Section A-Research paper

MICROPLASTICS,WASTEBANKS,BEACHTRASHANDSUSTAINABLEBEACHES (SustainablePlasticWasteManagementinBanyuwangi,EastJava,Indonesia)

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Abstract

Indonesia is the second country with the second largest plastic waste in the world after China. In Indonesia, plastic waste ranks second (17.97%) in the waste composition. Plastic waste that does not decompose perfectly will form microplastics that are harmful to the aquatic and terrestrial environments. The study used quantitative methods by conducting a cross-sectional study with survey methods to people who contributed in six coastal areas in Banyuwangi with 222 respondents. The survey uses Likert-scale questionnaires. Survey Data will be analyzed using SmartPLS 4 software to see the effect between variables. The results of the analysis showed that the evaluation of the measurement model includes the value of the loading factor (outer loading) above 0.70 is 0.909, Cronbach alpha composite reliability above 0.70 is 0.964, and Convergent validity with AVE size above 0,50 is 0,788. Waste banks significantly affect sustainable beaches by 27.6%, waste banks significantly affect coastal waste by 94.2%, and coastal waste affects sustainable beaches by 63.4%.The highest influence value is the influence of waste banks on the coastal waste 94.2%, meaning that if in the coastal environment, there is coastal Waste Management in the form of waste banks, it will be able to minimize the amount of waste on the beach, thus will get a sustainable beach. Sustainable beaches will experience environmental sustainability, economic sustainability, and social sustainability. One solution for reducing coastal waste is to develop waste banks on the beach.

Keyword: Microplastic,WasteBank,BeachTrash,SustainableBeaches

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1. INTRODUCTION

Data from the World Count website (2023) shows that the waste generated in the first half of this year reached 1,251,127,876 tons of waste generated and will continue to grow. According to the same website, 7,495,001 tons of plastic are dumped into the oceans and will continue to grow anytime. In2010,4.8millionmetrictons(MT)of 12.7millionMTofplasticwasteenteredandcontaminatedthe oceans from land and coastal areas (Jambeck et al., 2015). The United Nations Environment Programme (UNEP) (2021) estimates that plastic waste thrown into the sea will triple from 2016 by about 11 million tons to 29 tons by 2040. Plastic waste that accumulates will decompose through chemical, physical, and biological processes within a certain period of time. However, plastic waste decomposes over a very long time, so it allows plastic not to decompose completely and form microplastics (Hidalgo-Ruz et al., 2012).

In 2022, Indonesia's waste reached 33,175,220.06 (tons/year) with the largest percentage infood waste (KLHK, 2023). Plastic waste occupies the second position of waste in Indonesia, with 17.8%. Indonesia, as a country with high economic activity, will tend to produce more waste compared to countries with economic development. In addition to economic factors, the increase in waste generation every year is due to the growth and increase in population(Pratama and Ihsan, 2017). Assuming the Ministry of Environment, one person can produce at least 0.8 kg of waste. Indonesia is the second country with the most plastic waste in the world after China, with 3.2 million metric tonsper year (Jambeck et al., 2015).

According to MoEF (KLHK) data (SIPSN, 2022), East Java produces 1,487,812.44 tons of waste and ranks second as the province contributes the most garbage after Central Java. According to Emil Dardak, Deputy Governor of East Java to suarasurabaya.net (Pratama, 2022), East Java's high rubbish is caused by undeveloped Local Government Waste Processing Technology. Other causes are the economic factors and the second-largest number of universities in Indonesia (Annur, 2022). These things will affect the number of migrants from various regions to seek livelihoods and education.

Banyuwangi is one of the districts in East Java that has beautiful tourist destinations, ranging from beaches, mountains, and waterfalls to National Parks (Banyuwangi Tourism, 2023) so that migrants as tourists from within and outside the country will definitely be interested in vacationing in Banyuwangi. The high number of tourists who visit has the opportunity to increase waste generation in tourist areas. Based on KLHK data, garbage generation in Banyuwangi every day reaches 813.91 tons, and every year extends to 297,078.45 tons (KLHK, 2023), while the percentage of plastic waste in Banyuwangi reached 21.78%.

