Understanding Of The Behavior Of Solid Waste Management In The Context Of Waste Hierarchy: A Case Study Of Bogor District, West Of Java – Indonesia

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Abstract

The high level of consumption in society has contributed to the increase in the amount of waste generated due to the growing city population. According to waste production data compiled by the Bogor Regency Environmental Service (DLH), approximately 2423.3 tons. According to Government Regulation 81/2012 concerning Waste Management, communities must be responsible for waste. The Bogor Regency area is known to have the most ineffective waste management. As a result, there is debate about whether the government should create programs based on the 3Rs to increase commnity engagement. Using the Theory of Planned Behavior, this study aims to identify and identify the factors influencing people's behaviour in Bogor Regency regarding 3R (TPB). According to the current research findings, attitude is the most significant variable because it has the most vital relationship with the 3R behavioural intention and is an essential factor. Then, subjective norms, perceived behavioural control, and environmental aspects are deemed irrelevant. There is a close and vital relationship between the purpose behind the 3R activities and the behaviour itself. Communities with negative attitudes towards the 3Rs could benefit from increased awareness and a more positive attitude if the government campaigns about the 3Rs. The campaign will enable the formation of subjective norms for behaviour that conforms to the 3Rs. Furthermore, the government must assume responsibility for providing waste recycling education.

Keywords: Waste, Community, TPB, 3R, Behavior, Attitude, Recycling

1. Introduction

The issue of waste management is currently being tackled on a global scale. The study by Tan et al. explains that the more the population, the more the volume of waste will increase (Tan et al., 2015; Madsen et al., 2021). The World Bank projects that the quantity of garbage produced worldwide will rise to 2.2 billion tons by 2025 from the current 1.3 billion tons produced yearly. In Indonesia, the garbage produced yearly is around 38.5 million, equating to 200,000 tons, and it is growing at a rate of 2-4 per cent annually (Wijayanti & Suryani, 2015). Every day, the amount of waste generated in Bogor reaches 2423.3 tons. The increased volume of waste that is not managed sustainably can have a variety of impacts, including the pollution of water, soil, and air; the spread of numerous diseases; the presence of large numbers of flies; the production of an offensive odour; accidents at work; the poisoning of livestock (Madsen et al., 2021; Zhang et al., 2008). The Indonesian Government Regulation No. 81 of 2012 regarding Domestic Wastes and Household-like Waste Management legislates that the municipality, as a waste producer, is also willing to take responsibility for managing waste. The regulation focuses on household waste, similar to waste generated in households. In rule number 21 of 2006, published by the Minister of Public Works, one mission was to encourage community empowerment. It strives to promote public health as well as the condition of the environment, and it also seeks to transform trash into a valuable resource.

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Doing the "3R" is one of the strategies that may be used to cut down on waste and manage it (reduce, reuse, recycle) (Minelgaitė & Liobikienė, 2019). The meaning of "reduce, reuse, and recycle" is detailed in

Government Regulation Number. 81 of 2012, published that year. As per an interview with the Environmental Service of Bogor District, the 3R campaign has been implemented at the R.T. (Rukun Tetangga or Neighborhood Association) and R.W. (Rukun Warga or Citizens Association) levels in various villages. When choosing from various options, each person unquestionably considers their unique factors. A variety of considerations may be considered while choosing what to do. In order to understand people's tendencies in determining their actions and decisions, it is imperative to discover the factors that determine individual behaviour. This concept will allow one to grasp the propensity of individuals. These aspects of behaviour prediction can either immediately or indirectly affect an individual's actions. The Theory of Planned Behavior (TPB) posits that behavioural prediction factors will likely impact intention, affecting subsequent behaviour. The TPB refers to a theoretical framework that aims to explore the various factors that influence the behaviours of individuals.

