Household Behavior on Plastic Waste Separation in Indonesia

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Abstract

Plastic waste separation is useful to minimize the production number of wastes that will contaminate environment. Waste separation is also needed for recycling needs. This research investigates the household behavior towards the plastic waste separation in Indonesia according to the Norm Activation Model (NAM), Theory of Planned Behavior (TPB), situational factors, and habit. Data were collected using questionnaires and analyzed using SmartPLS. The result of this research shows that the awareness of consequences is positively affect the ascription of responsibility. Both have positive influence on personal norms. Personal norms, attitude, and habit influence the intention and waste separation behavior, whereas the situational factor directly affect plastic waste separation behavior.

Keywords
Norm Activation Model (NAM), Theory of Planned Behavior (TPB), situational factor, habit.

1. Introduction
The Minister of Environment and Forestry (LHK) explained that the waste heap in Indonesia would continue to increase with the increasing population growth rates. In 2020, the waste heap in Indonesia is 67.8 million tons (Azzahra 2020). Based on Non-Physical Adipura Data 2015-2016, the percentage of waste sources explains that most of the waste heap comes from household waste. Based on Adipura program data (2020), waste management in the community must be encouraged because the waste from households is as much as 36% of the total amount of waste. The household waste composition includes organic waste, plastic, paper, metal, and others (Khan et al. 2019, Strydom 2018). From various types of household waste, plastic waste is a major threat to human health and the environment (Latif et al. 2012). Production of plastic waste in Indonesia reaches 6.8 million tons per year. Seventy percent of Indonesia's plastic waste, which is approximately 4.8 million tons per year, is not properly managed. Around 47% of plastic waste is burned openly, 14% is disposed of in official open landfills but not managed well, and as much as 9% leaked into waterways and seas (about 620,000 tons of plastic waste). Plastic waste that is not appropriately managed can pollute the ecosystem and damage tourism and fisheries. Furthermore, burning plastic waste in open space releases hazardous substances into the air. Environmental pollution due to plastic waste is getting worried if there is no solution (NPAP Indonesia 2020). The problem of environmental pollution can be overcome by separating waste. Separating the waste aims to facilitate the handling of waste. However, waste separating behavior in Indonesia has not become a habit in society. In 2014, the number of people in Indonesia who do waste separation was only 18.84% of the total households, and those who do not sort waste are 81.16% (BPS.2014). Environmental problems are caused by human behavior that can be reduced by changing behavior (Steg and Vlek 2009).

Several studies use Theory Planned Behavior (TPB) and Norm Activation Model (NAM) to examine the variables of a person's behavior decision in doing waste separation. The classic model of the Theory of Planned Behavior provides a framework to examine the factors that influence separate waste from the community (Stoeva and Alriksson 2017). TPB is used to predict whether someone will do or not perform a behavior that emphasizes individual behavior is influenced by attitudes, subjective norms, and perceived behavioral control (Ajzen. 1991). The use of the NAM because the model can explain the unity between the consequences of awareness, the ascription of responsibility, and personal norms that affect individual behavior in pro-environment (Schwartz 1977). Situational factors also become one of the determinants of intentions and behavior. Situational factors refer to the personality approach that holds the concept that people are more influenced by external situational factors rather than by internal traits (Latif et al. 2012). Someone's intention and trash separation become real if there is support for

infrastructure and knowledge awareness of the right person. In addition, habits also affect the intention and behavior of separating the waste (Ulhasanah and Goto 2018). Habitual behavior involves misperception and selective attention are people who tend to focus on information that confirms their choices and ignore information that is inconsistent with their habitual behavior. To design interventions in an effective way to modify habitual environmental behavior. Talking about designing interventions that could have an effective way to change habitual environmental behavior, it is essential to consider how habits are formed, strengthened, and maintained (Steg and Vlek 2009). The habits of the Indonesian people who are used to collecting mixed and dispose waste without separating can be an obstacle in implementing 3R activities (Recycling, Reducing, and Reuse) (Santoso and Farizal 2019).

The previous study discussed the factors that influence waste sorting behavior. Many factors are added by TPB and NAM to study waste separation behavior (Zhang et al. 2019). However, only few studies that investigate TPB and NAM factors focusing on society behavior towards plastics waste (Khan et al. 2019). Also, there are few research which examines the mediating effect of situational factors on waste sorting behavior (Latif et al. 2012). Ulhasanah and Goto (2018) adds a habit factor that has an influence on waste sorting behavior. Research conducted in Indonesia regarding the management of plastic waste is only carried out in each region, not in one country. Like what factors influence the community in sorting household waste in DKI Jakarta and Depok (Santoso and Farizal 2019), and research on waste management problems in Padang and examine the behavior of Padang residents (Ulhasanah and Goto 2018).