According to Jadhav et al. (2021), microplastics are synthetic materials that contain polymers withahighsenseofplasticsandaredegradedintomicrofragments.Microplasticsarenotonlyfoundin terrestrialandaquaticenvironmentsbut canalsoaccumulateinfishbodies,thisisbecausefishconsider microplastic formations such as fish feed in general (Rijal et al., 2021). Microplastic debris can be cosmetics such as scrubbers in cleaning products, skin scrubbing creams, and lint from laundry can enter waters through drainage systems (Karbalaei et al., 2018). In addition to polluting waters, microplastics pose a potential threat to contaminated soil biota and will alter soil habitats (Jambeck et al. al., 2015), other impacts include shifts in soil structure, polluting groundwater, microplastics that cause relevant long-term anthropogenic stress and trigger global changes in terrestrial ecosystems.

There are two sources of microplastics, namely primary and secondary. Primary microplastics come from pure plastic particles, while secondary ones come from the breakdown of large plastics (Karapanagioti, 2015). While the types of microplastics that can pollute the air are polypropylene and polystyrene, these types of microplastics are produced from household waste (Gregory, 1996). Basedon their type, microplastics are divided into 5, namely fragments (irregular particles such as flakes or pieces of micro-plastics), fibers (e.g Filaments or threads), beads (e.g Seeds, small bead spheres, microspheres), foams (e.g Polistrien) and Granules (e.g Resinate granules, nurdles.) (Widianarko et al., 2018). Microplastics in the air are usually synthetic fibers mixed with airborne dust. In urban areas, pollution ranges from 53 to 118 particles/m2/day, while in enclosed spaces, up to 59 microplastic particles percubicmeterofairare found.(Dris,etal.,2016;Gasperi,etal.,2015;Sobhanietal.,2020). The common forms of Microplastics are granules, fragments, and invisible fine fibers. Microplasticsare formed from larger plastic fragments (macroplastics), which break down into nano-plastics measuring less than 1µm (Lambert & Wagner, 2016; Hartmann et al., 2019).

Plastic waste that pollutes the waters and coastal areas has the potential to contaminate marine life that lives in the waters. Microplastics that contaminate fish possibly enter the human body, potentially causing health problems in humans. One solution that can reduce microplastic pollution in coastal areas is to manage plastic waste on the coast of Banyuwangi Regency. So, this article will review the microplastics and the effect of waste banks on sustainable beaches. The purpose of thisstudy is to evaluate the presence of microplastics in the environment and analyze the outcome of waste banks and coastal waste generation on sustainable beaches.

2. MATERIALANDMETHODS

StudyDesign

This study used cross-sectional quantitative methods and a questionnaire survey Likert scale as data collectivity. Survey activities were held in seven different beach locations in the Banyuwangi, namely Gumuk Kantong Beach, Syariah Beach Santen Island, Cemara Beach, Cacalan Beach, Boom Beach, Satellite Beach, and Ujung Beach. The number of respondents in this study was 222 using the Slovin formula. The Data-collecting process uses nonprobability sampling or the so-called census. The stages of data collection are the preparation of research proposals, the maintenance of the feasibility of the code of ethics of the Faculty of Public Health, University of Airlangga, the processing of research permits, data collection and validity tests, and reliability tests.

StatisticaAnalysis

After collecting the respondent data, the next step is to test the SEM-PLS (Structural Equation Modeling Partial Least Square) model using SmartPLS 4 software to test the effect between research variables. This model was chosen because this analysis can estimate a small number of samples, although it is more consistent with broad samples (Hair et al., 2021). Evaluation of the measurement modeliscalledgoodiftheloadingfactor(outerloading)isabove0.70(Hairetal.,2021)oratleast
0.60 (Chin, 1998), Cronbach alpha composite reliability above 0.70, convergent validity with Ave size above 0.50 and discriminant validity with HTMT size below 0.90 or Cornell and Lacker (Ave > root of correlation).

