



The effect of plastic waste on the coastal socio-economic community of the Lantebung in Makassar City, West Sulawesi Province, Indonesia

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Abstract

Mangrove ecosystems provide various ecological and economic functions, such as environmental services as an ecotourism area. This study aims to determine the factors that influence plastic waste on the socio-economic life of coastal communities in the Lantebung area. The data in this study are primary data obtained from interviews with respondents with structured questions and statements. The data collection method with structured interview and data analysis used in this research is an impressional statistical method with an SEM approach. The results of the data analysis, the factors that affect plastic waste are the volume of waste with a loading factor value of 0.966. In contrast, the factors that affect the social economy is a loading factor value of 0.732. Plastic waste has a significant relationship to the socio-economic community, with a P value of 0.018 less than 0.05. The direction of the relationship between plastic waste and the socio-economic community is negative, with -0.240, meaning that the higher the plastic waste, the socio-economic community in the Lantebung mangrove area will decrease.

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Keyword

Coastal;
Lantebung;
Makassar;
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Introduction

Coastal areas are rich in potential resources consisting of biological and non-biological resources. Biological resources consist of various fishery products, coral reefs, mangrove forests, and others, while non-biological resources are in the form of petroleum products and mining products and environmental services, which are the primary capital of national development. Hence, they are essential for people's livelihoods (Kismartini & Bugin, 2019). Coastal ecosystems generally found are mangroves with much diversity (biodiversity). The types of mangroves that are often seen include mangroves (*Rhizophora*), api-api (*Avicennia*), *Sonneratia* and types of Nipah (*Nypa*). Mangrove ecosystems have

ecological and economic functions, including providing environmental services as ecotourism areas.

Main ecosystems in coastal and marine areas such as mangroves have many functions, including providing nutrients in the waters, breeding and spawning grounds for various types of aquatic biota, protecting the coast from abrasion, protecting the coast from tsunamis and wind, and preventing seawater intrusion. In addition, the function of the mangrove ecosystem economically includes it as a livelihood source and an ecotourism area (Utina et al., 2018). According to Ihsan et al. (2015), ecotourism is a science that discusses environmental insight by implementing the principles of environmental sustainability and balance. In contrast, according to Lappo., et al. (2010), ecotourism is a positive relationship between actors related to alternative tourism concepts by emphasizing social, community, and natural values.

In addition to providing benefits from the mangrove ecosystem in the form of an ecotourism area, it also has an impact in the form of garbage or plastic waste generated by visitors or tourists. The waste includes mineral water bottles, biscuit packages, cracker packages, glass drinking water packages, bread packaging packages and plastic bags. Suppose the disposal of plastic waste is not prevented immediately. In that case, it will have a socio-economic impact on the community around the mangrove ecotourism area, such as reduced income, decreased health, and decreased revenue due to fewer visitors. Plastic waste contamination can have an impact on marine and mangrove ecology. This happens because plastic waste is the main factor that causes air pollution. After all, the mangrove ecosystem is damaged. Besides the ecological impact, marine debris can cause a decrease in tourist visits to carry out tourism activities around the mangrove area because the surrounding area is dirty, affecting the decline in people's income (Waryono, 2006; Putri et al 2020).

The above is the basis, so research on "the effect of plastic waste on the socio-economic conditions of coastal communities in the Lantebung mangrove ecotourism area in Makassar City" is essential. This study aimed to determine the factors that influence plastic waste and the impact of plastic waste on the socio-economic life of coastal communities in the Lantebung area of Makassar City.

Materials and Methods

Time and place

This research was carried out within three (3) months, from May to July 2021. Data was collected in the mangrove ecotourism area of Lantebung, Bira Village, Tamalanrea District, Makassar City, South Sulawesi Province (Figure 1). The location was chosen because the Lantebung area is one of the mangrove ecotourism development areas in Makassar City.



