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Research Paper

Waste Management in Heritage Tourism Area: Perspectives from Visitors and Waste Management Operators

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Abstract

Waste management is a complex challenge for cities in developing countries, including Indonesia. This issue is particularly severe in heritage tourism areas, where unmanaged waste can affect the aesthetics and image of historic places. Therefore, this study aimed to investigate the sustainability aspects of waste management using heritage visitors' destinations and waste management operator areas of the Old City of Semarang. A quantitative method was used to achieve this objective, and data were collected through questionnaires, interviews, field observations, document reviews and analyzed using descriptive methods. The results showed that visitors had positive behavior and awareness regarding waste management. Furthermore, sustainable waste management was implemented but not fully realized across all aspects. This study offered various measures to improve sustainable waste management in area, including waste sorting, collaboration between stakeholders, and policy advocacy on sustainable waste management.

Keywords: sustainable waste management; waste sorting; visitors; heritage tourism.

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1. Introduction

Waste management is a complex challenge for cities in developing countries and concerns every citizen (Wilson, 2015). Even though several countries have strived to implement sustainable waste management practices (Chuenwong et al., 2022; Tisi et al., 2023), only a significant portion of generated waste was collected and ended in landfills for burning (Rodić & Wilson, 2017). This condition was prevalent in Indonesia, where waste management still relied on a local government-facilitated system, leading to suboptimal transport and processing of waste (Bagastyo et al., 2023).

On a national level, the average capacity of municipal government to collect waste was estimated to be only 45% of the total waste, with a recycling rate of 14% through informal waste sorting (Kurniawan et al., 2023). This waste was disposed of in landfills, where the accumulation can harm both health and environmental sustainability (Abubakar et al., 2022; Adhikari et al., 2024; Derdera & Ogato, 2023; Suryawan & Lee, 2023). In addition to causing environmental pollution, waste generation can increase methane gas production, contributing to greenhouse gas emissions that trigger global warming (Batista et al., 2021). Waste management presents a complex challenge, specifically in urban areas (Weekes et al., 2021). Issues such as lack of local government capacity (Bashir & Goswami, 2016; Setiadi et al., 2020), unclear regulations (Dangi et al., 2017), inadequate waste segregation, low funding, and lack of equipment are often faced in waste management. Consequently, waste management could be more optimally managed at the regional level (Caponi, 2022; Chioatto et al., 2023) as a national issue requiring a comprehensive approach.

Waste management is a systematic, comprehensive, and sustainable activity that includes reduction and processing (Suryawan & Lee, 2023). The process involves the principles of collection, treatment, and disposal, adding value to waste, inclusivity of user and provider, financial sustainability, as well as sound institutions and pro-active Policy (Wilson, 2015). All these aspects should be simultaneously addressed for effective waste problem resolution (Bappenas, 2021). By considering the relevant factors, future management practices can be improved to benefit current and future generations (Tisi et al., 2023).

One of the major cities in Indonesia struggling with waste issues is Semarang. Serving as an economic hub for Java Island, Semarang is a focal point for economic growth in the Kedungsepur region (Kendal, Demak, Ungaran, Salatiga, and Purwodadi). As the fifth largest metropolitan city, Semarang has approximately 1.66 million people (Indrayati et al., 2023). This high population density, coupled with increasing activities and urbanization rates, has led to a rise in waste generation. Waste issues are often viewed as a direct consequence of the city's rapid growth, coupled with the development of visitor destinations. The rate of waste generation has increased with rapid population and economic growth worldwide, specifically in tourism cities (Chuenwong et al., 2022). A significant environmental concern originates from waste generated by travel and tourism (Herrera-Franco et al., 2024; Vinti et al., 2023). Various studies have shown a possible relationship between the amount of waste generated at various visitor destinations and the number of visitors (Bashir & Goswami, 2016; Maione, 2019; Yuxi et al., 2023). Considering these facts and the implications, it is crucial to understand how to implement effective waste management, specifically in tourism areas.

Cultural tourism is currently experiencing high demand (Jiang et al., 2024), with visits to cultural and historical sites being the fastest-growing activity (Chang & Zhang, 2024; Lu et al., 2023). This form of tourism focuses on places with historical and cultural significance (Lu et al., 2023). As tourism activities in heritage sites continue to increase, there is a crucial need to improve waste management capabilities. Effective waste management is essential to promote sustainability in area (Ross, 2020) as well as preserve the aesthetics and image of heritage sites.