3. RESULTANDDISCUSSION

3.1. RESULT

3.1.1. Microplastic

The unmanaged Plastic waste will cause waste sources. The waste source will be degraded and fragmented into microplastics if improperly managed. Microplastics caused by waste generation will pollute the coastal environment and other areas, as shown in the following table :

Table1.MicroplasticsExtendinSeveralLocationsinIndonesia

Author	Source	MicroplasticsbyType					Total of Microplastic
		Fiber	Fragment	Filament	Granule	Film	
Fathulloh, (2021)	RecyclingFactory	1041	70	125	7	-	1243
	The Waste of KedungAnyar	3	1	11	0	-	15
Lestari, et al., (2021)	7LocationsinPulau Panjang, Jepara	34	51	-	-	8	93
Ayuningtyas et al. (2019)	FishAuction Place						10,44(10^2 Particles/ m^3)
	MangroveArea						22,89 (10^2Particles/ m^3)
	FishFarmingPond						8,89(10^2Particles/ m^3)
	River Estuary						7,78 (10^2Particles/ m^3)
	The Open Sea						7,11(10^2Particles/ m^3)

Author	Source	MicroplasticsbyType					Total of Microplastic
		Fiber	Fragment	Filament	Granule	Film	
Yunantoet al. (2021)	NaturalMangrovearea (Bali)	26,773 (Particles/Kg)	44,332 (Particles /Kg)		10,768 (Particles/Kg)	377,338 (Particles/Kg)	459,211 (Particles/Kg)
	MangroveArea(The FormerPond)(Bali)	30,840 (Particles/Kg)	55,072 (Particles /Kg)		3,852 (Particles/Kg)	84,610 (Particles/Kg)	174,374 (Particles/Kg)
Nugrahaet al. (2018)	The area near the mouthoftheBadung River theDeadRiver						113(Particles/ Kg)
	Theareanearthe Landfill Suwung						83(Particles/ Kg)
	AreaNearthePortof southern Benoa						73(Particles/ Kg)
	The area near the mouthoftheSama River						87(Particles/ Kg)
	Areanearthemouthof the Bualu River						77(Particles/ Kg)
Satiyartiet al, (2022)	TheKunyitRiver Estuary	6	6		2	-	14
	SukarajaBeach	5	4		2	3	14
	SukarajaWaters	4	5		2	3	14

Based on the results of a review of several articles above, there is much microplastic contaminationinvariousareasonthecoastofIndonesia.Theresultsofthereviewarticleaboveexplain that microplastics are not only in seawater but also found in sediments and even marine life. The types of microplastic particles found were fiber, fragment, filament, film, and granule, and the majority of microplastic particles detected were > 10 particles. Plastic waste that can cause microplastics needs good management. Microplastics that pollute coastal areas are managed to minimize microplastic contamination by creating waste banks in coastal areas.

3.1.2AnalysisofTheeffectofWasteBanks,CoastalWasteandSustainableBeaches in Banyuwangi Regency

EvaluationoftheModelconstructoftheeffectofwastebanksandwastegenerationonsustainable beaches can be seen in the figure below :

