Evaluation of waste management in tourism area of Luar Batang Village, outside area of the Historic Old Jakarta Kota, Penjaringan District, North Jakarta

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Abstract. Penjaringan Subdistrict is included in the tourism area of the Historic Old Jakarta Kota outside area which is a community based historical cultural tourism center with an area of ±19 Ha, consisting of 7 cultural heritage buildings. One of the cultural heritage buildings in the tourist area outside the walls of the old city is the area outside the stem area. In this tourist area there is a historic worship building in the form of a mosque. Increased tourist visits can cause problems on regional scale waste management caused by waste from tourist activities. This study aims to evaluate the existing conditions of Waste Management in Tourism Area of Luar Batang Village Outside area of the Historic Old Jakarta Kota and waste management facilities starting from source to landfill. This research was conducted through the measurement of waste generation and composition based on SNI 19-3964-1994 as a method of taking and measuring samples of urban waste generation and composition. The results of this study indicate that the generated waste is 28.5 kg/day or around 0.216 m³/day. The composition of waste in the tourist area of Luar Batang Village, Outside Area of the Historic Old Jakarta Kota shows that the biggest physical component of waste is organic with an average daily percentage of 83.30%, plastic waste of 4.05% (PET), 3.37% PP waste, and 6.40% for LDPE, as well as Styrofoam waste of 2.46%, in addition to the waste cans the trash with a percentage of 1.55% and cardboard waste of 1.43%.

1. Introduction
Historic Old Jakarta Kota is one of the cultural heritage building areas as regulated in the Provincial Regulation of the Special Capital Region of Jakarta Number 1 of 2014 concerning Spatial Planning and Zoning Regulations. Administratively the Historic Old Jakarta Kota is located in 2 administrative regions of the Special Capital Region of Jakarta, is West Jakarta and North Jakarta. Penjaringan Subdistrict, North Jakarta is included in the Tourism Area of the Historic Old Jakarta Kota Outside Area is a community-based historical cultural tourism center with an area of ± 19 Ha, consisting of 7 cultural heritage buildings. One of the cultural heritage buildings is a historic worship building in the form of a mosque located in the area outside the stem area of the village.

With the increase of tourist visits in tourist areas can cause problems, such as waste management problems caused by tourist activities around the tourist area [1]. In certain conditions the peak of tourist visits will cause the generation of waste generated increases compared to normal days so that the generation of waste that is not transported will cause more waste to pile up at the distribution points of waste.

Based on the existing conditions of waste storage facilities in the tourist area Luar Batang Village is adequate, but the handling of waste around the tourist area can’t be said to be in good condition [2].
There are several factors that cause these problems such as behaviour patterns and awareness of tourists to maintain the environment around the tourist area is still quite low, in addition to the lack of awareness of local tourists in differentiating and classifying waste based on the type of waste [3]. In the long run if this problem is not handled properly it will cause a decrease in environmental quality [4], affect the aesthetics or beauty of the environment, as well as potentially affect the selling power and attractiveness of tourists [5].

So that evaluation of waste management is needed in order to support the realization of the development of the Historic Old Jakarta Kota as an integrated tourism area with the provision and development of facilities as well as improving the mindset and perspective of the community on waste management and handling as a system implementation solution in the management and handling of waste The Historic Old Jakarta Kota, Penjaringan District, North Jakarta.

2. Methodology
In this study the data collection techniques used were by conducting field observations to get an overview related to the Luar Batang Village, Outside Area of The Historic Old Jakarta Kota and the technical description of the waste management operations. Then the generation of waste and composition is measured based on SNI 19-3964-1994 as a method of taking and measuring the sample generation and composition of urban waste. The measurement of waste generation and composition is carried out for 5 days starting from July 1 to July 5 2020, data collection carried out for 5 days due to the current condition of tourism area of Luar Batang Village [2], Outside Area of The Historic Old Jakarta Kota there are restrictions on pilgrimage access during the Covid-19 outbreak.

3. Results and discussion
3.1. General description of Luar Batang Village, outside area the Historic Old Jakarta Kota
Luar Batang is an urban village that has historical value and is part outside area of the Historic Old Jakarta Kota Walls. Based on the Provincial Regulation of the Special Capital Region of Jakarta Number 1 of 2014 concerning Spatial Detailed Plan and Zoning Regulations, Luar Batang village is an area with development in accordance with the characteristics and culture of the region so that this area needs to be preserved.

In this tourist area there is a historic worship building in the form of a mosque. The Luar Batang mosque is located in Luar Batang Village, Penjaringan Sub-district, North Jakarta. This mosque is one of the centers of Islamic symbols in the Dutch East Indies era. This mosque is called a sacred mosque because there is a grave of a cleric named Habib Husein bin Abubakar bin Abdillah Alaydrus or better known as 'Habib Husein'. Area of Luar Batang Village can be seen in Figure 1.