This situation is also evident in the Old City of Semarang, where an increase in visits can lead to waste management challenges due to tourism activities. Under certain conditions, fewer visits result in less waste generation (Muqsit et al., 2024) while peak visits can lead to more waste generation than usual (Bashir & Goswami, 2016). Increased waste generation prevents the public sector from providing adequate services, leading to uncollected waste and accumulation at waste collection points. Waste issues have significantly reduced the aesthetics and image of heritage sites. Furthermore, there are direct and indirect health implications, including unpleasant odors due to unmanaged waste piles. The behavior and awareness of visitors can also affect waste generation (Brotosusilo & Handayani, 2020; Kwakye et al., 2024). Achieving sustainable waste management is only possible with a deep understanding of waste

management practices (Amoah & Addoah, 2021). Therefore, sustainable waste management strategies, coupled with an understanding of behavior and awareness, have become crucial.

Sustainable waste management aims to mitigate the negative impacts of waste. An assessment of waste management conditions in the old city, which serves as a heritage landmark of Semarang City and Central Java Province, warrants further exploration, specifically from visitors' and waste managers' perspectives. Therefore, the current study aimed to complement recent investigations on waste management by Chuenwong et al., (2022) which focuses more on waste sorting and public awareness, and Bashir & Goswami, (2016) focusing on infrastructure conditions and institutional capacity influencing waste management in visitors cities.

2. Methods

This study used quantitative descriptive analysis techniques. The quantitative method includes theory testing by measuring study variables using numerical data. Descriptive analysis was used to identify waste management practices in the Old City of Semarang, based on the results of questionnaires, field observations, interviews, and literature review. This quantitative method was considered appropriate due to its confirmatory characteristics, aimed at assessing the sustainability of waste management implemented in the Old City. In addition, the quantitative study uses variables previously identified in the literature review, which will be discussed in the following subsections.

2.1 Data Collection Methods

Data were obtained using four methods, namely questionnaire, observation, interview, and secondary data. The questionnaire was designed to collect data related to behavior, awareness of waste management, and the condition of sustainability. Based on data from interviews with the Old City Management Authority or BPK2L (Badan Pelaksana Kegiatan Kota Lama), area received approximately 1,000 visitors daily. This number was used as the population (N) of the study. According to Slovin's formula to generate (n) sample, which is n = N/1 + Ne2, and using 0.1 error tolerance (Buchori et al., 2021), the sample consisted of approximately 100 respondents. The total sample used for this questionnaire was distributed through a field survey from 2023 to 2024 and an online survey in 2024 to ensure a randomized representation of the respondents. For the online survey conducted using Google form, respondents were required to meet two criteria: 1) having visited the Old City of Semarang and 2) being aged over 12 years old. The behaviors, traits, and perspectives of the respondents on sustainable waste management were recorded. In total, 100 questionnaires were completed by Indonesian visitors, with 70 percent collected through direct field surveys and 30 percent online.

Interviews were conducted to determine how waste management was implemented in the Old City of Semarang. The interviews also described the initial conditions of waste management, followed by a document review to complement and confirm the existing data. The informants represented the Old City Management Authority (BPK2L) and CV. Umega, is a private sector responsible for waste management in the old city area. These informants were selected due to the ability to understand the condition of waste management in area and directly engage. The in-depth interviews were conducted in 2023.

Field observations were conducted to verify the condition of waste management in the Old City of Semarang. Data collected through observations in 2023 included descriptions of existing waste management conditions and the environmental and physical conditions of area, such as the cleanliness, the condition of the garbage bins, and the temporary garbage collection points. Furthermore, secondary data were obtained from online literature sources, such as journals, study papers, and news relevant to the study. Data collected through secondary sources included the profile of the Old City and its waste management practices.

2.2 Analysis Techniques

Descriptive analysis was used to explain the implementation, behavior, and awareness of waste management in relation to sustainability. A 4-point Likert scale (e.g. Strongly agree; Agree; Disagree; Strongly disagree) was used to describe the behavior and awareness of visitors regarding waste management. In addition, a 5-point Likert scale (i.e. Very good; Good; Acceptable; Poor; Very poor) was

used to evaluate the results of sustainable waste management. Table 1 shows the set of study variables and indicators.

