



Planning and Implementation of Inter-Municipal Collection System (IMCS) in Kosrae



Federated States of Micronesia
State of Kosrae

How IMCS successfully introduced in Kosrae

In Kosrae, where four municipalities are mandated to provide collection services to the residents, the municipalities with a weaker financial base had been struggling to provide regular collection services to the residents. Illegal heaps of wastes had been created, especially in the municipalities with no regular waste collection services. These illegal dumps have been removed, through the efforts of KIRMA, in collaboration with DT&I. These illegal heaps clearly showed the negative consequences of a lack of regular collections in some municipalities.

Two factors were important in the development of this collection system: i) DT&I's procurement of a new 4-ton compactor truck by the Non-Project Grand Aid of Japan, and ii) the J-PRISM II's survey result that revealed only 18 tons per week of waste are discharged from all the four municipalities. The new compactor truck of DT&I is big enough to collect all of the waste generated in the island and transport it to the public disposal site. Thus the J-PRISM II experts recommended key stakeholders to consider the introduction of an Integrated Municipal Collection System (IMCS) instead of a collection service from each individual municipality. Key stakeholders conducted a series of discussions among themselves, such as mayors, DT&I, KIRMA and the Governor's Office, and decided to introduce the IMCS.

Leading Agency(s)

Kosrae Island Resource Management Authority (KIRMA), Department of Transportation and Infrastructure (DT&I), and Municipalities (Lelu, Tafunsak, Malem, Utwe)

Location/ Geographical Coverage



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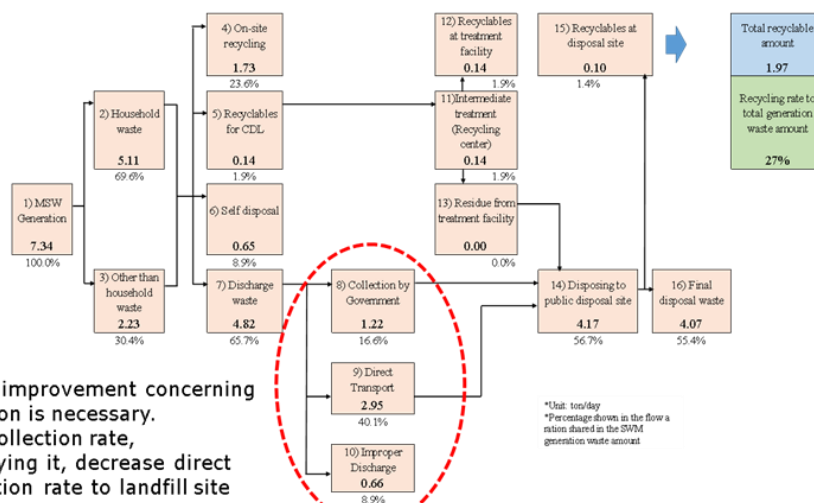


Measures/ Approach

A step-by-step approach was taken by paying special attention to consensus building among stakeholders in each step, as seen below.

Step 1: Identifying the most urgent SWM issue through understanding the current SWM situations technically as well as quantitatively

To clarify the current status and issues of waste in state of Kosrae, SWM baseline surveys were conducted in Kosrae in June 2017, and the waste flow shown in the figure shown was drawn and presented to key stakeholders.



The following improvement concerning waste collection is necessary.

- Increase collection rate,
- Accompanying it, decrease direct transportation rate to landfill site and,
- Decrease improper discharge waste rate.

The waste flow analysis in Kosrae shows that the amount of waste collected by municipalities accounts for only 16% of the waste generated, while more than 40% of wastes were self-discharged to the dumpsite, and 9% were improperly discharged. These disappointing figures made key stakeholders realize how serious the problem was and helped them reach a consensus to improve waste collection as a priority.

Step 2: Taking the decision to introduce IMCS

As detailed in the Success Factors, DT&I's procurement of a new 4-ton compactor truck by the Non-Project Grand Aid of Japan, and the survey result that revealed only 18 tons of waste are discharged from all the four municipalities made IMCS feasible in Kosrae. Key stakeholders conducted a series of discussions among themselves, such as mayors, DT&I, KIRMA and the Governor's Office, and decided to introduce the IMCS.

Step 3: Planning IMCS

Before the introduction of any IMCS, three issues had to be clarified first. They are: (i) who operates IMCS, (ii) how to finance IMCS and (iii) which collection system shall be employed.

- *Who operates IMCS*

After series of discussions, it was concluded that DT&I would be the operating body because DT&I has more human resources with knowledge of heavy vehicles, as well as the maintenance systems with a workshop for such vehicles. Thus the State Code was amended on November 21, 2019 in which Division of Solid Waste Management is established under DT&I and the IMCS is to be operated by DT&I. Furthermore, salaries for the additional three persons of the Division of Solid Waste Management were appropriated under the State's general budget.