Figure 1. The research location of the Lantebung mangrove ecotourism area

Data Types and Sources

The type of data in this research is primary data. Primary data were obtained from direct interviews with predetermined respondents with several structured and structured questions. Primary data is obtained directly by researchers or for the first time (Yusuf & Daris, 2018). Meanwhile, according to Umar (2013), primary data is obtained from filling out questionnaires (interviews) that come directly from the first source, individuals and groups. This research data comes from the community around ecotourism and visitors who are respondents who provide information about the criteria and indicators studied.

Methods and Data Collection

The collection method in this study was carried out using a survey method with structured interview techniques. The survey research method uses a questionnaire tool by taking samples from one population (Singarimbun & Sofian, 1982). According to Sugiyono (2018), the meaning of the survey is the method used to obtain data, the behaviour of variable relationships and test the hypotheses obtained quantitatively. Information can be obtained through data collection using interviews if the researcher already knows the information for sure. Before conducting interviews, a research instrument was first prepared to consist of several questions whose answers had been prepared.

The study's respondents comprised 60 people divided into 20 people from the community, 20 visitors and 20 managers. The technique of collecting samples was done by using a random sampling technique (random). Sugiyono (2017) states that random sampling is sampling in a population that is carried out randomly without choosing a particular sample.

Data analysis

The research data were processed using inferential statistical methods with the SEM approach. This method consists of analyzing data and drawing conclusions from a random sample. Inferential statistics include: estimating data and testing hypotheses, and making decisions. The discussion of inferential statistics includes analysis of covariance, simple linear regression analysis, analysis of variance, analysis of correlation, and testing the average.

Structural Model Equation (SEM) is a common cross-sectional statistical modelling technique, incredibly linear, factor analysis, path analysis, and regression. SEM is a confirmatory technique and not exploratory. Hence, researchers are more inclined to use SEM to determine whether a particular model is valid by using SEM to find an ideal model (Syahrir et al., 2020).

The steps that can be carried out in SEM analysis are as follows:

- 1) Create designs and models based on theory, determine how to measure constructs, collect data, and then modulate data and output.
- 2) Input data in SemPLS software
- 3) Interpreting the output of the analysis by measuring the evaluation of the structural model and the equation test.

Results and Discussion

Characteristics of Respondents Age

Respondents (visitors, community, and managers) have diverse characteristics from their teens to their parents' ages; this allows respondents to vary in age. Characteristics of respondents based on age are presented in table 1 and figure 2 below:

Table 1. Characteristics of respondents based on age

No	Age	Respondent	Percentage
1	<20	2	3%
2	20-40	35	58%
3	41-60	22	37%
4	>60	1	2%
Total		60	100%

Source: Primary data, 2021

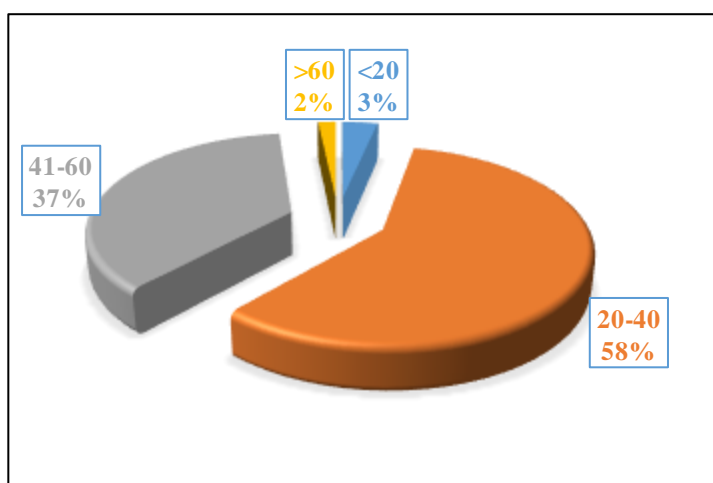


Figure 2. Graph of respondent's profile based on age

In Figure 2 and Table 1 above, it is known that the age of the dominant respondent ranges from 20-40 years, namely 35 people (58%), while the respondent's age is at least over 60 years, one person (2%). This means that the age of 20-40 years is productive. Simatupang's statement (2019) states that those aged 35-44 are highly desirable to obtain travel insurance.

