



Implementation of the Balanced Scorecard in Performance Measurement of Waste Management in Mamuju Regency

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ABSTRACT

Waste remains a major environmental health issue in urban areas, requiring comprehensive management efforts that involve government, workers, and the community. In this regard, government accountability—both financial and non-financial—is essential. To ensure effective oversight, performance evaluation through the Balanced Scorecard (BSC) framework becomes crucial. In Mamuju Regency, waste management faces challenges, as only 5.55% of total waste is transported to final disposal sites. This study applies the BSC method to assess waste management performance in Mamuju, focusing on two perspectives: customer satisfaction and learning and growth. Using a quantitative descriptive design, data were collected from 50 residents who utilize household waste collection services and 100 employees directly engaged in operational waste services. Information was obtained through structured questionnaires, operational and financial reports, and supporting documentation from the relevant agency. The analysis covered attributes under the two BSC perspectives. Findings reveal that in the customer perspective—covering service quality, relationships, and institutional image—satisfaction reached the “satisfied” category, indicating good performance. Meanwhile, in the learning and growth perspective, which included employee competence, information system support, motivation, empowerment, and fairness, results showed “highly satisfactory” quality, placing performance in the “excellent” category. The study recommends that the Environmental and Sanitation Office of Mamuju Regency adopt the BSC systematically as a planning and evaluation tool. Local authorities should also design indicators suited to regional conditions, improve infrastructure, enforce the use of protective equipment, and encourage active community participation in waste management.



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INTRODUCTION

Waste management is one of the pressing issues faced by rapidly growing urban areas, including Mamuju Regency. According to data from the National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry (KLHK) in 2022, the total national waste generation in Indonesia reached 21.1 million tons, of which only 65.71% (13.9 million tons) was managed, while the remaining 34.29% (7.2 million tons) was not properly handled.¹

Waste management problems are also evident in West Sulawesi, where only 38.78% of the waste is transported.² A similar situation occurs in Mamuju Regency, one of the districts in West Sulawesi Province with a population of 278,764.³ One major issue in Mamuju is the low rate of waste transported to the final disposal site, recorded at only 3.7% in 2018 and 5.55% in 2019.²

This waste problem is closely and reciprocally linked with population size, community values and behaviors, waste management organizations, and the systems implemented.

From an institutional standpoint, the Department of Environment and Sanitation (DLHK) of Mamuju Regency holds the primary responsibility for waste management, especially in transporting waste from temporary disposal sites (TPS) to the final processing site (TPA)⁴ However, in practice, support from urban villages (kelurahan), sub-districts (kecamatan), and the community significantly affects service success. Currently, there is only one main TPA in Mamuju, which is nearing capacity and not fully managed using a sanitary landfill system. Common challenges also arise due to limited transport fleets, human resources, and processing infrastructure.

In line with growing public service demands and the need for bureaucratic efficiency, a comprehensive and strategic evaluation method is required. One promising approach is the Balanced Scorecard (BSC), which allows for performance assessment not only from a financial perspective but also from customer (community) perspectives, internal processes, and organizational learning and growth.⁵

However, specific studies applying the BSC method in waste management remain scarce, especially in developing regions like Mamuju. Most previous studies have utilized technical performance indicators or general satisfaction surveys without linking them to organizational strategy or interrelated performance dimensions. Some prior research has applied the Balanced Scorecard model in public organizations^{6,7,8,9,10,11,12} but few have addressed waste management directly. This study is therefore important to address this gap and provide a more robust foundation for data-driven, multidimensional strategy-based waste management systems.

The Balanced Scorecard (BSC) is a strategic management tool designed to comprehensively evaluate organizational performance through four main perspectives: financial, customer, internal business processes, and learning and growth. In the context of waste management, the BSC can be used to assess how effectively waste services deliver tangible benefits to the public, operate efficiently, and foster innovation for sustainability. The financial perspective evaluates the efficiency of operational costs in waste collection and processing, as well as the effectiveness of local budget allocation for the sector. The customer (community) perspective assesses public satisfaction with sanitation and waste services, measured through satisfaction surveys, number of complaints, and community engagement in waste segregation and reduction.