- *How to finance IMCS*

Budget required for collection service is US\$16,000 per year. With the amendment of the State Code, the state (i.e. DT&I) provides US\$10,000, being the labor cost. The remaining US\$6,000 is agreed to be covered by the four municipalities, divided up on a formula based on population size. DT&I and each municipality signed Memorandum of Understanding (MoU) to this effect.

- *Which collection system*

Collection method: curbside collection, with a sound system to alert the public that the truck is on its way

Discharging containers: The waste containers are 34-gallon wheelie trash-bins with lids, distributed to all households along with a wire platform on which to place the wheelie bins. The purchase cost of the wheelie bins and the wire material for the platform were provided by KIRMA who successfully obtained funding through the US Compact Funds.

Coverage area: Coverage area is limited to places which the 4 ton compactor truck can easily access. Other inaccessible areas will be covered by municipality vehicles, as was previously practiced.

Collection frequency: Once in a week per municipality. For Lelu and Tafunsak, there will be two trips required to collect their amount of discharged waste.

Step 4: Public Awareness by KIRMA

Community meetings were held in each municipality before the inauguration of the IMCS. In the meetings, KIRMA explained how to discharge waste, types of waste residents can discharge, types of unacceptable waste, and collection times for each municipality. KIRMA, in collaboration with J-PRISM II, produced brochures as well as stickers to help raise people's awareness.

Step 5: Preparatory works by DT&I

The following preparatory work was also carried out by DT&I prior to IMCS

- ✓ Training of collection crew
- ✓ Confirmation of the collection route and removal of obstacles on the

route

- ✓ Installation of a sound system on the truck to alert the public

Stakeholders/ Actors

- **Residents** of Kosrae are beneficiaries.
- **Residents** are the users of this good practice (IMCS) which was inaugurated with the collaborative efforts of the state agencies, namely **DT&I**, **KIRMA** and the **four municipalities**.
- The IMCS is primarily implemented by **DT&I**.
- Important external factors are the timely procurement of a **new 4-ton compactor truck** through the Non-Project Grand Aid of Japan

Results/ Outputs

Opening Ceremony

The IMCS opening ceremony was held on February 17 2020, a week after the collection started, with attendees including the Governor of the State.



Monitoring for the 1st week of IMCS (Feb. 10-14th, 2020)

Start-up inspection

The driver and the administrator responsible for waste management worked together to conduct a daily inspection of the compactor truck according to an inspection checklist before starting the collection run. The daily inspection procedure has improved, and the compactor truck now leaves on time.

Coordinating with municipality collection

Each of the 4 municipalities has an area where the compactor truck cannot enter, so the municipality's collection vehicles continue to operate in these areas to collect wastes. However, the time and location were decided for each municipality to transfer the collected waste to the compactor truck so that municipalities do not have to transport it all the way to the landfill site.



Municipal staff promote IMCS and provides guidance to residents

At the time of the first IMCS collection, a municipal official (including the Mayor himself for Utwe) provided guidance on the waste discharge manner to residents

and also encouraged them to pay the waste collection fees.



Inappropriate waste

Residents were notified of unacceptable waste that could damage the compactor truck, including cartridge gas cans. It is necessary to patiently inform the residents to help them fully understand what waste is suitable to go into the truck.



Sound system

At the time of waste collection, local song about Kosrae's beauty is played by the truck sound system, signaling the arrival of the collection truck. This was well received by the residents.



End of work inspection

The compactor truck is equipped with a simple cleaning device. The body is washed at the end of each day when the last waste is dumped at the landfill site.



Result of quantitative monitoring

Lelu and Tafunsak required two trips, while Malem and Utwe required only one trip in the morning. From the result of one week of waste collection, it can be said that the collection days and number of trips were sufficient to handle the waste generated.

The travel distance per week is about 160 km (100 miles), total fuel (diesel) consumption is 25 gallons per week (95 liter per week), and fuel efficiency was 6.3 km per gallon (3.9 mile per gallon, 1.7 liter per km). The fuel consumption was as expected.

Total collected waste is around 11 tons per week. The amount of waste discharged

at the time of the baseline survey was estimated to be 1.22 tons per day, and the weekly discharged waste amount was estimated to be 8.5 tons. Therefore, it can be said that the amount collected at the IMCS was 1.3 times that of the baseline survey.

Table 4 Result of quantitative monitoring

Item	unit	Lelu		Tafunsak		Malem	Utwé	Weekly total
		(am)	(pm)	(am)	(pm)			
Collection time	hour	3	3	3.75	1.25	4	4	19
Travel distance	km	16	24	32	22	30	33	157
	Mile	9.9	14.9	19.9	13.7	18.6	20.5	97.6
Fuel consumption	gallon	-	-	-	-	-	-	25
Fuel economy	km/gal	-	-	-	-	-	-	6.3
	mile/gal	-	-	-	-	-	-	3.9
Waste amount	ton	1.72	1.88	2.42	0.52	2.4	2.1	11.04

Success Factors

The following factors, which are essential for the successful introduction of any IMCS, can be said as pre-conditions rather than the success factors.