The Theory of Planned Conduct (TPB) is a theoretical construct that methodically examines the factors that influence human behaviour. The present concept represents a progression of the Theory of Reasoned Action (TRA), which posits that the intentions of an individual are the principal determinant of their actions. This new theory aims to test this idea. Attitude and subjective norms are two aspects that might affect whether or not someone has the intention to do something or not do something. A novel idea proposes that in the development process, actions will be confined due to a lack of opportunities, skills, and resources. Ajzen expands TRS into TPB by incorporating an additional variable, which he refers to as perceived behavioural control (MicheleTonglet et al., 2004). According to the TPB hypothesis, behavioural prediction factors, such as attitudes, subjective norms, and behavioural control perceptions, influence intention, which then influences conduct later. A person's attitude can be defined as the affection (feeling) they have for accepting or rejecting a particular thing or conduct. It is evaluated using a method that, in the end, places the individual on a two-pole evaluative scale, such as agreeing or disagreeing, excellent or poor, likes or dislikes, and so on (Ajzen, 2011). Subjective norms typically refer to a knowledge of how an individual interprets the existence of societal pressure to engage in or abstain from a specific action (Ajzen, 1991). The perception of behavioural control pertains to the subjective assessment of ease or difficulty associated with performing a particular behaviour. This process is achieved by contemplating past encounters and strategising. The concept of intention pertains to the inclination of individuals to engage in specific behaviours (Hill et al., 1977). An individual's response to their surroundings is reflected in their behaviour, an activity they take. The individual intention of a person can affect the conduct that person displays. TPB was utilised to investigate correlations between the elements that affect waste behaviour. The TPB emphasises consumers' beliefs, intentions, and attitudes (Ajzen, 2011). The year 1969 marked the beginning of efforts to understand consumer behaviour through the lens of attitude (Wicker, 1969). On the other hand, it was found that attitudes were not very useful for predicting behaviour (Wicker, 1969). Ajzen found a solution to this issue by introducing the concept of intent to engage in behaviour as a mediator between the underlying components that cause behaviour, such as attitudes (Ajzen, 1991). The concept of perceived behaviour control, or PBC, was also introduced by Ajzen as a subsequent step in developing TPB (Ajzen, 1991). PBC considers non-human elements that influence behaviour regardless of the actor's intentions. A literature review reveals that numerous studies have been carried out to investigate the determinants of pro-environmental behaviour. These studies have explored various individual psychological factors such as values, environmental awareness, subjective norms, personal identity, and control beliefs (Gkargkavouzi et al., 2019)(Mi et al., 2021)(Sabri et al., 2022), demographic and sociological characteristics (age, gender, educational facilities) (Li et al., 2019)(Sun et al., 2018). When the TPB model is used to explain environmentally friendly behaviours, such as reducing food waste, ethical standards and environmental views can be incorporated into the model (Kaiser et al., 2005; Stefan et al., 2013; Turaga et al., 2010)(Zebardast & Radaei, 2022). Socio-economic considerations have also been proven to affect food waste behaviour (Parizeau et al., 2015; Stefan et al., 2013; T.E. Quested et al., 2013; Thyberg & Tonjes, 2016). Deng and colleagues employ the extended theory of planned behaviour (TPB) framework to quantitatively examine the factors and interaction mechanisms influencing the public's behavioural intention to decrease their utilisation of personal care and cosmetic products, including microplastics (Deng et al., 2022). One approach to reducing the amount of garbage produced is to improve waste management in Bogor Regency – West of Java. In addition, the Indonesian government has set a goal to reduce domestic garbage and waste that can be recycled as household waste by as much as 30 per cent by 2025. As a result, the government should work on developing 3R initiatives in order to boost the amount of engagement

from the community. In the current research, prior to the formation of the program, it is vital to understand and identify the drivers that influence the 3R behaviour of the community. In order to determine the components, we use the Theory of Planned Behavior, also known as TPB. In addition, this study discusses the relationship between behavioural prediction factors, intentions, and behaviours regarding the implementation of waste management (Gusti et al., 2015; L. Xu et al., 2017).

2. Method

The questionnaire used in this study with a 5-point scale ranging from strongly disagree to disagree, neutral to agree, and agree to agree strongly. This study involved the participation of as many as 480 different respondents, all giving the same percentage of their opinion. Respondent areas, such as Cileungsi District, Kemang District and Tenjo District, were selected based on population density. The initial development of the questionnaire took place in Indonesia. The poll contains no optional items, so none of the information is missing from the sample. No identity was ever revealed in the survey. The TPB only considers three behavioural prediction elements: attitude, subjective norms, and perceived behaviour control. These factors are attitude, subjective norms, and perceived behaviour control. It is advised that the TPB model be expanded during its development to include other variables such as moral norms, previous experience, situational conditions, and repercussions. These are only some examples. Some studies believe incorporating contextual factors as more variables are preferable. The level of an individual's view of situational variables, including restricted space, time, and barriers, is evaluated using situational factors. Several factors of concern in this study are presented in Table 1.

