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Original Article

Cost-benefit analysis of municipal solid waste management in Myanmar

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Abstract

Yangon faces environmental challenges from improper municipal solid waste (MSW) management. The rapid generation of MSW urges the government to initiate strategies to reduce waste. This study utilizes a cost-benefit analysis (CBA) to examine the economic feasibility of MSW management scenarios using the internal rate of return (IRR). Benefits include tipping fees, compost products, digestate, recycled products, and electricity generation. Costs involve facility investment, operating, electricity, and fuel costs. The results show that the incineration-recycling-sanitary landfill scenario provides the best IRR value of 88.44% over 15 years, and the incineration-recycling-anaerobic digestion-open dumping scenario provides the second-best IRR value of 41.42%. The government should provide R&D support to enhance the gas collection efficiency at sanitary landfills and anaerobic digestion processes to gain high benefits and low costs. The benefit and cost data may be adjusted to reflect current practices and select the best scenario for long-term sustainability.

Keywords: cost-benefit analysis, feasibility, municipal solid waste, Myanmar

1. Introduction

Municipal solid waste (MSW) is challenging for developing countries as it impacts the environment, society, and economy. Charma and Jain (2020) mentioned that MSW is expected to reach 2.6 and 3.4 billion tons by 2030 and 2050, respectively. By 2050, the waste generation will triple in lower-income countries. In Myanmar, the MSW generation is projected to reach 213.2 million tons in 2025 (Fodor & Ling, 2019). Yangon City faces MSW challenges due to poor segregation, lack of waste treatment infrastructure, and uncontrolled open dumping. About 60% of MSW comes from households, 15% from markets, and 10% from commercial operations. YCDC (2024) stated that the total generated MSW was 0.267 kg/capita/day in 2011 and will double in 2021; Figure 1. Approximately 93% of the MSW is disposed of in open dumping, and less than 10% is incinerated, or recycled.

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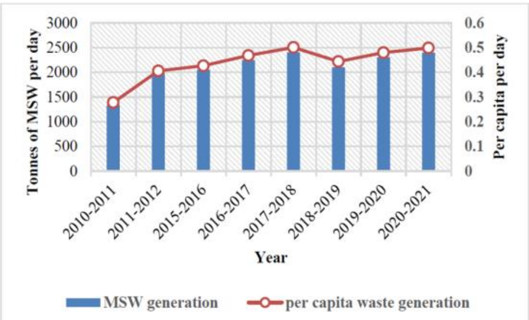

Figure 1. MSW generation in Yangon, Myanmar (YCDC 2024)

Various waste management systems are studied in the literature. For example, Tyagi *et al*. (2021) stated that waste-to-energy (WtE) projects can generate energy, recover materials, and reduce landfill consumption. Mabalane, Oboirien, Sadiku, and Masukume (2021) mentioned that anaerobic digestion can improve MSW treatment plants' energy production and economic feasibility; however, its operation in developing countries faces economic issues. MSW management's cost-benefit analysis (CBA) is crucial to avoiding unnecessary costs and investment risks.

Therefore, this study aims to estimate the benefits and costs of various MSW management scenarios in Yangon, Myanmar, to support the national solid waste management strategies, propose scenarios with the best benefit-cost perspectives, and facilitate decision-making for effective waste management strategies.

2. Materials and Methods

2.1 MSW management in Yangon

MSW in Yangon is classified as dry or wet, where a large portion is organic (44%). Only 5% of the waste is recycled, and the rest is disposed of illegally. 31% of MSW in Yangon (791.27 tons/day) are recyclable (Tun & Juchelkova, 2018a). Proper biological treatment is necessary; however, waste incineration and recycling in Yangon still need improvement (Han, 2019). Farzadkia *et al*. (2021) stated that proper recycling practices in developing countries have yet to be achieved. Incineration releases SO_2 and NO_x, which can cause acidification and toxic effects on people. Nevertheless, it can be neutralized by intensifying other effects, including acidification and eutrophication. Composting is a suitable method to reduce emissions by producing fertilizers. Anaerobic digestion can fully reduce ozone and fossil fuel depletion through biogas generation. The biogas generation levels of 137.51 m^3/ton of organic MSW and digestate of 200 kg/ton of MSW are considered in this study (Premakumara, Hengesbaugh, Onogawa, & Hlaing, 2017). Istrate, Iribarren, Gálvez-Martos, and Dufour (2020) mentioned that energy recovery from landfills can reduce environmental impacts by capturing methane and converting it to CO_2 through combustion.

