Factors that influence intention in processing organic waste using biopore hole

A Mardiyani¹, C Utomo²

¹Department of Technology Management, Institut Teknologi Sepuluh Nopember, Indonesia
²Department of Civil Engineering, Institut Teknologi Sepuluh Nopember, Indonesia

*Corresponding author's e-mail: anymardiyani.18092@mhs.its.ac.id

Abstract. Biopore hole is needed to reduce organic waste and this depends on a person's intentional behavior that arises due to several factors. Therefore, the purpose of this research is to determine the factors influencing the intention of processing organic waste using biopore hole in adiwiyata schools, Gresik regency. The research employ the extended theory of planned behavior model. Questionnaires were distributed to 393 respondents comprising of principals, teachers and students from 92 adiwiyata schools, The data analysis used structural equation modeling. The results show that several factors including perceived behavioral control, subjective norms, reward and punishment influence intention in processing organic waste. All three factors possess a significant relationship with intention (P value<0.1) but, subjective norms is the most influencing (β = 3.074, P value<0.1). Based on the result, It was recommended that a review of policies and programs need to be made by government to increase the intention of organic waste processing using biopore hole and will also serve as educational materials to schools.

1. Introduction

Waste exist as a major problem in Indonesia for years and this is comparable to population growth, lifestyle changes, and technological progress. Its volume which incorporate 60% organic and 15% plastic at 65 million tons in a year will continue to increase. Also, food waste contributes significantly to about 40% of the total volume of which 66.39% remains buried in the final processing site (TPA), 19.62% unmanaged and 14% were refined into compost, biogas, and other processed materials [1].

Based on UPT TPA data from Gresik regency environmental office in 2017, the composition of food makes a significant contribution of 42% approximately. Organic waste on the other hand has the capacity of becoming a beneficial to the environment after processing into compost.

Waste management requires legal certainty, clarity of responsibility, authority of the government, role of the community and the business world in order to run proportionally, effectively, and efficiently [2]. The local government made effort to carry out the mandate by involving community participation, this led to the construction of biopore by the regency environmental office. The maintenance of a biopore holes involves filling it with organic waste periodical until they turn into compost [3].

The influence of individual intention leads to the behaviour of processing waste with biopore infiltration hole and the theory of planned behaviour (TPB) is used to measure intention [4]. This theory is widely adopted to predict behavioural intention (BI), which comprises of three variables:
attitude (AT), subjective norms (SN), and perceived behavioral control (PBC). According to Ajzen [5], AT is a tendency to respond positively or unpleasantly to an object, person, institution or event. SN is individual perceptions of the expectation of those who are influential in their lives (significant others). PBC is individual perception of how easy or difficult it is to manifest a particular behavior. Also, BI is the tendency of the intention to be involved in a certain behavior. It is assumed that an individual who possesses these factors of BI will have increased intention to perform the behaviour [6]. This study therefore complement previous research by adding two variables, which includes reward and punishment (RP), and perceived usefulness (PU) to the TPB theory, therefore it becomes extended TPB (ETPB). RP is also a factor that influence a person's intention emanated from reinforcement sensitivity theory (RST) [7]. This theory suggests that punishment may reduce undesirable behaviour. On the contrary, rewards may promote favorable behaviours. Perceived usefulness (PU) refers to the extent to which an individual believes that the application of technology enhances job productivity [8]. PU as the second determinant of behavioral intention emerge from technology acceptance model (TAM) by Davis [8]. The proposed hypotheses of this research is revealed in Table 1.

| Hypotheses | Hypotheses Definition |
|------------|-----------------------|
| H1         | AT has a significant effect on the intention to process organic waste with biopore hole |
| H2         | SN has a significant effect on the intention to process organic waste with biopore hole |
| H3         | PBC has a significant effect on the intention to process organic waste with biopore hole |
| H4         | RP has a significant effect on the intention to process organic waste with biopore hole |
| H5         | PU has a significant effect on the intention to process organic waste with biopore hole |

The findings of this research will be useful to the government as guidelines to review policies and program or as educational materials in schools to change their intention towards processing organic waste.

2. Method
This research builds an ETPB model with 6 latent variables and 19 observed variables as shown in Figure 1. The variables used in this research are latent variables consisting of endogenous latent variables and exogenous latent variables. Endogenous latent variable is the intention in processing organic waste. While the exogenous latent variables are AT, SN, PBC, RP, and PU. A questionnaire is used as the instrument for data collecting for this research.

![Figure 1. Research model [9-10]](image-url)
Information:
\[ \eta = \text{endogenous latent variables} \]
\[ \xi = \text{exogenous latent variables} \]
\[ \zeta = \text{Endogenous variable residual error} \]
\[ \gamma = \text{Direct influence of exogenous latent variables to endogenous latent variables} \]
\[ \lambda = \text{The relationship between latent and observed variables} \]
\[ e = \text{Measurement error of the latent variable with the observed.} \]

The research were examined and interpreted using descriptive and confirmatory analysis. The descriptive test is used to determine the mean and standard deviation of the results given by respondents and the later uses structural equation modeling (SEM). The research used a quantitative approach based on the test of SEM which was able to verify empirically and especially, the existing relationship between the variables of the proposed model. SEMs are very common analysis technique and are frequently used to test models in different fields of social and behavioural sciences [11]. The objective of the SEMs, as a multivariate statistical analysis technique, is to verify hypotheses concerning the influence of a set of variables on others [11]. The collected data’s reliability and validity were tested on the account that the SEM is a first time measurement. Furthermore, model fit assessment, SEM assumption and hypotheses test were conducted.