Table 1. Variables and Indicators

No	Variable	Indicators
1	Characteristic of Visitors	Gender
2		Age
3		Occupation
4	Visitors' Behavior in Waste Management	Disposing of garbage in waste bin
5		Classifying waste
6		Disposing of plastic waste in the inorganic waste bin
7		Disposing of wrapped leaves in the organic waste bin
8		Disposing of garbage anywhere
9	Visitors' Awareness of Waste Management	People have an important role in waste management
10		Waste can have a negative impact
11		Waste is the residue of human activities that no longer have economic value
12		Waste can still have economic value when processed
13		Waste can be directly processed in a mixed state without being sorted
14		Waste management process consists of sorting, collection, transportation, processing, and final processing
15	Sustainable waste management	Waste management service results (seen from the cleanliness of area)
16		Availability of waste facilities and infrastructure
17		Cleanliness condition/appearance of waste facilities and infrastructure
18		Waste reduction activities (no waste accumulated in one place)
19		Waste management policies that are carried out
20		Socialization activities related to waste management (availability of facility signage)
21		Follow-up related to waste complaints

3. Results and Discussion

3.1 Characteristics of Visitors

The Old City of Semarang is a heritage tourism center with a total area of 39.3 ha, a built-up of 19.03 ha, and an undeveloped area of 20.27 ha. It is a historical part of Semarang and is included in the temporary list of world heritage sites by UNESCO (Dewi et al., 2020). It was revitalized in 2017 (Handaruni et al., 2021) and has since become a prominent historical and cultural visitor attraction. According to BPK2L, area is accessible daily and open to the public from various road directions. The number of visits cannot be accurately quantified due to the absence of a gate system. As visitors are estimated to make approximately 1,000 daily visits, the Old City has become increasingly vibrant and densely populated, particularly with visitors' activities.

Visitors have diverse characteristics in terms of gender, age range, and occupation. The varying characteristics influence the condition of existing waste management practices. This study showed that visitors were predominantly female, accounting for 54% of the total, while male made up the remaining 46% (Figure 1).

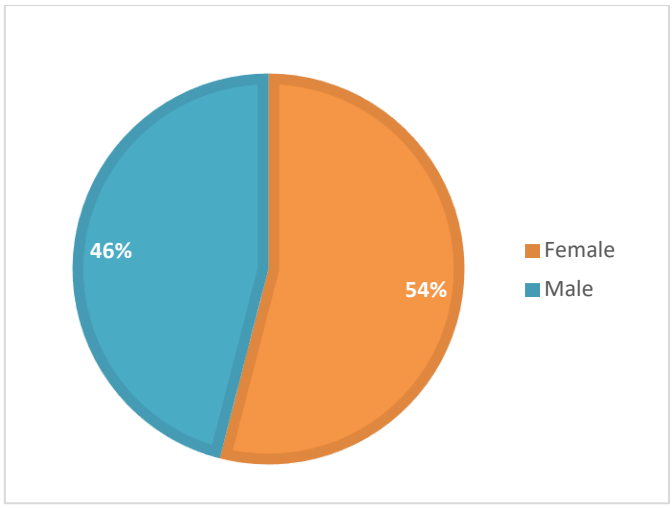

Figure 1. *Respondents by gender (author analysis, 2024)*

In terms of age, visitors were divided into six categories to simplify analysis. The determination of age categorization was based on the age classification standards of the Ministry of Health of the Republic of Indonesia (2009), with minor modifications to include early and late adolescence, early and late adulthood, and early and late elderly stages (Dewi & Mussadun, 2023). The six age categories were baby and toddler (0-4), childhood (5-11), teenage (12-24), adult (25-45), elderly (46-65), and senior (≥ 65).

The age range of visitors was predominantly teenagers (12-25 years), accounting for 58% of the total. Meanwhile, the adults (25-46 years) comprised approximately 37%, and the elderly (46-65 years), represented approximately 5%. Visitors in the age groups of 25-46 and 46-65 included parents accompanied by children, primarily those under 12 years, visiting the town for recreational purposes. Children were not represented in the diagram as the questionnaire was addressed to the parents (Figure 2). Regarding occupation, students constituted the largest group of visitors, accounting for 45%, followed by employees at 34%, others at 18%, and civil servants at 3% (Figure 3).