Procurement of a waste collection vehicle

A collection vehicle was procured and arrived in Kosrae in October 2019, and the subsequent training was carried out from October 29 till November 1, 2019.

Basic specifications:

- ✓ Type : Press type compactor truck
- ✓ Body capacity: 10.2 m³ (4 - 5.5 tons)



Amount of waste discharged

From the baseline survey, the amount of waste discharged for the 4 municipality in total is 18 tons in a week:

(waste discharged in a week) = (population)
x (per capita waste discharge amount) x 7
days/state = 6,616 x 387 x 7 ÷ 18 ton/week



Waste collection cost

Waste collection cost was estimated through following calculations. It was estimated that US\$16,000 per year is necessary, including labor cost.

- ✓ Capacity of the compactor truck: 4ton/trip
- ✓ Number of collection trips: 6 trips/week

- ✓ Travelling distance for collection and transportation: 170km/week
- ✓ Fuel economy: $170\text{km} / 8\text{km/gallon} = 21\text{gallon/week}$
- ✓ Fuel cost per month: $21\text{gallon/week} \times 4\text{weeks} \times \$4.5/\text{gallon} = \$378/\text{month}$
- ✓ Maintenance cost: (10% of fuel cost): $\$38/\text{month}$
- ✓ Labor cost (driver and 2 collection crew): $\$300 \times 3\text{persons} = \$900/\text{month}$
- ✓ Collection cost per month: $378+38+900 = \$1,316 / \text{month} \Rightarrow \$1,300/\text{month}$
- ✓ Collection cost per year: $\$1,300 \times 12\text{month} = \$15,600 \Rightarrow \$16,000/\text{year}$ (collection cost $\$5,000 / \text{year}$ without labor cost)

The waste discharged from the four municipalities was estimated as 18 ton per week, and a new 4-ton compactor truck is enough to collect waste from all four municipalities, thus the entire state. Also, the cost for the IMCS was estimated, so key agencies could budget successfully to bear the estimated IMCS cost. Timely procurement of a 4-ton compactor truck along with the quantitative data of the waste amount as well as the cost for IMCS made it possible for key agencies to consult constructively and finally introduce the IMCS.

Constraints

There are no serious constraints so far. This collection system of the IMCS works well as long as the new 4-ton compactor truck runs. However, the breakdown of the truck would be a serious constraint if that happened. (To address this issue in Kosrae, another new 4-ton compactor truck has been procured and will be used as a back-up truck.)

Sustainability

Sustainability can be examined in terms of (i) financial sustainability, (ii) organizational sustainability and (iii) technical sustainability.

(1) Financial sustainability

Thanks to the efforts made by DT&I, the SWM section was established under DT&I and US\$10,000 out of US\$16,000 has been secured from the state general budget. As long as the remaining of US\$6,000 is and will be borne by municipalities through collection fees, financial sustainability will be secure.

(2) Organizational sustainability

The SWM section was established under DT&I by amending the state code. The four municipalities, and other key organizations, are also statutory organizations. Thus, the organizational sustainability is firmly secure.

(3) Technical sustainability

The IMCS is based on the premise that the 4-ton compactor truck is operational. Thus, correct operation and maintenance is very important from the view point of technical sustainability. Since the life of collection vehicles is short in the islands

due to the damage from salt-laden air, not only proper operation and maintenance but also planned investment for future replacement by utilizing external funds is also necessary. In addition, the quantitative monitoring of IMCS needs to be continued in order to adjust collection dates, frequency, routes, etc., as necessary.

Replicability and/or Up-scaling

Inter-municipal collection system is a mechanism suitable for providing efficient collection services especially among small-scale local governments that are often financially weak and have difficulty to secure suitable collection vehicles. It can be introduced among local governments of a certain scale, too, however it is important to decide the implementing body, agree on the cost sharing method, and employ the same collection system among all local governments as shown in this case.

Lessons Learnt and Conclusion

Consensus building in every step is essential to introduce a new system.

With the background of the timely acquisition of a new compactor truck through the grant aid scheme and the small scale of the waste collection amount, the waste collection of the entire state became possible. Consensus building in every step, i.e. the division of roles of key organizations, cost sharing of the state and four municipalities, etc., is essential. In this case, consensus building became possible through the strong leadership of key organizations, namely DT&I and KIRMA, as well as the quantitative information such as the amount of waste discharged from each municipality, the cost to run IMCS, etc, which J-PRISM technical advisors assisted with.



Contributions to SDGs

This highly contributes to the **Target 12.5** *By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse* of the **Goal 12 Responsible consumption and production**.

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Relevant Websites/ Resources

None

Publisher

J-PRISM: The Project for Promotion of Regional Initiative Solid Waste Management, JICA: Japan International Cooperation Agency

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SPREP: Secretariat of the Pacific Regional Environmental Programme