3. Results and Discussion
All questionnaires were retrieved from the respondents and analysed accordingly. The results of the descriptive statistics, reliability and validity test is presented in Table 2.

| Variable | Indicator | Mean | Std. dev | Loading factor | CR |
|----------|-----------|------|----------|---------------|----|
| I        | I1; I2; I3| 3.87; 3.80; 3.82 | 0.949; 0.963; 0.981 | 0.521; 0.554; 0.741 | 0.7861 |
| AT       | AT1; AT2; AT3 | 3.82; 3.84; 3.78 | 0.957; 0.975; 1.019 | 0.557; 0.524; 0.559 | 0.7290 |
| SN       | SN1; SN2; SN3 | 3.82; 3.69; 3.77 | 0.970; 1.030; 1.002 | 0.599; 0.643; 0.575 | 0.7767 |
| PBC      | PBC1; PBC2; PBC3; PBC4 | 3.77; 3.75 | 0.963; 0.976 | 0.608; 0.613 | 0.8732 |
| RP       | RP1; RP2; RP3 | 3.79; 3.70; 3.77 | 0.983; 1.021; 0.972 | 0.550; 0.564; 0.559 | 0.7357 |
| PU       | PU1; PU2; PU3 | 3.82; 3.70; 3.86 | 0.996; 1.081; 0.917 | 0.517; 0.546; 0.523 | 0.7081 |

Based on Table 2, The loading factor for each indicator is greater than 0.5, therefore all indicators are valid. Furthermore, the results of the construct reliability (CR) on each variable are greater than 0.70. Therefore it is arguable that the construct reliability test on each variable is fulfilled. The result of the SEM assumption test conducted is shown in Table 3.

| Assumptions test | Limit value | Test value |
|------------------|-------------|------------|
| Normality        | -2.58 ≤ c.r ≤ 2.58 | c.r = 4.526 |
| Linearity        | F Linearity  | 231.541; 234.695; 246.475; 208.805; 190.681 |
|                  | P-value<0.05 | all P-value 0.000 |
| Multicollinearity| Tolerance ≥ 0.10 | 0.427; 0.481; 0.415; 0.413; 0.424 |
|                  | VIF ≤ 10     | 2.342; 2.081; 2.410; 2.424; 2.360 |
Based on Table 3, the critical ratio is outside the boundary value, therefore, the assumption of normality in each variable is not fulfilled. Consequently, it is continued by using the bootstrapping technique [9], [12]. Furthermore, the linearity test has a P-value less than 0.05. As a result the linearity assumption of each latent variable is fulfilled. Table 3 also shows that the tolerance value is greater than 0.10 and the VIF value is less than 10. This indicates that in each exogenous variable, there is no presence of multicollinearity. After several tests, the next measurement is to find a model fit and to test the proposed hypotheses. The model suitability test is measured based on goodness fit parameter as shown in Table 4. Each parameter passed its associated threshold. Furthermore, The hypotheses test is determined from the coefficient and p-value obtained from the regression weight. The results are summarized in Table 5.

| Parameter | Coefficient value (β) | P-value | Results     |
|-----------|-----------------------|---------|-------------|
| I <--- PBC | -2.557                | 0.056   | Significant |
| I <--- RP  | 0.898                 | 0.093   | Significant |
| I <--- SN  | 3.074                 | 0.012   | Significant |
| I <--- AT  | -0.327                | 0.417   | Non-Significant |
| I <--- PU  | -0.260                | 0.722   | Non-Significant |

As it is shown in Table 5, three factors influence intention in processing organic waste using biopore hole. They include perceived behavioral control, reward and punishment, and subjective norms. All three factors have a significant relationship with intention (P value < 0.1). However subjective norms possess a stronger and significant relationship (β = 3.074, P value<0.1).

The TPB states that behavioral control is determined by individual beliefs about the collection of resources which consist of equipment, competitiveness, opportunity, and time [5]. An individual with a high perception of control will continue to be motivated and strive for success, this is due to the belief in overcoming difficulties, accuracy and the availability of resources. The results of this research was certified by previous studies which revealed that perceived behavioral control significantly influences behavioral intention [13-14].

Reward and punishment are positive reinforcement that emerge from the behavioristic theory. The theory shows that human behaviour is controlled by reward or reinforcement as they affect individual intention to act. Punishment has a positive effect on the learning process and it is effective in a variety of social settings [15]. This research is supported by previous studies which affirm that reward and punishment have a significant link to individual intention [16]. Gresik government has local regulation on waste management [17]. However, there is no imprint of the mechanism of punishment. Therefore, this is a good confirmation of the advantages associated with reward and punishment-based programs to increase the intention of organic waste processing.

Based on this result, every unit increase in subjective norms increases intention towards processing organic waste with biopore hole. Furthermore, subjective norms are actors/environments that influence
behavioral intention. These perpetrators include the principal, teachers, parents, friends, and the school environment itself. This is in agreement with the theory of planned behavior [4], which states that subjective norms are decisive factors in implementing some certain behavior. It is also found, to be a significant indicator of intention, confirming to previous studies [13].

4. Conclusion
Several factors influence individual intention in processing organic waste using biopore hole. Based on this research, reward and punishment, subjective norms and perceived behavioral control have influence. Additionally, subjective norms have most influence with the highest coefficient value and positive relationship. Based on the findings of this study, the need for government to review polices and programs is recommended and it will also serve as education materials for schools to increase the intention of processing organic waste.

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