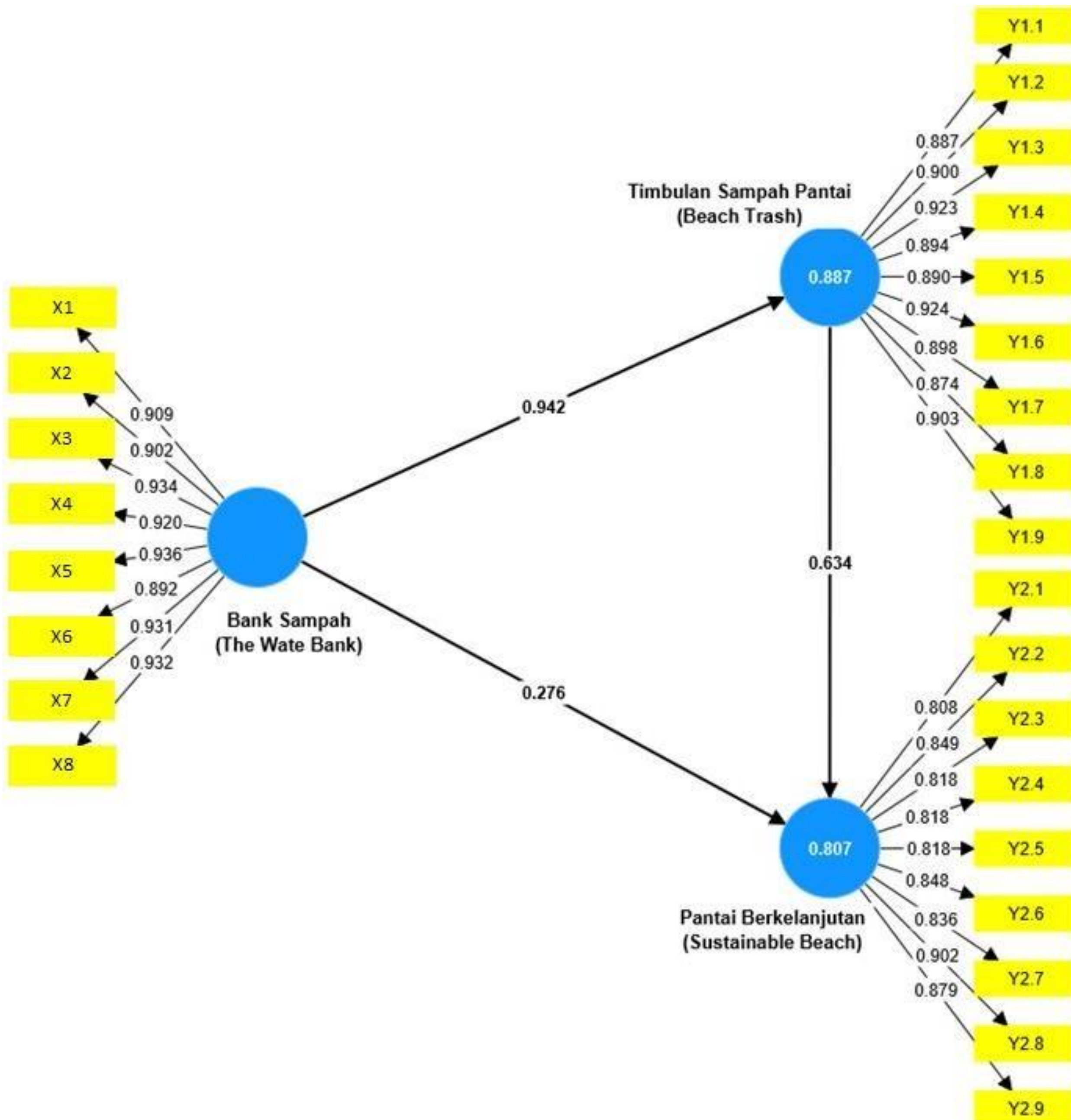

Figure1. MeasurementModel(OuterModel)The WasteBank, Beach Trash and Sustainable Beaches

The biggest loading factor is in variable X (Waste Bank), found in X5 (trash selling power)with a value of 0,936. The largest loading factor in the Y1 Coastal waste is Y1.6 (Pollution in environmental media if waste is unmanaged properly), with a value of 0,924. The biggest loadingfactor in the variable Y2 (Sustainable Beach) is Y2.8 (Minimizing Disease Risk), with a value of 0,902 (Table 2).

ConvergentValidityTest

A Convergent validity test was conducted to test the validity of the measurement variables used in this research survey. According to Hair et al. (2021), the indicator is declared valid or good convergent validity if the loading factor value is over 0.7. In addition to the value of the loading factor, the Convergent validity test is also seen from the Average Variance Extracted (AVE) greater than 0.5.