Education

Each individual has a different education caused by the mindset that influences a person's decisions. The characteristics of respondents based on education are presented in table 2 and figure 3 below:

Table 2. Characteristics of respondents based on education

No	Education	Respondent	Percentage
1	No School	9	15%
2	Elementary School	12	20%
3	Junior High School	4	7%
4	Senior High School	26	43%
6	D3	2	3%
7	College Students /S1	7	12%
Total		60	100%

Source: Primary data, 2021

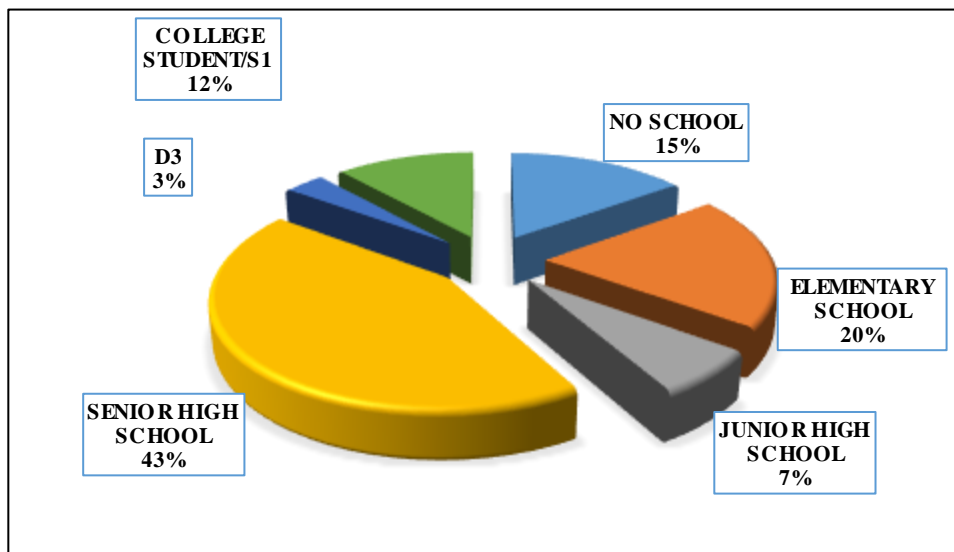


Figure 3. Graph of respondent's profile based on education

Table 2 and figure 3 show that the education level of SMA/SMK occupies the first position with a total of 26 people (43%). At the same time, the education level D3 has several respondents, at least two people (3%). For the elementary education level, there were 12 people (20%), Middle School students were 4 people (7%), students/S1 were 7 people (12%), and those who did not go to school were 9 people (15%).

Arif's research (2017) states that education is related to easy accessibility; tourists with a high level of education will find it easier to access tourist attractions with a high level of accessibility, and tourists with moderate education will more easily reach tourist areas with a moderate level of accessibility.

Work

In everyday life, a person's decisions are often influenced by the job one has. The characteristics of respondents based on work are presented in table 3 and figure 4 below:

Table 3. Characteristics of respondents based on work

No	Work	Respondent	Percentage
1	Does not work	3	4%
2	Bookkeeping Admin	1	2%
3	Midwife Assistant	1	2%
4	Barber Shop	2	3%
5	ART	6	10%
6	Sales / Traders	5	8%
7	Employee	5	8%
8	Head of Lpm Bira Village	1	2%
9	Chairman Rw.06	1	2%
10	Student	5	8%
11	Fisherman	20	33%
12	Tour guide	1	2%
13	Boat Builder	1	2%
14	Manager Jekomala	2	3%
15	Onion Peeler	1	2%
16	Driver	2	3%
17	Parking attendants	1	2%
18	Self-employed	1	2%
19	marketing	1	2%
Total		60	100%