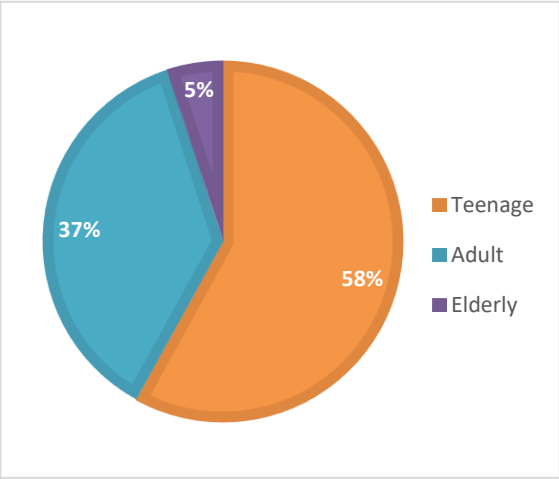

Figure 2. *Respondents by age (author analysis, 2024)*

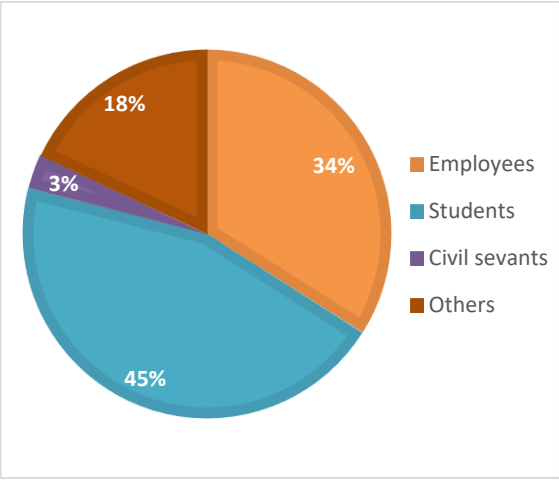

Figure 3. *Respondents by occupation (author analysis, 2024)*

3.2 Visitor Behavior in Waste Management

Behavior in waste management is a crucial aspect that significantly influences waste management. There is a strong relationship between behavior and the effectiveness of waste management practices (Kwakye et al., 2024). In this context, visitors' handling of waste disposal can serve as a basis for assessing behavior (Table 2).

Table 2. Visitor Behavior in Waste Management

Indicators	Strongly agree	Agree	Disagree	Strongly disagree
Disposing of garbage in waste bin	65%	35%	0%	0%
Classifying waste	37%	61%	2%	0%
Disposing of plastic waste in the inorganic waste bin	53%	47%	0%	0%
Disposing of wrapped leaves in the organic waste bin	46%	33%	21%	0%
Disposing of garbage anywhere	2%	8%	36%	54%

Source: author analysis, 2024

Visitors generally disposed of garbage properly, wherein 65% strongly agreed and 35% agreed. The majority sorted waste into organic and inorganic, wherein 37% strongly agreed 61% agreed, and 2% disagreed.

Differentiated by the type of waste bins, namely organic and inorganic, all visitors tended to dispose of plastic waste in inorganic waste bins. Specifically, 53% strongly agreed and 61% agreed to dispose of plastic waste in inorganic waste bin. Regarding leaf waste, approximately 21% of visitors did not dispose of it in organic bins. Among other visitors, 46% strongly agreed, while the remaining 33% agreed to dispose of leaf waste in organic bins. This showed that despite the awareness of proper disposal of plastic waste, visitors might not maximize the disposal of leaf waste. The majority refrained from littering, wherein 36% disagreed, 54% strongly disagreed, and 10% engaged in littering.

Visitors generally showed good waste disposal behavior. This positive behavior was practiced not only within the Old City but also in other places. The area had the potential to be free from waste and the adverse effects of waste. Efforts toward achieving a more sustainable environment were also less challenging.

3.3 Visitors Awareness in Waste Management

Awareness played a crucial role in simplifying waste management, ensuring it was properly managed for sustainability. However, this becomes challenging when visitors' understanding of waste management is low or limited (Amoah & Addoah, 2021). In this context, visitors' knowledge serves as the basis for waste management awareness, particularly in understanding the general aspects of waste management, its impact, the economic value of waste, and waste management process (Table 3).