![Figure 1. Area of Luar Batang Village](image-url)

Besides being used as a place of worship by local residents, this mosque has uniqueness compared to other historic mosques, namely its location right at the mouth of the port of Sunda Kelapa, an important port in the past, so this has become an attraction for tourists to travel religiously, and visit the tomb. Based on current conditions, the tourism area of the Luar Batang Village, Area outside the Historic Old Jakarta Kota has decreased the number of visitors due to restrictions on access to
pilgrimage during the Covid-19 outbreak. The decline in tourist numbers has decreased by 98%, which usually ranges from 5,000-6,000 tourists per day to 100 tourists per day [6,7]. However, this cannot be separated from the generation of waste caused by tourist activities and area maintenance activities.

3.2. General overview of waste management in tourism area Luar Batang Village, outside area of the Historic Old Jakarta Kota

3.2.1. Waste generation. Waste generation is the amount of waste generated from tourist activity in Luar Batang Village, Outside Area of The Historic Old Jakarta Kota in units of volume/day. Based on the data of daily average waste generation, it can be seen that the average daily solid waste generation is 28.5 kg/day or around 0.216 m$^3$/day. Following are the results of the analysis for the average waste generation in Table 1.

| Days to | Sampling Location | Daily Average Increment | Waste Weight, (Kg/Day) | Volume, (m$^3$/day) |
|---------|-------------------|-------------------------|------------------------|---------------------|
| 1       |                   | 7                       | 0.018                  |                     |
| 2       |                   | 6                       | 0.0675                 |                     |
| 3       | Luar Batang Mosque| 6                       | 0.0675                 |                     |
| 4       |                   | 4.5                     | 0.045                  |                     |
| 5       |                   | 5                       | 0.018                  |                     |
| Total   |                   |                         | 28.5                   | 0.216               |

3.2.2. Waste composition. The composition of waste in the tourist area of the Luar Batang Village, Outside Area of The Historic Old Jakarta Kota shows that the largest physical component of waste is organic with an average daily percentage of 83.30%. This type of organic waste dominates the overall waste originating from plant waste, leaves and tourist leftovers. In addition to organic waste, plastic is the second highest generated by tourist activity with a percentage of 4.05% for PET, 3.37% for PP and 6.40% for LDPE. Besides that, other organic waste such as cans, Styrofoam, paper/cardboard compositions are relatively small. The composition of waste in the tourist area of the Luar Batang Village, Outside Area of The Historic Old Jakarta Kota can be seen in Table 2.

Based on the waste composition in the tourism area of Luar Batang Village, Outside Area of The Historic Old Jakarta Kota, it can be seen that the composition of waste every day is different, this is influenced by the number and activity of tourists. It is also influenced by conditions where the tourist area has decreased the number of visitors due to restrictions on access to pilgrimage during the Covid-19 outbreak.

| Waste Composition | Average Waste Percentage (%) |
|-------------------|-------------------------------|
|                   | Days to                       |
|                   | 1    | 2    | 3    | 4    | 5    | Average |
| Organic           | 74.29| 80.00| 83.33| 88.89| 90.00| 83.30   |
| Plastic (PET)     | 7.14 | 5.00 | 1.67 | 4.44 | 2.00 | 4.05    |
| Plastic (PP)      | 4.29 | 6.67 | 1.67 | 2.22 | 2.00 | 3.37    |
| Plastic (LDPE)    | 8.57 | 6.67 | 8.33 | 4.44 | 4.00 | 6.40    |
| Cans              | 1.43 | -    | 1.67 | -    | -    | 1.55    |
| Styrofoam         | 2.86 | 1.67 | 3.33 | -    | 2.00 | 2.46    |
| Paper / Cardboard | 1.43 | -    | -    | -    | -    | 1.43    |
| Total             | 100  | 100  | 100  | 100  | 100  | 100     |

3.2.3. Waste management technical operations. Waste management in the tourism area of Luar Batang Village, Outside Area of The Historic Old Jakarta Kota, is handled by the Secretary of the Luar Batang Mosque Honorary Board in collaboration with The Historic Old Jakarta Kota Regional
Management Unit under the supervision of the Penjaringan District Environmental Management Unit. Technical of waste management in tourism area of Luar Batang Village, Outside Area of The Historic Old Jakarta Kota consists of waste collection at the source, collection, transfer, transportation and landfill.

- **Waste Storage.** Waste collection is a way to collect waste generated from tourist activities before being collected, moved, transported and disposed of to the final processing site. The types of storage used in this area are bin measuring 50 and 100 liters. Types of waste collection in the region can be seen in Figures 2 [8].