Table 1 The factors used in the study

Code	Factors
Subjective Norms (X1)	
X1-1	I don't need to buy things I rarely use
X1-2	I need to reduce the amount of trash I throw away
X1-3	I can't possibly reduce the amount of trash if I'm still wasteful in buying things
Moral Norms	
X2-1	I feel guilty if I still leave food while other people are hungry
X2-2	Leaving leftovers makes me not have a good conscience
X2-3	I was taught not to throw trash anywhere
X2-4	I don't like it when friends throw trash everywhere
Desire to protect the environment	
X3-1	I buy things according to my needs while at the community
X3-2	I intend not to produce a lot of waste
X3-3	I intend to throw the garbage in the trash bin
Situasional factors	
X4-1	I throw the trash out of place because there are already officers who clean it
X4-2	I threw the trash out of place because I was in a hurry to get to class so I didn't have time to throw the trash in the trash
X4-3	I throw the trash out of place because there is no trash can in front of the room
Trash Attitudes	
X5-1	Throwing garbage carelessly is an attitude that is not commendable
X5-2	In my opinion wasting food is a dishonorable attitude
X5-3	I get annoyed when leftovers are thrown in the trash
Environmental concern	
Y1	I have the belief that throwing garbage anywhere will damage the environment
Y2	I believe that every human being is responsible for protecting the environment around him
Y3	I don't throw trash anywhere
Y4	I feel guilty if I don't sort the trash and throw it everywhere
Y5	I always think about the consequences of littering
Trash Behaviour	

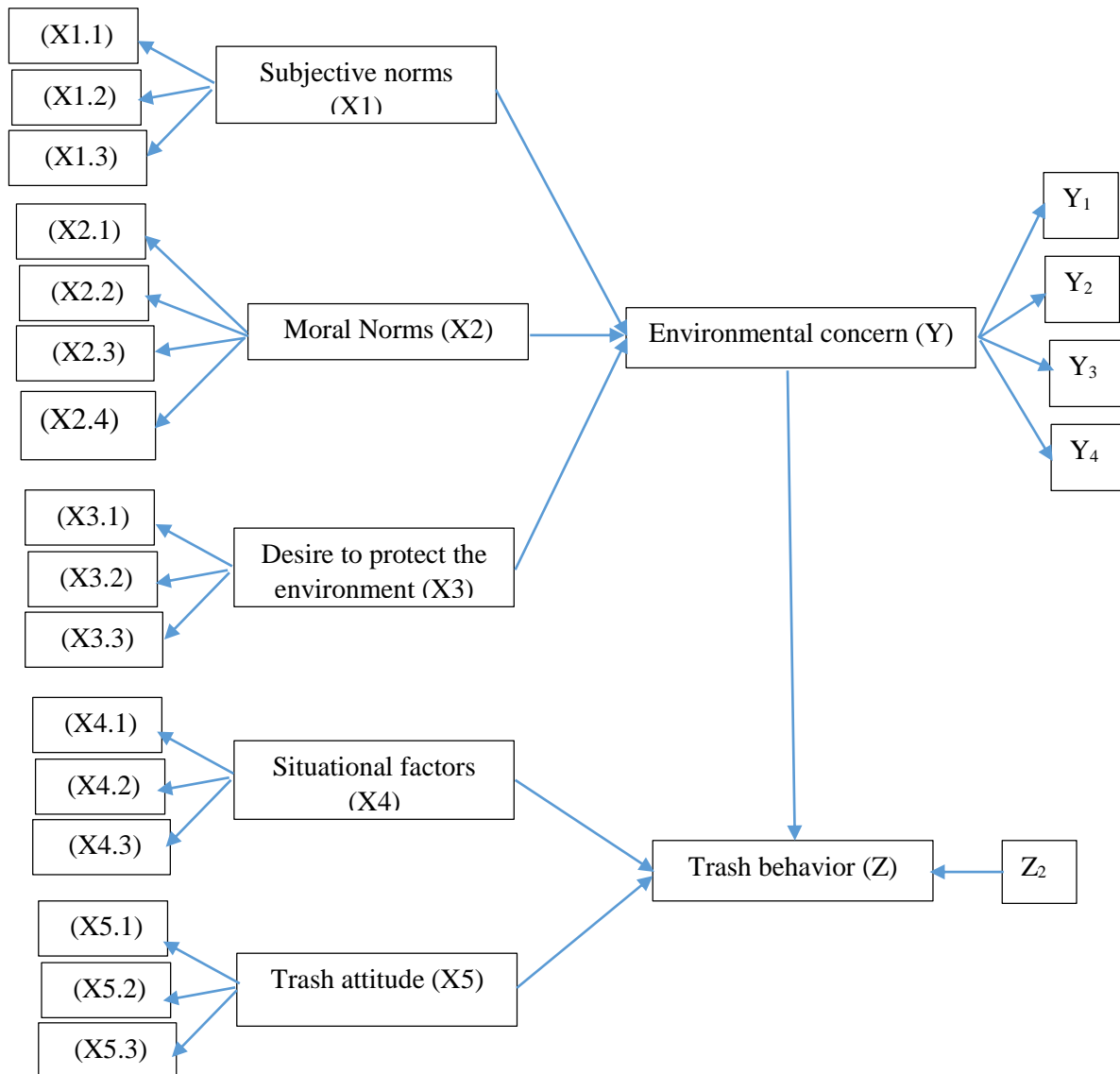| Z1 | You keep things you don't use anymore |
| Z2 | You throw trash in the trash bins that has been provided |