This study proposes six scenarios for MSW management in Yangon following the National Solid Waste Management Strategy and Master Plan (Figure 2 and Table 1) (ECD, 2018).

- Scenario A reflects the current practice, where incineration is considered with open dumping. The incineration plant has a capacity of 60 tons/day (2.4% of MSW). The rest of the waste is transferred to disposal sites.
- Scenario B increases the incineration rates to 15% to recover energy (ECD, 2018). Moreover, 50% of MSW is composted after the combustible waste is increased.
- Scenario C improves the circular economy. Half of MSW is used in anaerobic digestion. The biogas from this process produces electricity for the community (Chinda & Thay, 2022).
- Scenario D evaluates the effectiveness of two biological treatment methods, where 25% of MSW is used in anaerobic digestion and 25% is for composting.
- Scenario E captures half of the methane emissions at sanitary landfills to recover energy (Cudjoe, Han, & Nandiwardhana, 2020).
- Scenario F increases the recycling rate to 30% to promote the 3Rs policy (ECD, 2018). Half of MSW is composted, 10% of combustible waste is incinerated, and 10% of the waste from treatments is sent to disposal sites.

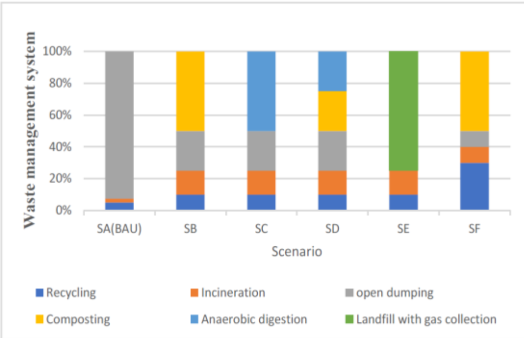

Figure 2. MSW management scenarios.

2.2 Cost-benefit analysis

Six scenarios are compared using cost-benefit analysis (CBA) to evaluate the optimal condition of MSW treatment (Table 2). The capital costs include mechanical, electrical, and construction costs. The operational cost depends on labor, utilities, and maintenance. The benefits are from selling digestate and compost fertilizers and electricity. The tipping fee is considered as revenue for all scenarios, although it is very low. The fees for households and businesses are $2.4 and $5.1/ton, and the fee gate is $3/year (Fodor & Ling, 2019). Other assumptions include:

- Investment in a recycling plant is not considered. Rather, recyclable materials are sold to the recycling shops.

Table 1. Proposed scenarios

Scenario	Portion of MSW (%)					
	Incineration	Recycling	Open dumping	Composting	Anaerobic digestion	Sanitary landfill
A	2.4	5	92.6	-	-	-
B	15	10	25	50	-	-
C	15	10	25	-	50	-
D	15	10	25	25	25	-
E	15	10	-	-	-	75
F	10	30	10	50	-	-

Table 2. Benefits and costs of the six alternative scenarios

Element	Detail	Scenario					
		A	B	C	D	E	F
Benefit	Electricity generation	√	√	√	√	√	√
	Material selling	√	√	√	√	√	√
	Tipping fee	√	√	√	√	√	√
	Compost sales		√		√		√
	Biogas selling			√	√		
	Digestate sales			√	√		
Cost	Investment	√	√	√	√	√	√
	Operation	√	√	√	√	√	√
	Electricity consumption	√	√	√	√	√	√
	Diesel consumption	√	√	√	√	√	√

- The investment cost of open dumping is not considered.
- The social impact and environmental costs of air pollution are not considered due to a lack of monetary assessment.

Six scenarios are considered with the net present value (NPV) and internal rate of return (IRR) to examine the feasibility of the projects (Cudjoe *et al*., 2020). According to Doan and Chinda (2016), the minimum acceptable IRR for government projects is 12%.