Table 3. Visitor Awareness in Waste Management

Indicators	Strongly agree	Agree	Disagree	Strongly disagree
People have an important role in waste management	44%	56%	0%	0%
Waste can have a negative impact	62%	38%	0%	0%
Waste is the residue of human activities that no longer have economic value	11%	5%	56%	28%
Waste can still have economic value when processed	70%	26%	4%	0%
Waste can be directly processed in a mixed state without being sorted	3%	16%	70%	11%
Waste management process consists of sorting, collection, transportation, processing, and final processing	30%	58%	12%	0%

Source: author analysis, 2024

Visitors recognized the crucial role of waste management and were aware of the negative impact of improper waste disposal on the surrounding quality and environmental conditions. All visitors acknowledged that each individual played a crucial role in waste management, wherein 44% strongly agreed and 56% agreed. Furthermore, all visitors believed waste could negatively impact surrounding conditions, wherein 62% strongly agreed and 38% agreed. There was a good level of awareness regarding waste management and the negative impact of waste.

In terms of awareness of the economic value of waste, the majority understood waste could be an economic asset when processed correctly and segregated. A significant number disagreed that waste was merely a residue of human activities without economic value, wherein 56% disagreed and 28% strongly disagreed. However, some still perceived waste as a residual product with no value, wherein 11% strongly agreed and 5% agreed. Regarding processing, a significant number believed waste could generate economic value when sorted, wherein, 70% strongly agreed and 26% agreed. Meanwhile, 4% believed waste had no value even after processing. Most visitors disagreed waste could be directly processed without sorting, wherein 70% disagreed and 11% strongly disagreed. A minority believed in direct processing without sorting, wherein 3% strongly agreed and 16% agreed. The majority showed a good understanding of waste management process, which comprised sorting, collection, transportation, processing, and final processing, wherein 30% agreed, 58% strongly agreed, while 12% disagreed.

There was a good level of awareness regarding waste management. Therefore, sustainable waste management could be more easily implemented, as visitors understood the practices as the responsibility of each individual and sorting was essential for adding value to waste. This result was in line with previous case studies conducted in other developing countries (Rodić & Wilson, 2017; Wilson, 2023).

3.4 Existing Waste Management in the Old City

Based on an interview with one of waste management operators in the Old City of Semarang, CV. Umega, the estimated volume of waste generated in the old city area daily was 36 m^3 or approximately 12.7 tons. The composition of waste was primarily from commercial and office spaces, collected in bins and plastic wraps. The Environmental Agency (DLH) and the contracted private company collected waste twice daily at 06.00 and 17.00. The garbage was usually disposed of at a temporary waste collection point (TPS), while plastic wrap was placed in garbage cans located along the roads. At TPS, waste underwent sorting into organic, inorganic, and hazardous categories before being transported.

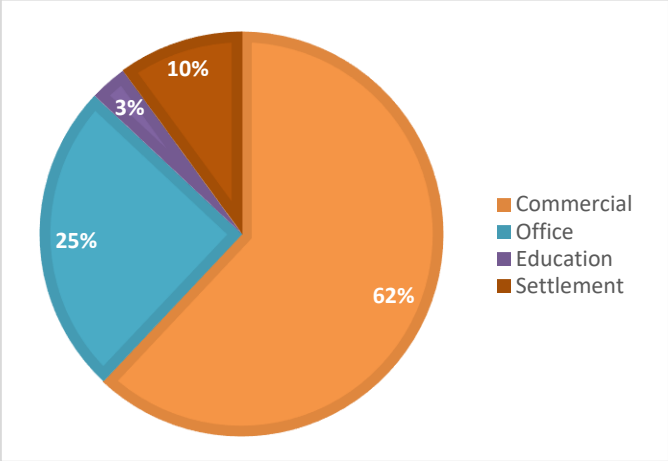

Figure 3. Garbage Composition in the Old City (author analysis, 2024)

Commercial activities were the primary contributors to waste generation, accounting for 62% of the total waste. Offices also contributed to waste generation, at 25%. In contrast, settlements accounted for only 10% of the total waste (Figure 3). The composition of waste reflected the main activity in area, which was predominantly commercial and served as a visitor's destination. Settlements comprised approximately 100 households, representing less than 5% of the total area, scattered across several locations, including the Military Police Corps (CPM) complex and Nuri and Garuda streets. Therefore, the majority of waste was generated from commercial areas rather than settlements. While there was no specific data on waste generated by visitors, visitors contributed significantly to the commercial waste category.