Table2.TheResultsofMeasuringIndicatorsofWasteBanks,CoastalWasteGenerationand Sustainable Beaches on The Coast of Banyuwangi Regency in 2022

Variable	Indicator	Loading Factor	Cronbach Alpha	Composite Reliability	AVE
WasteBank X	X1.WasteBank	0.909	0,974	0,974	0,846
	X2.PurposeofGarbageBank	0.902			
	X3.TheTrashBank That Educates	0.934			
	X4.Increasedenvironmentalcleanliness due to waste banks	0.920			
	X5.SellingPowerofWaste	0.936			
	X6.Lackofpublic awareness	0.892			
	X7.Socializationofwastebank	0.931			
	X8.Wastebankprogramempowerment	0.932			
Variable	**Indicator**	**Loading Factor**	**Cronbach Alpha**	**Composite Reliability**	**AVE**

Coastal Waste Y1	Y1.1.Indonesiaisthenumber2producer of plastic waste	0.887	0,949	0,955	0,709
	Y1.2.Plasticisdifficulttodecompose	0.900			
	Y1.3.Indonesia'swaste65milliontons/ year	0.923			
	Y1.4.15%ofplasticwastefromtotalwaste	0.894			
	Y1.5.3RProgram	0.890			
	Y1.6.Pollutionduetountreatedwaste	0.924			
	Y1.7.sourcesofgarbagedumpedinto rivers, lakes, seas	0.898			
	Y1.8.Diseasescausedbygarbage	0.874			
	Y1.9Microplasticexposure	0.903			
Sustainable BeachesY2	Y2.1.EnvironmentalScience	0,808	0,970	0,971	0,809
	Y2.2.EnvironmentalHealth	0,849			
	Y2.3.Sustainabledevelopment	0,818			
	Y2.4.Climatechange	0,818			
	Y.5.Disadvantagesofclimatechange	0,818			
	Y2.6.Healthyenvironment	0,848			
	Y2.7. Waste disturbance due to mismanagement	0,838			
	Y2.8.Reductionofdiseaseriskfactors	0,902			
	Y2.9.EnvironmentalHealthManagement	0,879			
	Average	0,886	0,964	0,963	0,788

Themeasurementresults resultedina LoadingFactorvalueofmorethan0.7(Hair etal.,2021), which the indicator is declared Valid for measuring evaluation variables. The results of the Convergent validity evaluation of the Average Variance Extracted (AVE) size are over 0.5, which means that the Construct model has good convergent validity (Hair, 2021).

ConstructReliability

In this study the results of the calculation of composite reliability and Cronbach alpha can be seen in table 3, the calculation results show that the value of Cronbach alpha and composite reliabilityis greater than 0.7 then the indicator is declared reliable in measuring the variable.

DiscriminantValidity

Discriminant validity is used to prove that variables differ in theory and are statistically tested (Hair, 2021). This proof is done by Heterotrait-Monotrait Ratio (HTMT) and Cross Loading.

Tabel3.HTMTWasteBank,WasteGenerationandSustainableBeachonBanyuwangiRegency in 2022

HTMT Matrix	BankSampah_(The Wate Bank)	Pantai Berkelanjutan_(Sustainable Beach)	Timbulan Sampah Pantai_(BeachTrash)
BankSampah_(TheWate Bank)			
Pantai Berkelanjutan_(Sustainable Beach)	0.892		
Timbulan Sampah Pantai_(BeachTrash)	0.968	0.917	

Tabel4.CrossLoadingWasteBanks,WastegenerationandSustainableBeachontheBeachesof Banyuwangi Regency in 2022

CrossLoading	BankSampah_(The Wate Bank)	Pantai Berkelanjutan_(Sustainable Beach)	Timbulan Sampah Pantai_(BeachTrash)
X1.1	0.909	0.787	0.849
X1.2	0.902	0.822	0.848
X1.3	0.934	0.820	0.882
X1.4	0.920	0.817	0.873
X1.5	0.936	0.831	0.883
X1.6	0.892	0.769	0.830
X1.7	0.931	0.786	0.880