Fig. 1 Hypothetical model of garbage disposal behavior

The Partial Least Square (PLS) approach will be used to analyse this study model with the assistance of the SmartPLS 3.0 software. PLS is one of the alternative methods of Structural Equation Modeling (SEM) that can be done to overcome problems in the relationship between very complex variables. However, the data sample size is small (30-100 samples) and has non-parametric assumptions, which means that the data does not refer to any specific data distribution. PLS can be done to overcome problems in the relationship between very complex variables because it can be done to overcome the problem in the relationship between very complex variables. The first step in the SEM-PLS approach is characterising the relationship structure between the study variables, which will be employed in the model analysis. In this paper, the relationship between variables in Figure 1. Testing the outside and the inner model is part of the Model Feasibility Test, also known as the Goodness of Fit Model. In order to validate the outer model, one must first examine several indicators, including the AVE value, convergent validity, discriminant validity, composite reliability, and composite reliability.

3. Result and discussion

Convergent validity: When determining convergent validity, one looks at the reliability of the tested items (the validity indicator), which is shown by the value of the loading factor. A number that reflects the link between the score of a question item and the indicator score that measures the construct is referred to as the loading factor. For a loading factor value to be considered genuine, it must be more significant than 0.7.

Table 2. First Iteration Factor Loading Value

Variable	Indicator	Outer Loading	Variable	Indicator	Outer Loading
Subjective Norms	X1.1.	0,796	Trash behavior	X5.1.	0,772
	X1.2.	0,814		X5.2.	0,848
	X1.3.	0,767		X5.3.	0,781
Moral Norms	X2.1.	0,854	Desire to protect the environment	Y.1.	0,815
	X2.2.	0,787		Y.2.	0,818
	X2.3.	0,739		Y.3.	0,805
	X2.4.	0,817		Y.4.	0,751
Intention to reduce waste	X3.1.	0,895		Y.5.	0,695
	X3.2	0,724	The attitude toward waste disposal	Z.1.	-0,109
	X3.3	0,900		Z.2.	0,999
Situational Factors	X4.1.	0,889			
	X4.2.	0,899			
	X4.3.	0,734			

On the other hand, research conducted by Hair et al. for a loading factor of approximately 0.3 is considered to have met the minimum level, a loading factor of approximately 0.4 is considered better, and a loading factor greater than 0.5 is generally considered significant (Hair et al., 2010). This information was gleaned from an initial investigation into the loading factor matrix. In this particular investigation, the maximum loading factor utilised was 0.7. After running the data via SmartPLS 3.0's processing algorithms, the results of the loading factor can be shown in Table 2. According to the findings of the data processing done with SmartPLS, displayed in the table above, most of the indicators found within each variable investigated here have a loading factor value greater than 0.70 and are therefore considered valid. On the other hand, the Y.5 indicator and Z.1 variables, both of which had a loading value of less than 0.7, were present. According to these findings, the indicator variable with a loading factor value larger than 0.70 possesses a high level of validity. As a result, it satisfies the criteria for convergent validity. While the variable indicator with a loading value of less than 0.70 has a low level of validity, the variable indicator still has to be deleted from the model since it has a loading value of less than 0.70. After the Y5 and Z1 indicators were taken out of the equation and recalculated, the results of the previous table, Table 3, show an increase in outer loading on various variables. It is plain to see that the outer loading of all the other variables has a value greater than 0.7, which requires the hypothesis to be considered valid.

Discriminant Validity

Examining the concept measurement's cross-loading value is one way to determine whether or not it possesses discriminant validity. The cross-loading value indicates the correlation between each block construct, its associated indicators, and the indicators derived from other block constructions. A measurement model can possess good discriminant validity if the correlation between the construct and its indicators is more robust than the correlation with indicators from other block constructs. Following the application of SmartPLS 3.2.9 to the data, the results of cross-loading can be found in Table 4.

Table 3. Second Iteration Factor Loading Value

Variable	Indicator	Outer Loading
Subjective Norms	X1.1.	0,801

	X1.2.	0,815
	X1.3.	0,760
Moral Norms	X2.1.	0,854
	X2.2.	0,792
	X2.3.	0,738
	X2.4.	0,814
Intention to reduce waste	X3.1.	0,896
	X3.2	0,720
	X3.3	0,901
Situational Factors	X4.1.	0,889
	X4.2.	0,898
	X4.3.	0,735
Trash behavior	X5.1.	0,770
	X5.2.	0,848
	X5.3.	0,783
Desire to protect the environment	Y.1.	0,855
	Y.2.	0,833
	Y.3.	0,824
	Y.4.	0,713
Attitude of waste disposal	Z.2.	1,000

The findings of the cross-loading are presented in Table 3, and they demonstrate that the value of the construct's correlation with its indicators is higher than the value of the construct's correlation with the other constructs. Hence, it can be inferred that all constructs and latent variables exhibit robust discriminant validity, indicating that the indicators within the construct indicator block surpass those within the other blocks.