2.3 Data collection

Data are curated from the literature in Myanmar and neighboring countries (Table 3). For example, the investment cost of the incineration plant is $16 million with an interest rate of 5.5% annually (JFE Engineering Corporation, 2018). The operating cost of anaerobic digestion of $12.61/ton is retrieved from Thai literature (Sun, Chungpaibulpatana, & Limmeechokchai, 2020). The electricity produced from the gas collection at sanitary landfills is 106 kWh/ton (Pawananont & Leephakpreeda, 2017).

3. Results

3.1 Scenario A

In this scenario, 2.4% of MSW is considered for incineration. This is equivalent to 0.024×2,552.47 = 61.26 tons/day. Only 5% of MSW (127.62 tons/day) is recycled, and the remaining MSW (2,363.59 tons/day) is disposed of in open dumping with an operating cost of $18/ton of MSW. The benefits include:

- Electricity from incineration = 61.26 tons of MSW/day × 310 days/year × 193.6 kWh/ton of MSW × $0.082/kWh = $301,476.03/year
- Selling materials for recycling = {127.62 × 310 × [(0.04 × 0.23) + (0.15 × 0.73) + (0.07 × 0.07) + (0.02 × 0.86)]} = $5,570.7/year
- Tipping fee = 2,552.47 tons of MSW × 310 days/year × $5/ton of MSW =
- $3,956,328.5/year

Costs include:

- Investment in the incineration plant = $16 million
- Operation
  - At the incineration plant = 61.26 tons of MSW/day × 310 days/year × $40/ton of MSW = $759,615.07/year
  - At the recycling plant = 127.62 tons of MSW/day × 310 days/year × $210/ton of MSW = $8,308,062/year
  - At the open dumping = 2,363.59 tons of MSW/day × 310 days/year × $18/ton of MSW = $13,188,816.69/year
- Electricity for incineration = 61.26 tons of MSW/day × 310 days/year × 86.4 kWh/ton of MSW × $0.082/kWh = $134,544.6/year
- Diesel for incineration = 61.26 tons of MSW/day × 310 days/year × 0.48 L/ton of MSW × $0.86/L = $7,839.32/year

The results reveal negative cash flow throughout the project (Tables 4 and 5). This is due to the high investment in the incineration plant, which has very little utilization, and a high operating cost at the open sites. At 5.5% interest rate, the NPV becomes $-187,714,545.96, making it impossible to calculate an IRR. Therefore, this scenario is not recommended.

3.2 Scenario B

In this scenario, 15% of MSW is considered for incineration, 10% for recycling, 50% for compost, and the remaining MSW for open disposal. The benefits include:

- Electricity from incineration = $1,884,225.19 /year
- Selling materials for recycling = $11,141.02/year
- Selling compost products = 1,276.24 tons of MSW/day × 310 days × 0.54 tons of compost/ton of MSW × $106/ton of compost = $22,646,113.06/year
- Tipping fee = $3,956,328.5/year

Costs include:

- Investment
  - The incineration plant = $16 million
  - The composting plant = $17,509,520
- Operation
  - At the incineration plant = $4,747,594.2/year

Table 3. Summary of literature curated data

Data	Detail	Value	Reference
MSW	Total collected MSW	2,552.47 tons/day	Intharathirat and Abdul Salam (2016), Pawananont and Leephakpreeda (2017), JFE Engineering Corporation (2018), Tun and Juchelkova (2018a), Li and Feng (2018), Fodor and Ling (2019), Huiru, Yunjun, Liberti, Pietro, and Fantozzi (2019), Sun *et al.* (2020), Seventer (2021), YCDC (2024)
	Tipping fee	$5/ton of MSW on average	
	Project period	15 years	
	Working days	310 days/year	
	Interest rate	5.5% annually	
Composting	Compost products	540 kg/ton of MSW	
	Selling price of compost	$106/ton of compost products	
	Diesel consumption	1.3 L/ton of MSW	
	Diesel price	$0.86/L	
	Electricity consumption	5.6 kWh/ton of MSW	
	Electricity price	$0.082/kWh	
	Plant investment	$17,509,520	
	Operating cost	$10/ton of MSW	
Incineration	Plant capacity	1,000 tons/day	
	Diesel consumption	0.48 L/ton of MSW	
	Electricity consumption	86.4 kWh/ton of MSW	
	Electricity generation	193.6 kWh/ton of MSW	
	Plant investment	$16 million	
	Operating cost	$40/ton of MSW	
Anaerobic digestion	Biogas generation	1,450 kWh/ton of MSW	
	Digestate	200 kg/ton of MSW	
	Selling price of digestate	$106/ton of digestate	
	Diesel consumption	0.05 L/ton of MSW	
	Electricity consumption	50 kWh/ton of MSW	
	Plant investment	$46,220,280	
	Operating cost	$20/ton of MSW	
Recycling	Recycled glass	40 kg/ton of MSW (85% efficiency)	
	Recycled plastic	150 kg/ton of MSW (69.7% efficiency)	
	Recycled paper	70 kg/ton of MSW (60.3% efficiency)	
	Recycled metal	20 kg/ton of MSW (98% efficiency)	
	Selling price of glass	$0.23/kg	
	Selling price of plastic	$0.73/kg	
	Selling price of paper	$0.07/kg	
	Selling price of metal	$0.86/kg	
	Operating cost	$210/ton of MSW	
Open dumping/ Sanitary landfill	Gas collection	100-170 m^3/ton of MSW	
	Diesel consumption	0.6 L/ton of MSW	
	Electricity consumption	2.62 kWh/ton of MSW	
	Electricity generation	106 kWh/ton of MSW	
	Plant investment	$32,665,721	
	Operating cost	$18/ton of MSW	