X1.8	0.932	0.787	0.879
Y1.1	0.821	0.833	0.887
CrossLoading	BankSampah_(The Wate Bank)	Pantai Berkelanjutan_(SustainableBeach)	Timbulan Sampah Pantai_(BeachTrash)
Y1.2	0.858	0.809	0.900
Y1.3	0.895	0.807	0.923
Y1.4	0.807	0.845	0.894
Y1.5	0.824	0.792	0.890
Y1.6	0.888	0.806	0.924
Y1.7	0.847	0.786	0.898
Y1.8	0.795	0.762	0.874
Y1.9	0.879	0.792	0.903
Y2.1	0.585	0.808	0.628
Y2.2	0.724	0.849	0.728
Y2.3	0.606	0.818	0.612
Y2.4	0.596	0.818	0.648
Y2.5	0.814	0.818	0.821
Y2.6	0.846	0.848	0.849
Y2.7	0.655	0.836	0.668
Y2.8	0.852	0.902	0.864
Y2.9	0.823	0.879	0.852

The HTMT measurement results show that the measurement model is less accepted becausethere are variable pairs in the cross table less than 0.90 (>0.90). According to Hair et al. (2017), HTMT measurements can be improved by eliminating indicators that are highly correlated with otherindicators or eliminating the lowest outer loading in the model. However, because each indicator measured is theoretically important considering the policy implications, it is retained. Although HTMT has not been accepted, cross-loading evidence shows acceptable discriminant validity. The results ofthe cross-loading evaluation show that all measurement indicators correlate more strongly with the variables they measure and are weakly correlated with other variables. This can be seen in Table 2.

GoodnessofFitPLSModel

Based on the results shown in Table 5, SRMR is considered good because it is 0.065, this value is considered good because it is smaller than the SRMR criteria value of 0.08 (Hair et al., 2017). The results of this study show that the SRMR value is below the recommended value so the model is suitable and acceptable. The Goodness of Fit value is considered good with a value of 0.867 because it is greater than 0.36 or a high GoF value (Henseler and Sarstedt, 2013).

Table 5. Goodness of Fit Model PLS garbage Bank, Sustainable Beach and Beach Waste on The coast of Banyuwangi Regency in 2022

GoodnessofFitMeasurement	EstimationResult
SRMR	0.065
GoodnessofFitIndex	0,867

Hypothesistest

Furthermore, testing the hypothesis between variables is carried out. The results of hypothesis testing can be seen in table 5 below:

Table6.HypothesisTestofWasteBank,CoastalWasteandSustainableBeachesonthecoastof Banyuwangi Regency in 2022

Hypothesis	Path Coefficient	T Statistic	P-Value	95% Path Coefficient		F Square	R Square	Q Square
				Lower	Upper			
Waste Bank > SustainableBeach	0.275	2,580	0,01	0,062	0,479	0,045	0,807	0,806
Waste Bank > Coastal waste	0.941	80,067	0,00	0,911	0,959	7,814	0,887	0,886
CoastalWaste>Sustainable Beaches	0.635	6,132	0,00	0,435	0,839	0,237		

Based on the table above, it can be explained that there is an influence between exogenous variables on endogenous, each of which is the following hypothesis: The first hypothesis (Waste banks to Sustainable Beaches) is acceptable, meaning that there is a significant effect between the amount of waste on sustainable beaches p-value<0.05. The second hypothesis (Waste Bank Against Beach Debris Generation) is accepted, meaning that there is a significant effect between waste banks on beach waste generation p-value < 0.05. The third hypothesis (Coastal Debris Generation on Sustainable Beaches) is accepted, meaning that there is a significant influence between beach litter generation and sustainable beaches. In this study, the F Square value of direct influence between waste banks on waste generation and waste generation on sustainable beaches gets a value greater than 0.35 or high influence, while the FSquarevalueofwastebanksonsustainablebeachesissmallerthan0.35whichmeansthatithasa weak effect on sustainable beaches. These results confirm that the Waste Bank is very important and has a high influence on beach waste generation while beach waste generation is very influential in the sustainability of beach tourism.