Source: Primary data, 2021

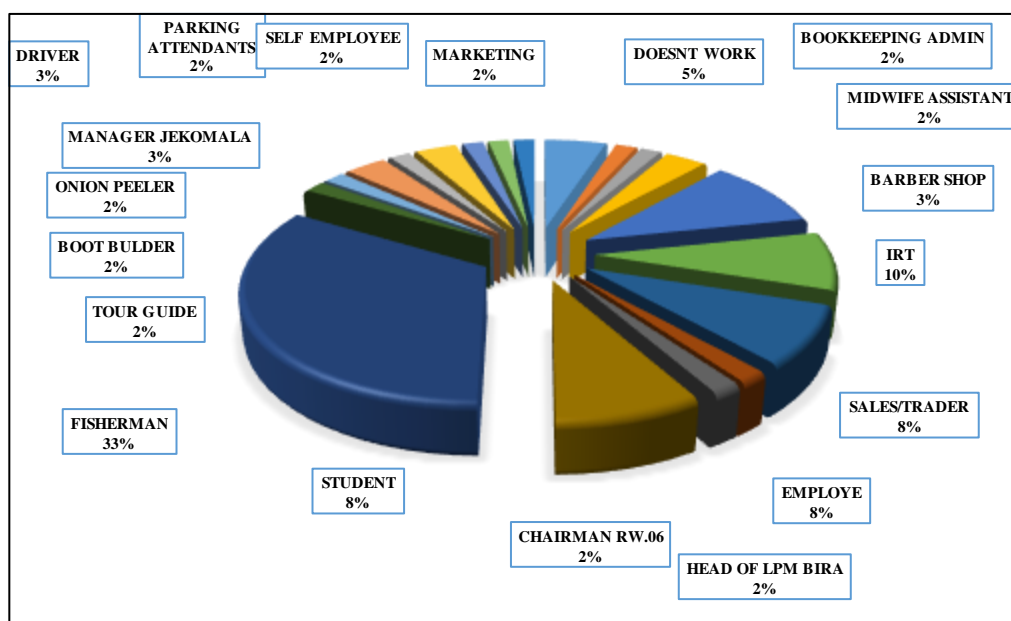


Figure 4. Graph of respondent profiles by occupation

Table 3 and figure 4 show that the most jobs of the respondents are fishermen, as many as 20 people (33%), while the fewest are several types of work such as bookkeeping admin, assistant midwife, head of LPM, head of RW, tour guide, boat maker, onion peeler, parker, entrepreneur and marketing each of 1 person (2%). For the type of job, barbershops, managers and also drivers are 2 people (3%), IRT is 6 people (10%), sellers or traders, private employees and also students/students are 5 people each (8%).

Jayanti's research (2018) and Roswiyanti et al (2022) said of states that the community's need factors will influence the type of community work. This encourages people to get more promising jobs in the agricultural and tourism sectors.

Income

One's income certainly has an important role in satisfying one's needs. The characteristics of respondents based on income are presented in table 4 and figure 5 below:

Table 4. Characteristics of respondents based on income

No	Income	Respondent	Percentage
1	Nothing	7	11%
2	Uncertain	1	2%
3	<500.000-2.500.000	9	15%
4	2.600.000-4.600.000	24	40%
5	4.700.000-6.700.000	3	5%
6	6.800.000-10.000.000	9	15%
7	>10.000.000	7	12%
Total		60	100%