By integrating the BSC across these four perspectives, waste management can be viewed not only in terms of outcomes, but also through process quality, community satisfaction, cost efficiency, and innovation capacity. This approach supports local governments and sanitation service managers in making informed, sustainable decisions. BSC is highly suitable for assessing public waste services because it offers a holistic approach, emphasizes real societal impacts, enhances efficiency and innovation, promotes accountability, and bridges the gap between public service goals and professional organizational management. By adopting the Balanced Scorecard approach, this study aims to provide a comprehensive evaluation framework for waste management services—beyond financial performance—by incorporating community satisfaction, internal process effectiveness, and the organization's ability to learn and innovate.

METHODS

This research is a quantitative descriptive study aimed at evaluating the performance of waste management services using the Balanced Scorecard (BSC) perspective. The objective of this study is to assess service quality from both internal (employees) and external (community) viewpoints to obtain a holistic understanding of the effectiveness of waste management services.

The population in this study includes community members who are direct users of household waste transportation services and employees directly involved in the operational aspects of waste management in Mamuju Regency. The sample consists of household waste service users and employees selected through purposive sampling based on the following criteria: For the community group, respondents were required to reside in areas served by the waste collection

system, have lived there for at least the past 6 months, with a total of 50 participants selected. For the employee group, respondents were required to have worked for a minimum of 6 months in operational waste services, with 100 employees selected. The study was conducted from January to October 2022 in Mamuju Regency, West Sulawesi Province.

Data collection was carried out using: Primary data, obtained through closed-ended questionnaires based on a 5-point Likert scale, distributed to both respondent groups (community and employees). Secondary data, including operational reports, financial statements of the waste management services, and other supporting documents from relevant agencies. The research instrument was developed based on the four Balanced Scorecard perspectives: financial, customer, internal business processes, and learning and growth.

The data obtained from measurements and interviews were analyzed using the following formula:¹³

$$IK_{\max} = R \times PP \times EX_{\max}$$

$$IK_{\min} = R \times PP \times EX_{\min}$$

$$\text{Interval} = (IK_{\max} - IK_{\min}) : 5$$

Keterangan:

R = Total number of respondents

PP = Number of statements in one dimension

EX_{max} = Maximum score on the Likert scale

EX_{min} = Minimum score on the Likert scale

Table 1. Interpretation

Score (%)	Category	Performance Level
< 20%	Very Dissatisfied	Very poor
20% - 39%	Dissatisfied	poor
40% - 59%	Moderately Satisfied	Fair
60% - 79%	Satisfied	Good
≥ 80%	Very Satisfied	Excellent

The research data were presented in tables/graphs accompanied by a narrative. The research ethics approval was obtained from the Health Research Ethics Committee of Poltekkes Kemenkes Surabaya with the number No.EA/1182/KEPK-Poltekkes_Sby/V/2022.

RESULTS

Customer Perspective

a. Customer Respondent Characteristics

Table 2. Distribution of Customer Respondents Characteristics

Respondent Characteristics	n	%
Gender		
Male	13	26.0
Female	37	74.0
Age (Years)		
25 - 34	15	30.0
35 - 45	24	48.0
> 45	11	22.0
Educational Level		
Junior High	4	8.0
Senior High	21	42.0
Diploma/ Bachelor	17	34.0
Master	8	16.0

Based on Table 2, the respondents' characteristics by gender show that the majority were female, accounting for 74%. The respondents' characteristics by age, as shown in Table 2, indicate that the largest proportion was in the 35–45 years age group, accounting for 48%, while the smallest proportion was in the >45 years age group, accounting for 22%. Table 2 reveals that the respondents' characteristics by education level show the highest proportion was those with a senior high school education (42%), while the lowest was those with a junior high school education (8%).

b. Customer Perspective on Products and Services

Product and service attributes relate to customer perceptions of the function, quality, and benefits of the products or services offered by the company, serving as indicators of success from the customer perspective. The score for this perspective was 74.4%, which, based on the categorical interval, falls into the 'satisfied' category. This indicates that the majority of the community is satisfied with the administrative services, waste transportation, and environmental cleanliness.

c. Customer Perspective on Relationships

This perspective assesses the company's approach to building and maintaining relationships with customers. Based on table 4, the score for this attribute was 79.4%, which falls into the 'satisfied' category. This indicates that there is a good relationship between customers and sanitation personnel, including the establishment of appropriate service rates and schedules.

d. Customer Perspective on Service Image

This attribute relates to the company's service image as perceived by the customers. Based on table 4, the level of customer satisfaction for this perspective was 64.32%, which falls into the 'satisfied' category. However, improvements are still needed in service facilities and infrastructure, such as waste collection vehicles and temporary storage sites.