Table 4. NCF results ($)

Year	Scenario					
	A	B	C	D	E	F
0	-16,000,000	-33,509,520	-62,220,280	-79,729,800	-48,665,721	-33,509,520
1	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
2	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
3	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
4	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
5	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
6	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
7	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
8	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
9	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
10	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
11	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
12	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
13	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
14	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41
15	-18,135,502.45	-1,897,289.41	25,913,513.73	12,008,112.41	43,042,855.55	-31,720,644.41

Table 5. NPVs and IRRs

Scenario	NPV ($)	IRR (%)
A	-187,714,545.96	-
B	-49,814,622.33	-
C	187,570,533.11	41.42
D	38,674,258.71	12.48
E	363,394,639.68	88.44
F	-333,562,991.97	-

  - o At the composting plant = 1,276.24 tons of MSW/day × 310 days × $10/ton of MSW = $3,956,344/year
  - o At the recycling plant = $16,616,579.7/year
  - o At the open dumping = $3,560,695.65/year
- Electricity
  - o For incineration = $840,893.88/year
  - o For composting = 1,276.24 tons of MSW/day × 310 days × 5.6 kWh/ton of MSW × $0.082/kWh = $181,675.32/year
- Diesel
  - o For incineration = $48,995.17/year
  - o For composting = 1,276.24 tons of MSW/day × 310 days × 1.3 L/ton of MSW × $0.86/L = $442,319.26/year

The NCFs show that though incineration and composting provide large benefits, the investments of the two plants are extensive. The NPV becomes $-49,814,622.33, making it impossible to calculate the IRR (Tables 4 and 5). Therefore, this scenario is not recommended.

3.3 Scenario C

This scenario is like scenario B, except that anaerobic digestion is utilized instead of composting (1,276.24 tons/day). The benefits include:

- Electricity from incineration = $1,884,225.19 /year
- Biogas from anaerobic digestion = 1,276.24 tons of MSW/day × 310 days × 1,450 kWh/ton of MSW × $0.082/kWh = $47,040,930.16/year
- Selling materials for recycling = $11,141.02/year
- Selling digestate = 1,276.24 tons of MSW/day × 310 days × 0.2 tons of digestate/ton of MSW × $106/ton of digestate = $8,387,449.28/year
- Tipping fee = $3,956,328.5/year

Costs include:

- Investment
  - o The incineration plant = $16 million
  - o The anaerobic digestion plant = $46,220,280
- Operation
  - o At the incineration plant = $4,747,594.2/year
  - o At the anaerobic digestion plant = 1,276.24 tons of MSW/day × 310 days × $20/ton of MSW = $7,912,688/year
  - o At the recycling plant = $16,616,579.7/year
  - o At the open dumping = $3,560,695.65/year
- Electricity
  - o For incineration = $840,893.88/year
  - o For anaerobic digestion = 1,276.24 tons of MSW/day × 310 days × 50 kWh/ton of MSW × $0.082/kWh = $1,622,101.04/year
- Diesel
  - o For incineration = $48,995.17/year
  - o For anaerobic digestion = 1,276.24 tons of MSW/day × 310 days × 0.05 L/ton of MSW × $0.86/L = $17,012.28/year

The NCFs show that though the investment in the anaerobic digestion plant is large, the benefits of biogas generation and digestate sales are extensive and surpass the costs. The NPV becomes $187,570,533.11, yielding an IRR of 41.42% in 15 years (higher than the minimum attractive rate); see Tables 4 and 5. Accordingly, this scenario is encouraged.