Source: Primary data, 2021

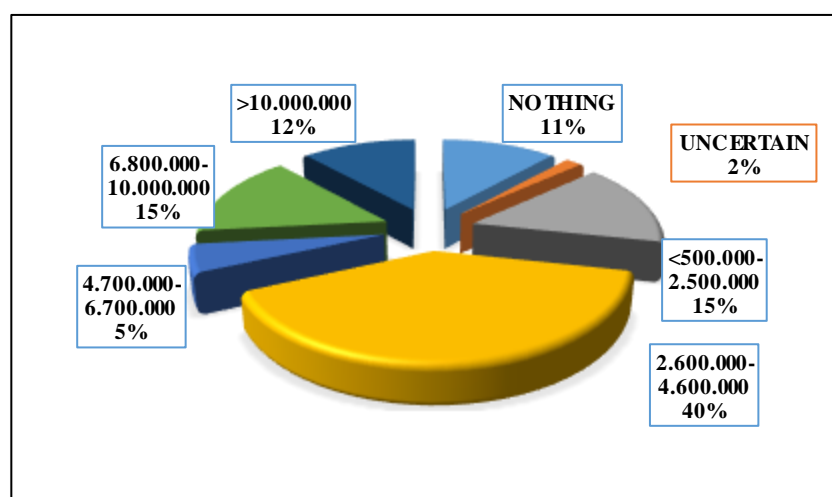


Figure 5. Graph of respondents' profiles based on income

In Figure 5 and Table 4 above, it can be seen that the income of the majority of respondents ranged from Rp. 2,600,000 – Rp. 4,600,000, as many as 24 people (40%), while the minor income is erratic, as much as 1 person (2%). It was also found that 7 people (11%) had no income, and people earned less than Rp. 500,000 – Rp. 2,500,000, as many as 9 people (15%), people who earn between Rp. 4,700,000 – Rp. 6,700,000 as many as 3 people (5%)

who earn between Rp. 6,800,000 – Rp. 10,000,000 as many as 9 people (15%) and income of more than Rp. 10,000,000, namely 7 people (12%).

Harvey's research (2013) stated that the level of spending, the amount of working time and the number of family members could affect the income level of people, especially those who use tourism services.

Income

Data analysis in the study used SmartPLS 3.0 software. The model built in this study can be seen in the following figure:

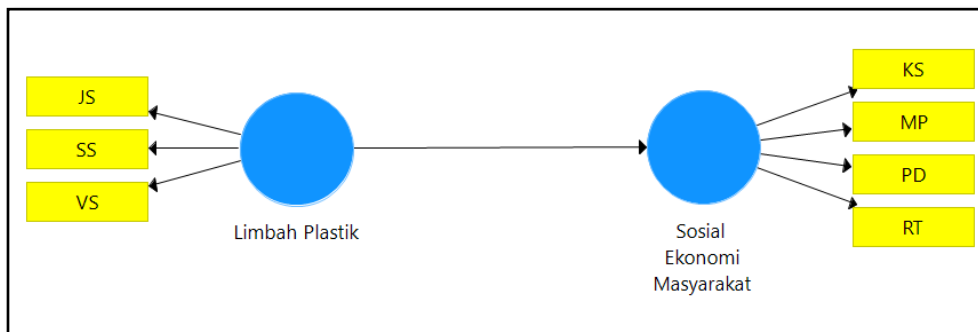


Figure 6. Outer Research Model

Factors Affecting Plastic Waste and the Socio-Economy of the Lantebung Coastal Community

The results of the data analysis show that the factors that affect plastic waste and the socio-economic community in the Lantebung mangrove ecotourism area can be seen from the factor loading values, where factors that have a value of > 0.700 influence the variable.

Plastic waste variable

This study's influencing factor is the waste volume, with a loading factor value of 0.966. According to Fajria et al. (2019), dense activities, especially in the coastal environment, can have a significant influence because they can reduce people's opinion and the ecology of the waters because of the large amount of waste generated by visitors. The ecological impact in the form of mangrove damage and the economic impact of decreasing people's income due to the reduced number of visitors. Human behaviour dramatically influences the existence of waste somewhere (Adam, 2015). In addition, population growth also affects the volume of waste because it is closely related to lifestyle (Hariyanto, 2014).

In reducing the volume of waste in the Lantebung ecotourism area, there needs to be active and integrated education and outreach, especially to the surrounding community and visitors, so that the awareness of environmental sustainability increases. One that influences the source of waste according to Wijaya (2021) is that there is still a lack or low public awareness of environmental cleanliness, so waste is disposed of anywhere. Therefore the community must prioritize discipline in disposing of waste in its place.

There are two sources of waste in the Lantebung ecotourism area: plastic waste generated from community activities or visitors and plastic waste carried from rivers and ocean currents. Darwin (2019) states that waste depends on the number of visitors, where to eat, and trash carried from ocean currents, whereas according to Subekti (2017), most of the garbage originating from river currents occurs during the rainy season.