Composite Reliability and Average Vehicle Efficiency

Apart from assessing the convergent and discriminant validity, the outer model can be evaluated by examining the construct reliability or latent variables measured by composite reliability values. This process can be done in addition to examining convergent and discriminant validity. If the value of the AVE is more significant than 0.5 and the value of the composite dependability is more significant than 0.7, then the build can be considered dependable. The following table outlines the output results that SmartPLS obtained for the composite reliability values. Table 5 shows that every construction demonstrates an AVE value larger than 0.50, with 0.628 being the absolute minimum. The requirements have been satisfied following the defined minimum AVE value limit of 0.50, thanks to this value. In addition, the value of composite reliability is taken into consideration as one of the indications. Because every variable in the above table has a C.R. value greater than 0.7, as seen in the table itself, the variable is considered to have a high level of reliability.

Table 4. Cross Loading Results

	X1- Subyektive Norms	X2- Moral Norms	X3- Intention to reduce waste	X4- Situational Factors	X5- Trash behavior	Y- Desire to protect the environment	Z- Attitude toward waste disposal
X1.1.	0,801	0,370	0,380	-0,059	0,368	0,261	0,348
X1.2.	0,815	0,318	0,300	-0,222	0,317	0,267	0,279

X1.3.	0,760	0,222	0,274	-0,192	0,187	0,213	0,318
X2.1.	0,309	0,854	0,466	0,058	0,648	0,605	0,444
X2.2.	0,341	0,792	0,415	0,036	0,551	0,506	0,376
X2.3.	0,227	0,738	0,289	-0,027	0,488	0,511	0,344
X2.4.	0,362	0,814	0,397	-0,049	0,558	0,610	0,328
X3.1.	0,296	0,451	0,896	-0,069	0,492	0,504	0,677
X3.2	0,279	0,220	0,720	-0,205	0,328	0,309	0,497
X3.3	0,430	0,510	0,901	-0,080	0,659	0,560	0,843
X4.1.	-0,174	-0,015	-0,158	0,889	-0,009	-0,238	-0,213
X4.2.	-0,173	0,039	-0,090	0,898	-0,067	-0,179	-0,167
X4.3.	-0,150	-0,012	-0,010	0,735	0,098	-0,062	-0,096
X5.1.	0,190	0,491	0,483	-0,033	0,770	0,448	0,438
X5.2.	0,306	0,632	0,467	0,003	0,848	0,463	0,409
X5.3.	0,416	0,571	0,513	0,011	0,783	0,458	0,389
Y.1.	0,232	0,546	0,612	-0,084	0,583	0,855	0,589
Y.2.	0,228	0,534	0,432	-0,150	0,485	0,833	0,444
Y.3.	0,239	0,591	0,378	-0,315	0,398	0,824	0,433
Y.4.	0,328	0,608	0,362	-0,150	0,351	0,713	0,321
Z.2.	0,396	0,466	0,820	-0,202	0,516	0,563	1,000

Table 5 Values for the Composite Reliability and the AVE

Variable	Composite Reliability	Average Variance Extracted (AVE)
X1- Subjective Norms	0,835	0,628
X2-Moral Norms	0,877	0,641
X3- Intention to reduce waste	0,880	0,711
X4- Situational Factors	0,880	0,712
X5- Trash behavior	0,843	0,642
Y- Desire to protect the environment	0,882	0,653
Z- Attitude toward waste disposal	1,000	1,000

Inner Model Testing (Structural Model)

R² value model: After the validation of the outer model, which establishes conformity with the structural model requirements, the inner model is tested. The inner model's assessment can be conducted by examining the r-square, which serves as a reliability indicator for the dependent construct, and the t-statistical value derived from the path coefficient test. Both of these metrics are present in the tabular representation provided underneath. A more excellent r-square value indicates a superior predictive capacity of the proposed research model.

Table 6. Value of R-Square model

Variable	R Square
Y- Desire to protect the environment	0,554
Z- Attitude toward waste disposal	0,387

According to Table 6, it is clear that subjective norms, moral standards, and intentions to minimise waste contribute to 55.4 per cent of the variance in the value of the desire to protect the environment. This information can be gleaned by examining the data shown in the table. In the meantime, the desire to protect

the environment, situational considerations, and the garbage mentality contributed 38.7 per cent toward the habit of disposing of waste. While the remaining factors outside the model were responsible for 44.6% of the variance in the value of the desire to protect the environment and 61.3% of the variance in the value of the behaviour of disposing of waste, the model itself was responsible for 0% of the variance in either of these two variables.