![Figure 2. Waste storage in tourism area Luar Batang Village [8].](image1)

- **Waste Collection and Transfer.** Waste collection generated in the tourism area of Luar Batang Village, Outside Area of The Historic Old Jakarta Kota is served by 1 motorcar capacity of 2 m³ and consists of 1 worker. The pattern of waste collection that is applied is individual indirect pattern. The process of collecting consists of the activity of collecting waste from the source, then transferred to the Gendong Kali Dipo Transfer, in Penjaringan Village [9]. Process of collecting and moving waste from the source to the Kali Gendong Depo show in Figure 3.

![Figure 3. The process of collecting and transfer waste from the source to the Kali Gendong Dipo.](image2)

- **Waste Transport.** Waste from source to landfill transported along with household waste that has been Kali Gendong Dipo Transfer, Penjaringan Sub-District, to landfill in Bantar Gebang, Bekasi, West Java using a Dump Truck capacity 25 m³ consisting by 2 workers. Process of transporting waste to landfill can be seen in Figure 4.

![Figure 4. The process of transporting waste to landfill.](image3)
3.3. Technical evaluation of waste management operations in tourism area Luar Batang village, outside area of The Historic Old Jakarta Kota

Based on the results of the evaluation of the general condition description of the operational waste management starting from the source, collection, transfer, transportation to landfill [10]. The strategy that can be applied by the manager of the Tourism Area Luar Batang Village, Outside Area of The Historic Old Jakarta Kota which has been done at this time, to support the realization of the development of the Historic Old Jakarta Kota as an integrated area by providing and developing facilities for waste management and handling, including:

3.3.1. Waste sorting separately based on the type of waste separated. The application of separate waste storage is considered effective to be applied in tourist area Luar Batang Village Mosque, the Historic Old Jakarta Kota, considering that the waste produced by tourists is generally in the form of food waste and plastic waste. The waste collection system that is applied is to use separate non-permanent storage based on the type of disaggregated waste, namely:

- Green color for organic or biodegradable waste such as leaf, twigs, food scraps and others.
- Yellow for an-organic waste or rubbish that is difficult to decompose such as glass, plastic, drinking bottles, straws, cans and others.
- Dark colors for waste dangerous and toxic materials such as chemicals, broken glass, and so on.

3.3.2. The collection and removal period is based on the type of disaggregated waste collection and removal of waste generated in the tourist of Kampung Luar Batang Village from the source to the Kali Gendong Dipo Transfer can be carried out alternately based on the type of disaggregated waste by considering the condition of the composition of the waste, such as:

- The greater the potential for organic waste, the collection and transportation period can be done a maximum of 1 (one) time a day.
- The collection and removal period of an-organic waste can be adjusted to a predetermined schedule, can be done more than 2 days 1 time.
- Hazardous and Toxic Waste collection and removal period in accordance with the specified time, can be done if the condition of the container is in full condition considering the Hazardous and Toxic Waste generated by tourist activity is very little or almost non-existent.

3.3.3. Improving the mindset and behavior of tourists towards the management of tourist area waste. Improved mindset and change in tourist behavior related to waste management tourist Area Luar Batang Village Mosque, the Old Town Wall of Jakarta, is not an easy thing to do, so it requires a fairly long process [11]. The way that can be done is by touching and comprehensive socialization to the entire community, especially tourists intensively and continuously [12]. This socialization provides an overview to the public, especially tourists related to the good management of regional waste, environmentally friendly, can improve the quality of health and environmental aesthetics and can be an increase in attractiveness for tourists’ [13].

4. Conclusion

Based on the results of measurements of daily average waste generation obtained by 28.5 kg/day or about 0.216 m³/day. The amount of waste generation is influenced by condition of tourist areas Luar Batang Village Mosque, the Historic Old Jakarta Kota experienced a 98% decrease in tourist numbers due to restrictions on access to pilgrimage during the covid-19 outbreak. The composition of waste in the tourist area of Luar Batang Village Mosque, shows that the biggest physical component of waste is organic with an average daily percentage of 83.30%, plastic waste of 4.05% (PET), 3.37% PP waste, and 6.40% for LDPE, and Styrofoam by 2.46%, in addition to the waste cans the trash with a percentage of 1.55% and cardboard waste of 1.43%. Waste collection in the tourist area of the Luar Batang Village Mosque, using an indirect individual pattern consists of collecting waste from the source with a motorcars with a capacity of 2 m³ through the process of transferring to the Kali Gendong Dipo Transfer Penjaringan. Transporting waste from the Tourism Area of the Luar Batang Village that has been collected and transported to the Gendong Kali Depo Transfer in Penjaringan.
with household waste is transported to landfill in Bantar Gebang, Bekasi, West Java using a dump truck capacity 25 m³.

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