Table 7. PLS Predict Beach Trash and Sustainable Beaches on The Coast of BanyuwangiRegency In2022

	PLS-SEM_RMSE	LM_RMSE
Y2.1	0,756	0,748
Y2.2	0,699	0,705
Y2.3	0,726	0,721
Y2.4	0,737	0,760
Y2.5	0,552	0,556
Y2.6	0,603	0,618
Y2.7	0,639	0,656
Y2.8	0,532	0,547
Y2.9	0,562	0,586
Y1.1	0,550	0,570
Y1.2	0,491	0,520
Y1.3	0,530	0,543
Y1.4	0,554	0,572
Y1.5	0,580	0,613
Y1.6	0,469	0,487
Y1.7	0,524	0,545
Y1.8	0,563	0,582
Y1.9	0,484	0,489

The final evaluation of the PLS model above is PLS Predict. PLS Predict was developed by Shmueli, et al (2016), which is used to measure the predictive power of PLS models. According to The Theory Of Hair, et al. (2019), the PLS model is said to be good when the RMSE (Root Mean Square Error) value is lower than the value of the linear regression model. Table 7 shows that 16 of 18 variables meet the validity of the model with an average RMSE is 0.586 smaller than the average LM-RMSE is 0.601. This shows that the PLS model used has a normal prediction rate that tends to be high according to The Theory of Hair, et al. (2019), so any changes that occur in the variables of wastebanks will predict significantly in the variables of waste generation and sustainable beaches.

3.2. DISCUSSION

3.2.1. Microplastic

Indonesia's population density, which reaches 275 million people according to the Central Statistics Agency, has led Indonesia to become a plastic-consumptive country, thus ranking as the secondcontributorto plastic wastein the world(Priliantini,2020).Accordingtodataobtainedfrom the Indonesian Plastic Industry Association (INAPLAS) and the Central Statistics Agency (BPS),Indonesia produces a total of about 64 million tons/year of waste, with 3.2 million tons of which are plastic waste. According to the same source at least every year there are about 10 billion pieces of plastic waste or this amount is equal to 85,000 tons of plastic bags thrown into the environment (Wahyudi, 2018).

The nature of plastic is that is durable, not easily weathered, lightweight, and anti-rust, making plastic difficult to manage. This results in plastic damaging the environment, so that plastic pilesdisrupt the balance of ecosystems (Asia & Arifin, 2017). Waste management, especially plastic waste, has not been resolved until now. Improper management will have a bad impact on the environment because it takes a long time to break it down. One of them, burning garbage will release harmful substances into the air. The most common and safe waste management today is 3R (Reduce, Reuse, Recycle). this 3R concept, aka managing plastic waste by recycling and reducing the use of plastic (Surono & Ismanto, 2016).

According to Solomon and Palanisami (2016), the factors for the spread of microplastics and macroplastics are due to wind, carried by rivers, and due to human activities because microplastics can float in the air, microplastics can also enter the human body through breathing. It is estimated that 7% of microplastic pollution in the sea comes from the air (Gasperi, et al., 2015). Microplastics can travel very far with the help of several factors such as wind and water. the ability of microplastics in their distribution is due to their lightweight, strong durability, and good buoyancy as well as their various shapes and colors (Karbalaei et.al. al., 2018). According to Wang (2022), microplastics in the marine environment raise World concern, microplastics found in aquatic areas have sizes ranging from 0.001to 0.5 mm, with transparent and black colors, as well as polypropylene and polyethylene polymertypes. Indonesia is the second largest producer of plastic waste in the world after China, the results of research conducted in the coastal area of Surabaya showed the existence of microplastic pollution inthe form of fragments, fiber, granules, and foam (Tang et al., 2022). Another study by taking sediment samples in the waters of the Java region detected 3 types of microplastics the most common are fragment, fiber, and film, while the highest abundance of microplastics is in Mangrove areas (Yona, 2019). Worldwide water contamination by microplastics is an emerging health and environmental problem. Although relatively inert, microplastics can absorb and carry other water pollutants such as heavy metals. Adsorption of heavy metals onto microplastics is a spontaneous process controlled by microplastic surfaces (Naqash, 2020).

Microplasticsthatpollutecoastalandaquaticenvironmentshavethepotentialto causepollution tomarinelife.BasedonresearchbyYudhantarietal.(2019),fishcaughtaroundtheislandofBali contain fiber-type microplastics that are thought to come from synthetic clothing fibers and fishingtools such as nets and fishing rods. Generally, fish ingest microplastics accidentally, this is because microplastics will resemble the natural food of their habitat (Crawford and Quinn,2017). Theingestion of microplastics will cause physical damage to fish, and will even have toxic effects on humans who consume them (Wright and Kelly, 2017). Based on the results of a study conducted in China showed that the absorption of microplastics by organisms is closely related to microplastic pollution in aquaculture environments. Pollution can be common to organisms and sea surface water in aquaculture areas, potentially contaminating humans (Lin, 2022).