Variance inflation factor (VIF)
The inner mode test can also be done by looking at the VIF value. If the value of VIF < 5, the model is fit and can be continued in the following analysis, as mentioned in Table 7. The VIF value between the several study variables has reached the threshold for passing the test, set at less than 5, as seen in the table above. The model was proven valid after being put through both the inner and the outer model testing, and it can now be utilised for testing the hypothesis.

Hypothesis test
The Inner Model test, a structural model, is the foundation for hypothesis evaluation. The outcomes of this test encompass the r-square output, parameter coefficients, and t-statistics. One approach to determine the acceptance or rejection of a hypothesis is to consider the substantial significance between constructs, t-statistics, and p-values. With the assistance of the SmartPLS program, the testing of the hypotheses of this research was completed. The results of the bootstrapping make these values visible to the reader. The t-statistic needed to be greater than 1.96, the significance level needed to be a p-value of 0.05 (5 per cent), and the beta coefficient needed to be positive. The present investigation utilised heuristics as a guiding principle. Table 8 demonstrates the importance of testing the research hypothesis, while the outcomes of the research model can be interpreted as shown in Figure 2. The first hypothesis examines whether subjective norms significantly affect the desire to protect the environment. The test results show that the subjective norm beta coefficient on the desire to protect the environment is -0.025, and the t-statistic is 0.262. With this t-statistical value, a p-value> 0.05 is obtained, which means that it can be concluded that it failed to reject H0. These results show that at the 95% confidence level, subjective norms do not significantly affect the desire to protect the environment.

Table 7. Value of VIF model

Variable	Indicator	Outer Loading
Subjective Norms	X1.1.	1,355
	X1.2.	1,394
	X1.3.	1,378
Moral Norms	X2.1.	2,001
	X2.2.	1,727
	X2.3.	1,456
	X2.4.	1,687
Intention to reduce waste	X3.1.	2,124
	X3.2	1,443
	X3.3	2,023
Situational Factors	X4.1.	1,730
	X4.2.	2,403
	X4.3.	1,747
Trash behavior	X5.1.	1,290
	X5.2.	1,715

	X5.3.	1,518
Desire to protect the environment	Y.1.	2,024
	Y.2.	2,104
	Y.3.	1,877
	Y.4.	1,425
Attitude toward waste disposal	Z.2.	1,000

The second hypothesis examines whether moral norms significantly affect the desire to protect the environment. The test results show that the value of the beta coefficient of moral norms on the desire to protect the environment is 0.566, and the t-statistic is 4.927. With this t-statistic value, we get a p-value <0.05, which means that it can be concluded that Reject H0. From these results, it is stated that at the 95% confidence level, there is sufficient evidence to say that subjective norms significantly affect the desire to protect the environment. The third hypothesis examines whether the intention to reduce waste significantly affects the desire to protect the environment. The test results show that the value of the beta coefficient of moral norms on the desire to protect the environment is 0.294, and the t-statistic is 2.233. With this t-statistic value, we get a p-value <0.05, which means that it can be concluded that Reject H0. From these results, it is stated that at the 95% confidence level, there is sufficient evidence to say that the intention to reduce waste significantly affects the desire to protect the environment.

Table 8. Path Coefficient Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
X1- Subjective Norms-> Y-Environmental concern	-0,025	-0,010	0,096	0,262	0,793
X2- Moral Norms -> Y- Environmental concern	0,566	0,571	0,115	4,927	0,000
X3- Desire to protect the environment -> Y-Environmental concern	0,294	0,283	0,132	2,223	0,027
X4- Situational factors-> Z- Trash behavior	-0,123	-0,138	0,106	1,163	0,245
X5-Trash attitude-> Z- Trash behavior	0,310	0,324	0,134	2,319	0,021
Y- Environmental concern -> Z- Trash behavior	0,360	0,346	0,136	2,650	0,008

The fourth hypothesis examines whether situational factors significantly influence waste disposal behaviour. The test results show that the situational beta coefficient on the desire to protect the environment is -0.123,