Waste management was primarily managed by the private sector. CV Umega was responsible for waste collection, while PT Amazon and PT Deta Sukses Makmur (DSM) handled street sweeping and environmental cleanliness. Operator used a three-wheel vehicle as a feeder to collect the garbage to TPS. During this transporting process, recyclable garbage was separated and collected for potential sale. Waste

transportation occurred 4-5 times in the morning and 3-4 times in the evening. Therefore, when TPS reached overcapacity, the collected garbage scattered along the roadside without proper containment.

The current implementation of waste management adhered to the traditional *'end of the pipe'* paradigm, where waste was collected and transported for final disposal at Jatibarang landfill, located kilometers away on the outskirts of the city. This approach contributed to the accumulation of waste at the landfill and had environmental pollution risks. Waste in landfills could adversely affect health and environmental sustainability (Abubakar et al., 2022; Adhikari et al., 2024; Derdera & Ogato, 2023; Suryawan & Lee, 2023), while increasing methane gas production, a potent greenhouse gas that could trigger global warming (Batista et al., 2021).

3.5 Sustainable Waste Management in the Old City

Sustainable waste management comprises both physical and governance components. The physical component focused on waste collection, processing and adding value to waste. Meanwhile, the governance component prioritized institutional conditions, financing, and customer relations (Wilson, 2015) (Table 4).

Table 4. Visitor Perception of Sustainable Waste Management

Indicators	Very good	Good	Acceptable	Poor	Very poor
Waste management service results (evidenced by the cleanliness of area)	8%	44%	40%	8%	1%
Availability of waste facilities and infrastructure	1%	25%	40%	25%	9%
Cleanliness condition/appearance of waste facilities and infrastructure	5%	39%	35%	18%	3%
Waste reduction activities (no waste accumulated in one place)	7%	33%	53%	7%	0%
Waste management policies that are carried out	10%	29%	56%	1%	4%
Socialization activities related to waste management (availability of facility signage)	10%	26%	37%	21%	6%
Follow-up related to waste complaints	7%	16%	72%	5%	0%

Source: author analysis, 2024

In the physical component, one of the key aspects of a sustainable waste management strategy was the public health collection process. This study showed that waste management services in the old city produced moderate to good results in terms of cleanliness, with 44% rating it as good and 40% as acceptable. Essential to waste collection was the availability of transport vehicles, adequate waste facilities, and infrastructure equipment (Derdera & Ogato, 2023). The facilities and infrastructure also fell within the moderate to good category. While 40% of visitors found waste collection facilities acceptable, only 39% believed that the condition was good, and 18% believed it could be improved. Therefore, waste management operators need to optimize performance.

Another important aspect of the physical component of sustainable waste management was the impact of waste management on environmental conditions. This aspect showed the importance of minimizing waste in the environment to prevent pollution and associated health problems (Abubakar et al., 2022). Furthermore, waste reduction efforts were moderate to good. Although waste did not accumulate at a point, the old city area was not exceptionally clean. Only 33% of visitors believed the environmental conditions were good, with 53% rating it as acceptable. This was challenging to operators as a cleaner environment could contribute to visitors' comfort and satisfaction (Ross, 2020).

In the governance component, one of the key aspects of a sustainable waste management strategy was sound institutional and proactive policy. Effective implementation and cooperation were crucial for the sustainability of institutions (Chiwaridzo, 2024). In managing the old city, the Semarang City Government collaborated with BPK2L, which was responsible for waste collection in relation with CV Umega, while collaboration with PT Amazon and PT Deta Sukses Makmur (DSM), was responsible for street sweeping and environmental cleanliness. The division of roles among these institutions contributed to the sustainability of waste management. However, the majority of visitors perceived the policies implemented as moderate, with 56% expressing dissatisfaction. For example, implementing the principles of reduce, reuse, and recycle (3R) was fundamental to sustainable waste management. According to the 3R concept, waste could be transformed into valuable resources, thereby improving resource efficiency.

Contrary to this principle, observations showed that waste was directly disposed of in a landfill without any prior processing by management.

Another aspect of the governance component was inclusivity, pertaining to the roles and engagement of both service providers and users. Inclusiveness in service provision was essential for delivering comprehensive services to users across the area. The provision of waste facility signage was a means to extend service coverage throughout area. Waste facility signage was perceived as sufficient by visitors, with 63% rating it as acceptable to good. However, some believed there was room for improvement, with 21% rating it as poor and 6% as very poor. Effective communication and feedback between service providers and users was also crucial. Customer complaints regarding waste services were addressed satisfactorily, with 72% of complaints receiving favorable responses.