Growth and Learning Perspective

a. Employee Respondent Characteristics

Table 3. Distribution of Employee Respondents Characteristics

Respondent Characteristics	n	%
Gender		
Male	96	96.0
Female	4	4.0
Age (Years)		
< 25	12	12.0
26 - 34	36	36.0
35 - 45	31	31.0
> 45	21	21.0
Education Level		
Elementary School	49	49.0
Junior High School	23	23.0
Senior High School	27	27.0
Diploma / Bachelor's Degree	1	1.0

Based on Table 3, the respondents' characteristics by gender show that the majority were male 96%, while female respondents accounted for only 4%. The age characteristics in Table 3 show that the largest group was aged 26–34 years (36%), followed by the 35–45 years age group (31%). Table 3 illustrates that the highest proportion of respondents by educational background had completed elementary school (49%), followed by those with a high school education (27%).

a. Employee Capability

This attribute measures the company's contribution to employees in performing their job duties and responsibilities effectively and efficiently, based on their knowledge, skills, and experience. Based on table 4, the score for this perspective was 86%, indicating that the majority of employees were highly satisfied with capacity development and a conducive working environment.

b. Information System Capability

Information system capability is one of the essential features provided by the company for its employees. Based on table 4, the analysis results show that 86.85% of employees feel very satisfied, indicating that the company has performed very well in providing an information system that supports their work.

c. Motivation, Empowerment, and Equity

This attribute evaluates the relationship concerning motivation, empowerment, and equity provided by the company to its employees. Based on table 4, A total of 90.2% of employees expressed that they were very satisfied, indicating optimal performance.

The performance analysis results, based on the calculated scores and further assessment using scale criteria and measurement instruments, yielded the overall performance value of the Balanced Scorecard as follows:

Table 4. Performance Assessment Summary of Waste Management in Mamuju District Using the Balanced Scorecard

Number	Perspective	Measurement Dimensions	Score (%)	Category	Performance
1	Customer	Products and Services	74.4	Satisfied	Good
		Relationships	79.4	Satisfied	Good
		Service Image	64.3	Satisfied	Good
2	Growth and Learning	Employee Capability	86.0	Very Satisfied	Excellent
		Information System Capability	86.85	Very Satisfied	Excellent
		Motivation, Empowerment, and Equity	90.2	Very Satisfied	Excellent

Data in table 4 shows that the performance score of waste management in Mamuju District, from the customer perspective, falls into the 'Good' category, while from the learning and growth perspective, it is categorized as 'Excellent'.

DISCUSSION

Customer Perspective

The customer perspective refers to the viewpoint used to understand customers' needs, expectations, and behaviors in the context of the services or products offered. The measurement group under this perspective consists of three attributes: products and services, customer relationships, and service image.

The findings indicate that the majority of respondents were satisfied with household waste collection services. The procedures were perceived as simple and easy to follow, and the waste was consistently collected without leaving any behind in residential yards. These results are consistent with the study by Efendi AD¹⁴, which categorized the product and service attributes as satisfactory, as well as the study by Tomaso EN and Simanjuntak RP¹⁵, which found that overall customer satisfaction was in the very satisfied category.

For the customer relationship attribute, the satisfaction score also fell into the *satisfied*

category. This was due to the professionalism of waste collection personnel, who were consistently diligent, never negligent, and maintained harmonious interactions with customers. There were no reports of conflicts that might cause service disruption. Monthly waste collection fees were deemed affordable and appropriate in relation to the quality of service. Furthermore, the fee collection was conducted on a consistent schedule each month. These findings are consistent with the study by Efendi AD¹⁴, which also placed the customer relationship attribute in the satisfied category, while the study by Tomaso EN and Simanjuntak RP¹⁵ reported a very satisfied rating for overall customer satisfaction.

Regarding the service image attribute, most customers expressed satisfaction, influenced by several factors: the condition of waste collection vehicles (carts, tricycles, or trucks) was deemed adequate and appropriate; mechanisms were available for submitting complaints or suggestions about household waste services; and the location of Temporary Disposal Sites (TPS) was considered strategic. However, certain aspects still need improvement, such as the consistent use of proper personal protective equipment (PPE). These findings are consistent with the study by Efendi AD¹⁴, which also placed the customer relationship attribute in the satisfied category, while the study by Tomaso EN and Simanjuntak RP¹⁵ reported a very satisfied rating for overall customer satisfaction.

