bio-toilet at CUY


Figure 4: Bio-toilet at UY1

1-3 Develop an operation manual and educational posters

- ✧ Operation manuals were developed and distributed to relevant persons and full-time custodians at CUY and UY1.
- ✧ Educational posters were developed and displayed.

Figure 5: Educational poster

1-4 Conduct practical training on operation and maintenance for counterparts

- ✧ Custodian of CUY were given practical training at the test installation in Oct. 2017, and again in Sep. 2018 when a new custodian took over.
- ✧ Custodians of UY1 were given practical training in Sep. 2017.

1-5 Monitor the status of bio-toilets utilization

- ✧ Monitoring began in Sep. 2017 at UY1 but it took longer than expected to reach normal operations. This meant that data couldn't be regularly gathered.
- ✧ Monitoring at CUY began in Oct. 2017 but an insufficient level of awareness from the custodian meant that accurate data couldn't be obtained.
- ✧ Training was provided again after traveling to Cameroon in Apr. 2018, and monitoring has continued since.

1-6 Identify the status of use, convenience and issues by interviews

- ✧ At CUY, as the toilets were not in the line of visitor flow, the usage was relatively low. Also, while the custodian did collect fees, some users refused to pay the fee. Thus, the payment system needs to be reviewed.
- ✧ Regular use was confirmed at UY1. Stable supplies of consumables such as toilet paper is needed.

Figure 6: Users of bio-toilet

1-7 Analyze advantages, disadvantages and benefits of the system

- ✧ Confirmed the following advantages over existing public toilets:
  - Bio-toilets that need not to use water offered more reassurance about

sanitary conditions.;

- Lack of odor, a proper entry and exit, and presence of a custodian offered more comfort and a sense of safety.

✓ Outcome 2 Activities and Results

2-1 Conduct promotion activities of public toilet system adopting the bio-toilet technology through events, seminars and visits for relevant organizations

- ✧ In Nov. 2017, an event to mark start of toilet operations was held at CUY.
- ✧ Since Nov. 2017, progress reports have been submitted regularly to C/P organizations and related government offices.
- ✧ In Nov. 2018, a seminar was held to report & promote outcomes to central/local gov't representatives. Media was also in attendance, including a national TV broadcaster.

Figure 7: Operation starting event

Figure 8: Report & promote seminar

2-2 Analyze the profitability of the fee-collection system

- ✧ Bio toilets at CUY operated at same fee (100 FCFA) as other toilets in the city.
- ✧ Through the interview e with users, confirmed that there were no problems with the above price.

2-3 Analyze business risks

- ✧ To avoid risks of imitation of the product, signed NDAs with local partners and spread out production across different sites..
- ✧ Regarding risk of fees being stolen, although no final solution has been found during the project, envision to use electric locks or stationing a custodian nearby kiosks, etc.

2-4 Conduct a survey on business partners

- ✧ Through discussions with partners, assessed parts sourcing in Cameroon and Japan. As a result, kept the ease of procuring raw materials for bio toilets in mind and identified a parts sourcing/assembly partner in Douala.
- ✧ Identified partners in Yaoundé and Douala for promoting sales.

2-5 Examine approaches for production of bio-toilets in Cameroon

- ✧ Sourced and assembled parts locally in Douala, and set up local subsidiary in Douala.
- ✧ Completed production of local prototype, and verified that there were no quality or cost issues.

2-6 Formulate a plan for dissemination

- ✧ Currently focusing on cities of Yaoundé and Douala, working with local sales promotion/administrative partners to disseminate bio toilets.

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

After the project is completed, each counterpart organization will hire administrators by themselves, manage and operate the bio-toilets.

4. FUTURE PROSPECTS

(1) Impact and Effect on the Concerned Development Issues through Business Development of the Product/ Technology in the Surveyed Country

On September 27, 2018, TMT.Japan Ltd. set up a local subsidiary, TMT.Cameroon Sarl, in the city of Douala. The subsidiary is scheduled to fully begin business from 2019.

Through this project, TMT.Japan Ltd. anticipates that its upcoming business expansion in Cameroon will help address the following development issues:

- ✓ Reduce infectious diseases and other illnesses caused by unsanitary toilets;
- ✓ Improve completion rates at school, and reduce lateness and absences among female students;
- ✓ Reduce incidents of outdoor defecation;
- ✓ Reduce amount of sewage being improperly disposed of;
- ✓ Create stable jobs related to bio toilet businesses.

Figure 9: Members of TMT. Japan Ltd. & TMT. Cameroon Sarl

(2) Lessons Learned and Recommendation through the Survey

- ✓ There were some cases where neither the Japanese embassy nor JICA held connections to the most relevant contacts in the Cameroonian government. However, as a result of direct contacts with them, they unexpectedly made the door open for us in some cases. This way, even with existing rules, the way ahead could be opened when trying different approaches.