3.4. Scenario D

This scenario combines scenarios B and C, considering 15% of MSW for incineration, 10% for recycling, 25% for composting, and 25% for anaerobic digestion. The benefits include:

- Electricity from incineration = $1,884,225.19 /year
- Biogas from anaerobic digestion = 1,276.24 tons of MSW/day × 310 days × 1,450 kWh/ton of MSW × $0.082/kWh = $23,520,465.08/year
- Selling materials for recycling = $11,141.02/year
- Selling compost products = $11,323,056.53/year
- Selling digestate = $4,193,724.64/year
- Tipping fee = $3,956,328.5/year

Costs include:

- Investment
  - o The incineration plant = $16 million
  - o The composting plant = $17,509,520
  - o The anaerobic digestion plant = $46,220,280
- Operation
  - o At the incineration plant = $4,747,594.2/year
  - o At the composting plant = $1,978,172/year
  - o At the anaerobic digestion plant = $3,956,344/year
  - o At the recycling plant = $16,616,579.7/year
  - o At the open dumping = $3,560,695.65/year
- Electricity
  - o For incineration = $840,893.88/year
  - o For composting = $90,837.66/year
  - o For anaerobic digestion = $811,050.52/year

- Diesel
  - For incineration = $48,995.17/year
  - For composting = $221,159.63/year
  - For anaerobic digestion = $8,506.14/year

The results (Tables 4 and 5) show that this scenario requires the highest investment in incineration, composting, and anaerobic digestion plants. Nevertheless, the NCFs are positive each year, bringing an NPV of $38,674,258.71 and an IRR of 12.48% in 15 years. Therefore, this scenario is recommended.

3.5 Scenario E

In this scenario, 15% of MSW is considered for incineration, 10% is recycled, and the rest is disposed of in sanitary landfills for gas collection. The benefits include:

- Electricity
  - From incineration = $1,884,225.19 /year
  - From gas collection at sanitary landfills = 1,914.35 tons of MSW/day × 310 days × 1,450 kWh/ton of MSW × $0.082/kWh = $70,561,026.65/year
- Selling materials for recycling = $11,141.02/year
- Tipping fee = $3,956,328.5/year

Costs include:

- Investment
  - The incineration plant = $16 million
  - The gas collection plant = $32,665,721
- Operation
  - At the incineration plant = $4,747,594.2/year
  - At the recycling plant = $16,616,579.7/year
  - At the sanitary landfills = $10,682,086.95/year
- Electricity
  - For incineration = $840,893.88/year
  - For gas collection = 1,914.35 tons of MSW/day × 310 days × 2.62 kWh/ton of MSW × $0.082/kWh = $127,496.48/year
- Diesel
  - For incineration = $48,995.17/year
  - For gas collection = 1,914.35 tons of MSW/day × 310 days × 0.6 L/ton of MSW × $0.86/L = $306,219.43/year

This scenario's NPV is the largest, bringing an IRR of 88.44% in 15 years (Tables 4 and 5). The gas collection is used for electricity generation, making a large profit. With a very high return, this scenario is highly recommended.

3.6 Scenario F

This scenario encourages more recycling (30% of MSW or 765.74 tons/day). Another 10% is incinerated, 50% is composted, and the remaining MSW is disposed of in open dumping. The benefits include:

- Electricity from incineration = $1,256,164.89 /year
- Selling materials for recycling = $33,423.06/year
- Selling compost products = $22,646,113.06/year
- Tipping fee = $3,956,328.5/year

Costs include:

- Investment
  - The incineration plant = $16 million
  - The composting plant = $17,509,520
- Operation
  - At the incineration plant = $3,165,100/year
  - At the composting plant = $3,956,344/year
  - At the recycling plant = $49,849,674/year
  - At the open dumping = $1,424,295/year
- Electricity
  - For incineration = $560,602.51/year
  - For composting = $181,675.32/year
- Diesel
  - For incineration = $32,663.83/year
  - For composting = $442,319.26/year

The results (Tables 4 and 5) show that though a higher recycling rate is implemented, the benefit from selling recycled materials is small. This is because recycled products are not widespread in Myanmar (Oikawa, & Iwasaki, 2023). The NPV becomes $-333,562,991.97, making it impossible to calculate the IRR. Therefore, this scenario is not recommended.