and the t-statistic is 0.245. With this t-statistical value, a p-value> 0.05 is obtained, which means that it can be concluded that it failed to reject H0. From these results, it is stated that at the 95% confidence level, situational factors have no significant effect on the behaviour of disposing of waste. The fifth hypothesis examines whether the attitude of disposing of waste significantly affects the behaviour of disposing of waste. The test results show that the value of the beta coefficient of moral norms on the desire to protect the environment is 0.310, and the t-statistic is 2.319. With this t-statistic value, we get a p-value <0.05, which means that it can be concluded that Reject H0. From these results, it is stated that at the 95% confidence level, there is sufficient evidence to say that the attitude of disposing of waste significantly affects the behaviour. The sixth hypothesis examines whether the desire to protect the environment significantly affects waste disposing of behaviour. The test results show that the value of the beta coefficient of moral norms on the desire to protect the environment is 0.360, and the t-statistic is 2.650. With this t-statistic value, we get a p-value <0.05, which means that it can be concluded that Reject H0. From these results, it is stated that at the 95% confidence level, there is sufficient evidence to say that the desire to protect the environment has a significant effect on the behaviour of disposing of waste.
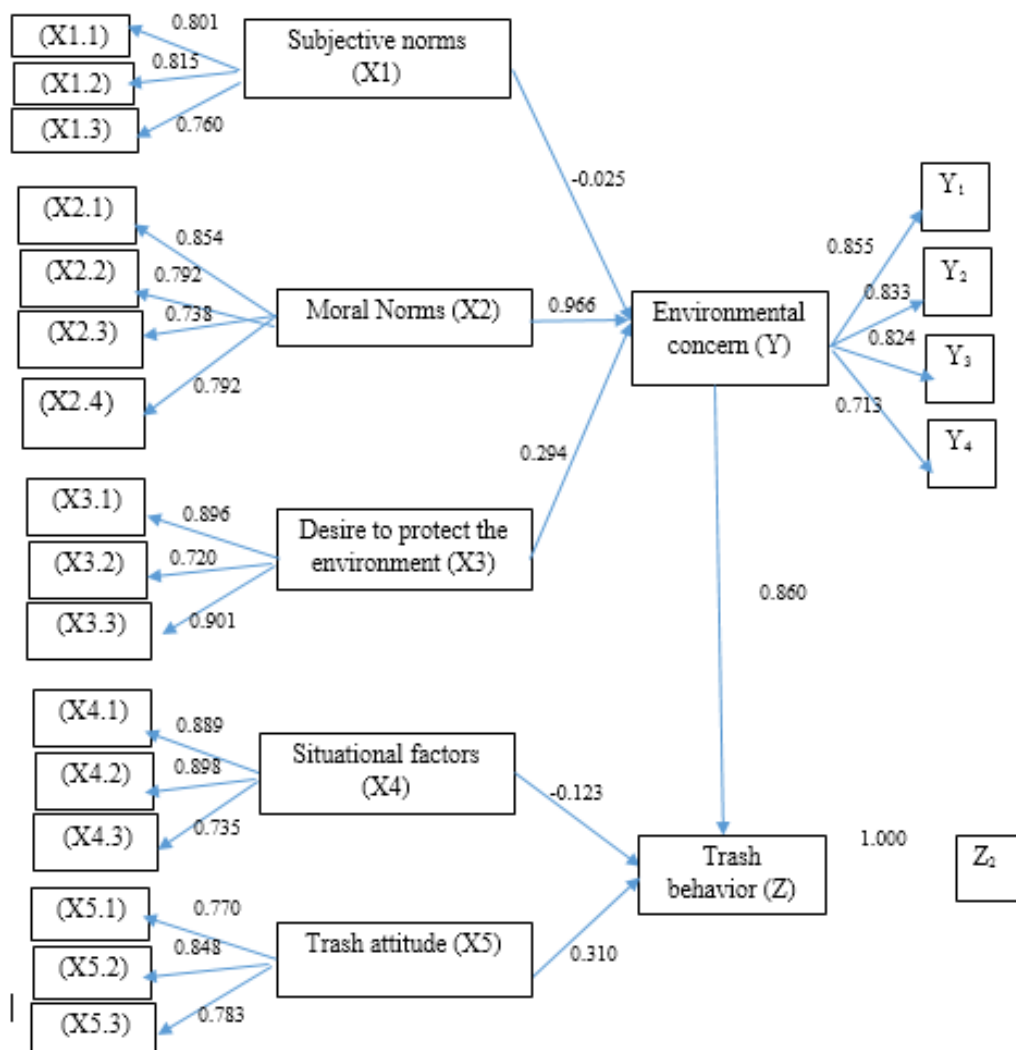

Fig. 2 Model Behavior of Solid Waste Management.