3.2.2. TheeffectofWasteBanksandBeachTrashonSustainableBeaches

Beach trash based on the results of analysis using Partial Least Square showed a positive effect on the sustainability of the beach. To minimize waste generation, a waste Bank must be created. A Waste Bank is one alternative to invite people to care about waste that can be developed in the regions. Waste banks have advantages in empowering communities and providing economic benefits for residents (Kristina, 2020).

The results of the analysis with partial least Square between the waste Bank and the coastal waste generation showed a positive effect which means that the existence of the waste Bank affects coastal waste generation. The results of a study conducted in Malang Indonesia show that waste banks have a positive effect on changing people's behavior regarding waste management (Muljaningsih, 2022). This mindset change has the potential to reduce waste generation caused by the community with good waste management. Other studies have shown positive results on the existence of waste banks, where asmuch as 90% of waste can be recycled and composted through waste banks (Khair, 2019). The results of another study conducted in South Surabaya Indonesia showed that waste banks were able to reduce the amount of waste by 6964.8 kg/month (Kesauliya, 2019). Waste Bank in its application can reduce waste that is wasted to the environment so that the existence of waste banks in coastal areas can reduce waste generation in coastal areas. In line with the results of the analysis conducted showed that the garbage Bank has an effect of 94.2% on coastal garbage generation, which means that the existence ofa garbage bank affects minimizing coastal garbage generation. Reduced waste generation willminimize pollution of coastal areas and waters to reduce microplastic contamination caused by waste generation in coastal areas.

The waste bank is one way of minimizing waste to the environment. It is also a solution to reduce the waste volume, especially the volume of garbage on the beach that many tourists have vacationed (Suryani, 2014). Waste banks also change community participation by increasing the younger generation's involvement in waste management (Ramadhani, 2020). Waste banks in coastal areas are a much-needed thing (Edison et al., 2022). The existence of waste banks can affect the sustainability of coastal tourism, as the analysis results show that waste banks have a positive effect on sustainable beaches. The analysis results show that waste banks have an outcome of 27.6% on sustainable beaches, which means that the existence of waste management in the form of waste banks can affect the sustainability of beach tourism. Reducing waste or waste through waste banks has a positive outcome on the environment and our public health, as it is said (Azizah, 2018) that waste reduction activitieswill reduce adverse impacts on the environment and society.

4. Conclusion

The study concludes that microplastics are found in various places in coastal areas. Microplastics are found in sediments, seawater, and even in marine life in the ocean. The microplastics that contaminate coastalregions come from the sourceof garbage on the coast. Thetypes of microplastic particles found were fiber, fragment, filament, film, and granule, and the majority of microplastic particles detected were > 10 particles. Evaluation of the measurement model is good because the value of the loading factor (outer loading) above 0.70 is 0.909, Cronbach alpha composite reliability above 0.70 is 0.964, and Convergent validity with AVE size above 0.50 is 0.788. All variables influence waste banks to beach trash, waste banks to sustainable beaches, and beach trash to sustainable beaches. The highest influence value is the influence of waste banks on the beach trash of 94.2%, meaning that if in the coastal environment, there is coastal Waste Management in the form of waste banks, it will be able to minimize the amount of waste on the beach, thus will get a sustainable beach. Sustainable beaches will experience environmental sustainability, economic sustainability, and social sustainability. Onesolution for reducing beach trash is to develop waste banks.

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6. ConflictofAuthor(s)

Theauthorhasnoconflictof Interest

7. Ethical Approval

The study was approved by the Faculty of Public Health Universitas AirlanggaDescription of Ethical Approval No: 168/Ea/Kepk/2022 Title of Integrated Sustainable Plastic Waste Management Analysis on The Coast of Banyuwangi Regency, East Java Province.

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