Socio-economic variables

The influencing factor is health, with a factor loading value of 0.732. Improving social welfare in the community must be supported by adequate health because high work productivity and community income are strongly supported by high public health. People's thinking power is greatly influenced by people's daily consumption of food and nutrition (Suryandari, 2017).

Arum & Sujiyatini (2009) state that learning capacity and work productivity are influenced by the level of health in both the family and individual environments. Being physically fit and healthy affects the level of productivity at work. At the macro level, health is essential in reducing poverty and increasing economic growth.

High economic growth is influenced by the level of good health among the people. Health affects economic factors because if health is disrupted, it will also disrupt community performance, whereas if performance is disrupted, the income generated will decrease. For example, it is known that the average coastal community in the Lantebung ecotourism area has the main occupation as a fisherman; if the fishermen's health is disturbed, the catch will also decrease.

The Impact of Plastic Waste on the Socio-Economic Society of the Lantebung Mangrove Ecotourism Area

In looking at the relationship between plastic waste and the socio-economic community, a bootstrapping test was carried out on SmartPLS with a significance of 5% with the following image model:

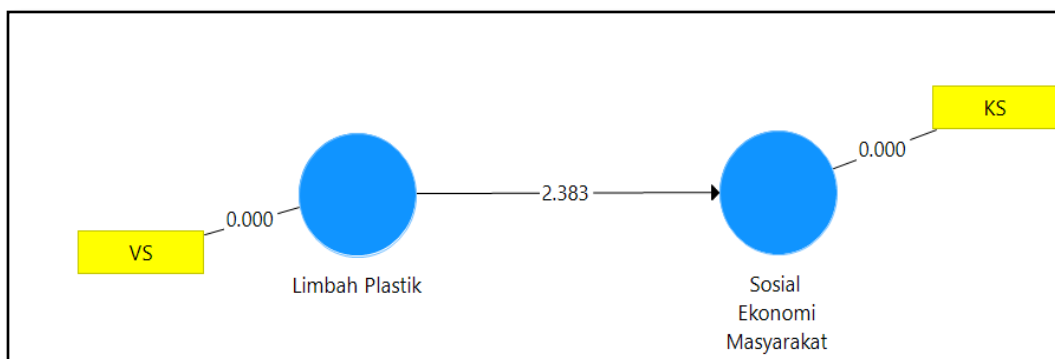


Figure 7. The relationship between plastic waste and the socio-economic community

Table 5. The relationship between plastic waste and the socio-economic community

	Original Sample (O)	Sample Mean (M)	Standard Deviation	T Statistic	P Values
Plastic waste --> Socio-economic community	-0,240	-0,237	0,101	2,383	0,018

Source: Path Coefficients Bootstrapping SmartPLS

Table 5 can be seen that plastic waste has a significant relationship with the socio-economic community with a P value of 0.018, less than 0.05 (H1 is accepted) with the direction of the relationship between plastic waste and the socio-economic community is hostile, meaning that the higher the plastic waste, the social economy of the community will decrease with the Original Sample (O) value of -0.240.

Plastic waste pollution has an impact on ecological aspects and economic aspects. This can cause damage to mangroves and ultimately reduce the number of visitors to tourist sites. According to Day (2020), the bad habit of people who have existed for a long time, namely throwing garbage all over the place, will indirectly impact us in the form of losses because marine life experiences digestive system disorders and marine biota growth.

According to Desy (2018), the ecological impact of the death of the mangrove ecosystem is decreasing the ecosystem's population around the mangroves. Furthermore, it was added that mangrove damage would affect the decrease in people's income.

Conclusion

The Lantebung mangrove ecotourism area impacts the plastic waste volume with a loading factor value of 0.966. In contrast, health influences socio-economic status with a loading factor value of 0.732. Plastic waste has a significant relationship to the socio-economic community, with a P value of 0.018 less than 0.05. The relationship between plastic waste and the socio-economic community is negative, with a value of -0.240, meaning that the higher the plastic waste, the socio-economic community in the Lantebung mangrove area will decrease.

Thanking Expression

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