4. Discussion

According to the TPB, an individual's aim to reduce waste should predict food waste behaviour and be a mediator in predicting waste behaviour via underlying determinants (Ajzen, 1991). The findings support the hypothesis that a person's level of waste behaviour can be predicted by their intention to reduce waste. According to Visschers et al., the intention to reduce waste does mediate moral norms (H.M.Visschers et

al., 2016). According to Rats et al., moral norms influence people's views toward the environment(Raats et al., 1995).There is a high degree of goodness of fit in the SEM model. The findings suggest that three variables can be used to forecast how much waste is thrown away accurately—for instance, environmental attitudes, environmental ideas, and moral norms. The regression analysis model indicates that waste behaviour was most significantly influenced by environmental beliefs and attitudes (Farr-Wharton et al., 2014; Mirosa et al., 2016). Additionally, it illustrates how one's beliefs and attitudes influence their actions (Ajzen, 1991). In addition, as Raats et al. explain, moral norms' influence on behaviour is indirect and occurs through attitudes (Raats et al., 1995). The elements influencing household behaviour are poorly understood, and the literature on pro-environmental behaviour frequently ignores emotional considerations(Lam et al., 2022). As the CFA and SEM analyses did not yield significant outcomes regarding the aim of reducing or eliminating food waste, it was deemed appropriate to exclude it from the model. After removing the food conservation objective, the model's fitness level was observed to have increased. The research conducted by Stefan et al. (2013) revealed that the intention to reduce waste did not significantly affect the quantity of food reported as being wasted. According to Stefan et al., people do not have a vital purpose in preventing food waste because food waste has become ingrained in traditional aspects of daily life (Stefan et al., 2013). As a result, the community throws away waste without giving it much thought, so they have a feeble intention to reduce their waste. The situational factors were not significant in the SEM analysis either, and eliminating this factor improved the degree to which the data fit the model. As a result, the SEM model did not consider any situational aspects. The reason that situational factors and the aim to avoid waste were not significant in the SEM model may have something to do with the fact that in the regression analysis, both of these components were only moderately predictive of food waste. In the regression analysis, age was found to have the least significant impact on food waste behaviour. As a result, socio-economic factors were not evaluated in the CFA or SEM analyses.The findings of the regression and structural equation modelling studies provide information that can be helpful in the development of campaigns that aim to reduce waste in the community. This study shows that people connect waste and adverse environmental effects, contrary to the findings of earlier studies (Parizeau et al., 2015; Watson & Meah, 2012), since ideas and attitudes toward the environment are the primary predictors of food waste behaviour. It is claimed that changing behaviours toward more sustainable practices can be accomplished by raising awareness about the environmental implications caused by waste.

According to the findings of this survey, people in Bogor Regency are now more concerned about waste and more aware of the harmful effects of waste on the environment than before. It also shows the relationship between the attention paid to environmental issues and changes in consumer behaviour. he most important takeaways from this research are that environmental concerns and attitudes influence customers' behaviour towards waste. The present investigation contradicts the results reported by Parizeau et al. (2015) and Watson & Meah (2012), wherein it was observed that individuals exhibited a lower level of apprehension towards the environmental aspects of waste and a higher level of concern towards the economic and social dimensions of waste. This finding contradicts their findings. Although it has been suggested by Mirosa et al. (Mirosa et al., 2016), Quested et al. (T.E. Quested et al., 2013), and Farr-Wharton et al. (Farr-Wharton et al., 2014), more environmental considerations should be incorporated into the study on waste (X. Xu et al., 2020). There is a need for more studies to shed light on the significance of environmental considerations in behaviour toward waste. In addition, there is a demand to research the efficacy of product purchasing initiatives designed to reduce waste. For example, if people are made aware of the destructive impact of waste on the environment, it can encourage them to reduce the amount of waste they produce.

The present investigation revealed that the TPB model did not exhibit the expected level of efficacy. Specifically, the intention construct did not yield a statistically significant outcome in the SEM model and only demonstrated moderate predictability in the regression model. Stefan et al. came to the same conclusions and concur that there is a demand for developing new models to forecast the behaviour of consumers concerning waste (X. Xu et al., 2020)(Stefan et al., 2013). Other research has drawn various conclusions on people's habits and waste (H.M.Visschers et al., 2016; Parizeau et al., 2015; Stefan et al., 2013). The study highlights the need for new models to anticipate waste behaviour further. It is necessary to create improved methods for measuring elements connected to waste, such as attitudes against waste, intentions regarding waste, and subjective norms around waste.

5. Conclusion

This study found that students showed good attitudes, high behavioural intention, and accurate information. Furthermore, a correlation exists among knowledge, attitudes, and behavioural intentions. Based on the research results, it is recommended that the Regional Government of Bogor Regency increase public awareness regarding proper waste recycling practices. The current lack of information among the public regarding waste reduction and recycling hinders the potential for waste to be transformed into valuable commodities that can be sold. Information on waste reduction, reuse, and recycling should be the subject of future studies.

Credit authorship contribution statement

Dino Rimantho: Conceptualization, method, investigation, writing, editing, supervision, review. **Nur Yulianti Hidayah**: Method investigation, data investigation. **Anggina Sandy:** Method investigation, data investigation. **Laela Chaerani:** Method investigation, data investigation. **M. Hatta:** Method investigation, data investigation. **Dita Ariyanti:** Investigation, editing review. **Tina Hernawati Suryatman**: Writing, editing, supervision, review.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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