3.7 Discussion of Results

A closer examination of the results (Table 6) reveals that the as-is scenario (scenario A) achieves the most benefits from the tipping fee, which is relatively small, while the operating costs are extensive. In contrast, most of the benefits in scenarios B and F are from compost sales, which are almost seven times higher than those in scenario A. However, they require high investment and operating costs. Scenarios C and D also have high investment, specifically in anaerobic digestion plants; however, they can be used to make biogas that generates large benefits. Increasing portions of MSW for

Table 6. Summary of benefits and costs of the six assessed scenarios

Scenario	Total value ($)		Highest contribution	
	Benefit	Cost (with initial investment)	Benefit	Cost
A	4,263,375.04	38,399,103.86	Tipping fee	Operation
B	28,497,719.04	63,904,599.24	Compost	Investment
C	61,279,856.99	97,586,802.50	Biogas	Investment
D	33,565,775.85	112,298,604.81	Biogas	Investment
E	76,412,813.50	49,063,646.55	Electricity generation	Investment
F	27,891,926.02	93,122,180.16	Compost	Operation

anaerobic digestion is suggested to improve the IRR.

Though scenario E has invested heavily in gas collection plants, these plants can produce electricity for trading and achieve the highest benefits among the six scenarios (almost 19 times higher than in scenario A, and three times higher than scenarios B and F). This is consistent with United States Environmental Protection Agency (2024), which stated that gas collection at sanitary landfills provides electricity generation benefits and reduces environmental impacts.

4. Conclusions

MSW is a critical issue, and good management is required to minimize the environmental impacts. Examination of the economic feasibility of various scenarios is crucial so that the government can effectively plan for implementation. This study proposes six MSW management scenarios, assessed using the CBA approach. The results show that the current practice does not provide long-term benefits from economic and environmental perspectives. This is because most of the MSW is dumped directly in landfills, causing contamination and global warming (United States Environmental Protection Agency [EPA], 2024).

The best scenario is scenario E, where most of the MSW is disposed of in sanitary landfills for gas collection and electricity generation. Although the investment is extensive, the IRR estimate becomes 88.44% in 15 years. Un (2023) stated that using landfill gas significantly reduces CO_2 emissions. Nevertheless, removing gases from landfills is a complex task and requires skills. Several methods may be implemented, such as adsorption with activated carbon, gas separation, biological treatments, cryogenic separation, thermal oxidation, and chemical reactions. The choice of method depends on the composition of the gases and the environmental regulations (Un, 2023).

Apart from scenario E, scenario C may be a choice for implementation, especially when the local government has the knowledge to implement and operate anaerobic digestion. The results reveal an IRR of 41.42% in 15 years. Joshi and Visvanathan (2019) commented that anaerobic digestion is the preferred option for food waste management in Asia. However, Mo et al. (2021) stated that although anaerobic digestion is a proper waste management method in Myanmar, it has complex processes, thus requiring skills in implementation. Higher portions of MSW may be processed with better skill to achieve a higher IRR.

The results reveal that recycling is not sustainable in Myanmar for several reasons. Ko et al. (2021) commented that the main challenges of recycling shops in Myanmar are acquiring official licenses, financial problems, limited land for managing recyclable waste, and unstable market conditions. The government should provide skill training for recycling shops and integrate informal recycling into the mainstream waste management sector.

This study contributes to the body of knowledge. The CBA method indicates the economic feasibility of the projects in an easily understood manner, making planning for long-term investment and implementation easy. Several scenarios were examined, providing insights into various options for MSW management. The government may use or adjust scenarios to suit current practices and compare the results for further planning.

There are some limitations. The data used in the analysis are from Myanmar and neighboring countries like Thailand, Malaysia, and Indonesia. Field data collection is recommended to achieve more accurate results.

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