Financial sustainability was the final aspect of sustainable waste management within the governance component. Smooth financing was essential for the sustainability of waste management sustainability (Wilson, 2015). Based on interviews with CV Umega and BPK2L, financing for waste management in the Old City was sourced from both the government and private sector through retributions or charges imposed on users in commercial areas, such as shops and offices. This financing was used for the operational and maintenance aspects of waste management, including payment for operators, waste collection staff, cleaners, maintenance, and the procurement of waste facilities and infrastructure. Financing plays a crucial role in waste sustainability by impacting every phase of waste management business cycle.

In summary, the physical component of sustainability, comprising waste collection, processing, and adding value to waste, primarily focused on the sustainability of area and was executed at a moderate to good level. There was room for improvement in waste management services, facilities, infrastructure, and waste accumulation prevention. Furthermore, efforts to add value to waste needed to be maximized. The governance component of sustainable waste management, comprising institutional conditions, financing, and customer relations, was relatively at a moderate to good level.

3.4 Discussion

Waste management in the Old City Semarang Heritage Area had a reasonably moderate to good implementation, with commitment from related parties. The cleanliness of area, being a visitor's heritage site, prioritized waste management for the local government. This commitment was shown by the Semarang City Government, particularly the Department of Culture and Tourism as well as the Environmental Agency, in collaboration with BPK2L and private sectors like CV Umega, PT Amazon, and PT Deta Sukses Makmur (DSM). The cooperation among these stakeholders was key to success, showing a joint effort between the government, the community, and the private sector in achieving sustainable waste management objectives (Astawa, 2022; Derdera & Ogato, 2023; Tsai et al., 2021; Weekes et al., 2021). The government's awareness of the importance of maintaining cleanliness was further reinforced by its intervention, specifically through the implementation of a waste management-related policy. This policy could facilitate waste management practices (Bagastyo et al., 2023; Chang & Zhang, 2024; Kurniawan et al., 2023; Tsai et al., 2021).

The Old City Semarang, serving as a visitors attraction, also provided sufficient financing for waste management. With the availability of adequate finance, waste management could operate efficiently. This perspective was in line with (Broshi-Chen & Mansfeld, 2021; Obersteiner et al., 2021) showing finance as a driving factor for the long-term sustainability of waste management programs and the environment. With financial support, sustainable waste management, including waste collection, could be optimally executed. Such waste management practices could improve area's sustainability and maintain the aesthetics and image of the heritage area (Ross, 2020).

In sustainable waste management, understanding behavior and awareness is essential. Positive behavior and awareness could improve or strengthen sustainable waste management practices (Amoah & Addoah, 2021; Bahçelioğlu et al., 2020; Brotosusilo & Handayani, 2020; Derdera & Ogato, 2023). While visitors showed good behavior and awareness, specifically in sorting and disposing of waste, the same could not be said for office, education, and residential actors. Therefore, this disparity compromised the sustainability of waste management. Cooperative efforts and control were required through waste

management regulations in all activities sectors to address this challenge. Specifically, targeted waste sorting regulations should be established for all relevant stakeholders in this area.

Effective waste management necessitated strict monitoring and evaluation by all relevant parties. This included assessing the behavior and awareness of stakeholders, both physical and governance aspects of waste management. Monitoring and evaluation could ensure that waste management remained relevant and adaptive to environmental changes and requirements. Therefore, continuous development and improvement of waste management practices were essential to maintain sustainability in the long term.

Conclusion

In conclusion, this study investigated the sustainability of waste management in Semarang's Old City heritage area, focusing on the perspectives of visitors and waste management operators. Two key results were identified regarding the implementation of waste management in visitors heritage area. Firstly, the predominantly positive behavior and awareness about waste management among visitors served as an advantage for advancing waste management practices. Secondly, assessing waste management could guide managers and waste operators in improving performance, while promptly informing other stakeholders to actively contribute to waste management.

BPK2L could consider the following steps in order to achieve more sustainable waste management: (1) Prioritize sorting waste from sources by engaging stakeholders or sectors responsible for waste generation, (2) Encourage waste management operators to collaborate with various parties, including waste generators and the government, in order to promote sustainable waste management practices; (3) Develop a standalone policy on the implementation of sustainable waste management in the Old City of Semarang.

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