The results of this study indicate that, across all aspects of the customer perspective—namely product and service attributes, customer relationships, and service image—the customer satisfaction index falls within the *satisfied* category. However, public satisfaction may also be influenced by low expectations of public services, rather than genuinely high service quality. This is consistent with findings reported in previous research¹⁶, which classified the performance of the customer perspective as *satisfied*. Additionally, the customer perspective achieved a satisfactory performance score of 81.10%.¹⁷

Learning and Growth Perspective

One of the key perspectives in the Balanced Scorecard framework is the Learning and Growth Perspective, which comprises three essential components: employee capability, information system capability, and motivation, empowerment, and alignment.

The findings of this study reveal that the employee capability attribute falls into the *very satisfied* category. This is attributed to the availability of training and opportunities provided to all employees to participate in professional development programs. This aligns with previous research¹⁵, which indicated that employee satisfaction in the company was categorized as *very satisfied*, and with another study¹⁸ showing that employee satisfaction regarding the facilities and support provided by the company was considered very high. The higher the competence and qualifications of employees, the more easily organizational goals can be achieved, leading to innovations and positive improvements that contribute to better organizational development.

The study also found that the information system capability attribute was categorized as *very satisfied*. This is due to clear guidance on duties and responsibilities provided by management, a supportive working environment, and directives from leadership concerning upcoming tasks. Supervisors also regularly communicate positive values and ethical behavior to subordinates. These findings are consistent with previous studies¹⁵, which reported that employee satisfaction with company-provided support was in the *very satisfied* category.

For the motivation, empowerment, and alignment attribute, the results also fall into the *very satisfied* category. This is supported by several factors: employees are given opportunities to develop their talents; compensation and allowances are provided in accordance with responsibility levels and professionalism; promotion processes are carried out appropriately based on needs; attendance systems function properly; motivation is provided to subordinates; supervisors lead by example; recognition is openly awarded to high-performing staff; reprimands are given when standards are not met; communication among colleagues and departments is effective; and both interpersonal and interdepartmental collaboration is strong in completing tasks. These findings are in line with prior studies¹⁹, which concluded that motivation, empowerment, and alignment provided by the company to its employees were well managed.

All attributes under the Learning and Growth Perspective were rated as *very satisfactory* by employees, indicating the organization's success in creating a work environment that supports personal development and the enhancement of human resource capacity. This finding is consistent with previous research²⁰, which reported that all attributes in the learning and growth perspective were categorized as *very satisfactory*. However, other studies have noted that the learning and growth processes were not yet optimal, which has resulted in service delivery that falls short of customer expectations.²¹

The findings of this study have several practical implications. First, local governments should focus on standardizing and monitoring post-collection waste services, including the cleanliness of collection points and the responsiveness to community complaints. Second, there is a need for structured and continuous public education to encourage community participation in waste management starting from the source. Third, local policies should incorporate service evaluation mechanisms based on performance indicators to enable evidence-based decision-making, rather than relying solely on perception.

For future research, it is recommended to integrate qualitative approaches, such as in-depth interviews with service providers and users, to further explore the social and institutional factors that influence service quality. In addition, comparative studies across regions could offer insights into more effective and contextually appropriate waste management strategies.

CONCLUSION

This study reveals that the application of the Balanced Scorecard in public sector institutions can effectively measure organizational performance through both internal and external analyses, enabling a balanced view of outcomes. The external analysis, based on the customer perspective, concludes that the performance of waste management services is still in the *satisfactory* category, indicating a need for service improvement in line with community expectations. Meanwhile, the internal analysis, from the employee perspective, shows that the learning and growth perspective achieved a *very satisfactory* performance, which should be maintained to support improved employee retention and productivity.

Based on the findings of this study, several recommendations are proposed: The Environmental and Sanitation Department should implement the Balanced Scorecard framework systematically as a tool for evaluating and planning waste management strategies and develop specific indicators tailored to local conditions. There is a need to enhance infrastructure and facilities. Stricter supervision of the use of personal protective equipment (PPE) among employees is essential. The active participation of the community in waste management should be encouraged and supported.

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