- ✓ Through the project, we felt that Cameroonians are honest and hardworking people, and they have a strong sense of loyalty. Despite the fact that the local staff hired for TMT.Cameroon Sarl were given very difficult tasks during project development and after the project actually began, they worked with perseverance and enthusiasm. Their

contribution made the business prospects even brighter and was one of the major factors in TMT Japan Ltd. being able to successfully establish a local subsidiary.

- ✓ By sharing information often with the local JICA office, we were given many opportunities to meet with people outside business. One such meeting was with the Japan Overseas Cooperation Volunteers(JOCV), who are active in Cameroon. As TMT.Japan Ltd. worked to launch our business, JOCV's experiences were valuable for us as they gave us assistance in introducing us to local networks and in helping us with hiring local staff.

Appendix 1 OUTLINE OF THE SURVEY

The Republic of Cameroon

Verification Survey with the Private Sector for Disseminating Japanese technologies for Construction of public toilet system without sewerage system by utilizing biological toilet

TMT. Japan, Oita, Japan

Concerned Development Issues in Cameroon

- In Cameroon, which lacks a sewerage system, attributable to a shortage of/unhygienic toilets, there are serious issues of (1) groundwater contamination, (2) widespread diarrhea, infectious diseases, etc., (3) increased public safety risks due to defecation, etc. in the outdoors ,(4) frequent absenteeism, tardiness , leaving early , etc. of female students, necessitating hygienic toilets that can be easily and adopted and used.

Implemented Activities in the Survey

- Equip multiple bio-toilets ("composting toilets") in Yaoundé City and at the National University of Yaoundé I
- Confirm local compatibility of public toilet systems using bio-toilets
- Draft plans for business expansion towards the diffusion of bio-toilets

Proposed Products/Technologies

Composting toilets

-Toilet systems to break down sewage by harnessing microbes which existin the human body
-No water required
-No night-soiling required

Survey Overview

Name of Counterpart: Yaoundé City, University of Yaoundé I
Survey duration: October 2016 ~ February 2019
Survey Area: Yaoundé City

Impact on the Concerned Development Issues in Cameroon

- By constructing public toilet systems using bio-toilets, it will be possible to hygienically dispose of sewage and a mitigation of groundwater contamination, spread of diarrhea and infectious diseases, and so on ,can be anticipated.
- By creating an environment where women/female students can feel safe using toilets, a contribution to gender social equality can be anticipated.

Outputs and Outcomes of the Survey

As-is

- TMT is a company which was established to expand bio-toilet initiatives overseas.
- Aiming at business expansion considering the highly attractive market in developing nations where regions having no sewerage systems are common .

To-be

- Business expansion in Cameroon to be realized by localization of products and the establishment of manufacturing structures at local companies .
- Aim at wide-scope distribution and sales in future by incorporating not just Yaoundé City but other regions in Cameroon, as well as neighboring countries.

Appendix 2 Progress Schedule

Survey item	FY 2016 (month)					FY 2017												FY 2018											FY2019		
	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2			
1. The effectiveness of public toilet system adopting the bio-toilet technology is verified at public agencies																															
1-1 Examine approaches for implementation and operations of bio-toilets (including consent from the counterparts)																															
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Legend: Off-site operations

On-site operations

Appendix 3 Manning Schedule

Coordination	Name	Affiliation	Survey period																								Persons/month total	
			FY 2016					FY 2017												FY 2018								FY 2019		
			11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	On site	Japan
Operations chief/Project strategy formulations	Tomoki Yokoyama	TMT. Japan	11		7		10		13		18		9		21				15	15		15			16			10			5.3	7.4
Product dissemination activities/Marketing strategy drafting	Masaaki Nagai	TMT. Japan	11											10	14					15											1.7	3.3
On-site compatibility verification/Product development strategy drafting	Taishi Mikasa	TMT. Japan	11				10		13		14		9	10	21				15												3.4	5.4
Product installation support	Noboru Matsushita	Mikasa									14				16																1.0	0.0
Chief Advisor	Jun Hirabayashi	Accenture																							7						0.2	2.9
All surveys & analysis/ report drafting	Manami Oda/ Nozomu Azuma	Accenture	6				10				9				12					15											1.7	4.2
Dissemination and deployment plan drafting	Shuhei Fukuyama	Accenture													14			11				12									1.2	3.0
All surveys & analysis/market analysis	Midori Kasai	Accenture																11													0.4	0.1
On-site project administration /survey support	Susumu Nakayama	Worldcom Sarl.	7		6		9	2		7		15		7		15		5		7	3	6		3		7		6			3.5	3.6
Order recipient company Persons/month total																															11.4	16.0
External personnel Persons/month total																															7.1	13.7
Persons/month total																															27.8	29.7

Legend: On-site duties Off-site duties