Therefore, this study aims to build and develop a theoretical model related to TPB, NAM, habit and situational factors that influence household behavior towards separation plastic waste in Indonesia and find out the factors that influence household behavior towards waste separation in Indonesia.

2. Methodology
The model is developed based on SEM using smart-PLS. The steps are hypothesis development, data collection, develop model uses smart-PLS and evaluation method. The researcher uses PLS-SEM because it aims to predict and develop theory in exploratory research. The structural model in this research is complex, using 10 variables and 51 indicators. CB-SEM and PLS-SEM is different in statistical point of view, but PLS-SEM estimates can be a good proxy of CB-SEM results. When the CB-SEM assumptions are violated with respect to distribution normality, minimum sample size, and maximum model complexity, or when related methodological problems arise. If the data are to some extent nonnormal, use PLS-SEM. PLS-SEM is a good methodological alternative for theory testing. If the data is in normal distribution, the result of CB-SEM and PLS-SEM is identical (Hair et al. 2011).

2.1 Hypothesis Development
The model was built using Theory of Planned Behavior (TPB) (Ajzen 1991) and Norm Activation Model (NAM) (Schwartz 1977) by adding another variable, situational factors and habits. The variables used in this study are exogenous variables, namely attitudes, norms, subjective, behavioral control, awareness of consequences, situational factors, habit, and endogenous variables, namely ascription of responsibility, personal norms, intentions, and separation behavior towards plastic waste.

Waste separation can minimize negative impacts on the environment. Based on Norm Activation Model (NAM) framework, the results of research that community's awareness of consequences in separated waste positively and significantly related to the ascription of responsibility answers. The consequence of awareness is positively and significantly related to personal norms; and the ascription of responsibility is positively and significantly related to personal norms (Wang et al. 2019). Awareness of consequences is related to the ascription responsibility (Bamberg and Möser 2007). Personal norms were found to have the greatest direct positive influence on separating intentions citizen waste in this study, which suggests that when citizens have a higher moral obligation to sort waste, the intention to separate the waste will be stronger (Bortotelo et al. 2012). Personal norms are the most important variable in behavioral intention (Wan et al. 2012). Personal norms have the greatest impact and suggest citizens to have higher moral to separate waste, so the public's intention to separate waste will be higher strong (Wang et al. 2019).

Therefore, the following are the hypotheses regarding to the five variables mentioned:
Hypothesis 1-a: Awareness of consequences positively affect the ascription of responsibility
Hypothesis 1-b: Ascription of responsibility positively affect personal norms.

Hypothesis 1-c: Awareness of consequences positively affect personal norms.
Hypothesis 1-d: Awareness of consequences positively affect the intention.
Hypothesis 1-e: Personal norms positively affect the intention.

Theory of Planned Behavior (TPB) is used to predict whether someone will perform or not perform a behavior that emphasizes that attitudes, subjective norms influence individual behavior and perceived behavioral control (Ajzen 1991). Attitudes have a positive impact on intentions to recycle plastics (Strydom 2018). Individual attitude is the main predictor of behavioral intention to sort waste (Liao et al. 2018; Ma et al. 2018; Fan et al. 2019). Subjective norms have a positive effect on behavioral intention to sort waste (Fan et al. 2019). Subjective norms were found to have a positive correlation with the intention to separate municipal waste. Caring about the behavior of others can raise public awareness about the problem of waste and create an environment of recycling that is easy in the community can effectively promote the separation of household resources (Vassanadumrongdee and Kittipongvises. 2018). Perceived behavioral control positively affects intentions waste separation (Liao et al. 2018; Vassanadumrongdee and Kittipongvises (2018). Perceived behavioral control significantly predicts intention (Bamberg and Möser 2007; Zhang et al. 2019). In general, habit is reconsidered only if the context changes significantly. In order to design effective interventions to modify habitual environmental behavior, it is important to consider how habits are formed, strengthened, and maintained (Steg and Vlek 2009). Habit factors affect intentions (Ulhasanah and Goto 2018; Ofsatd et al. 2017). The hypotheses for variables of TPB are then formulated as follows:

Hypothesis 2-a: Attitude positively affects the intention
Hypothesis 2-b: Subjective norms positively affect the intention.
Hypothesis 2-c: Perceived behavioral control positively affects the intention.
Hypothesis 2-d: Habit positively affects the intention.

Attitudes show a significant and positive relationship with behavior (Lee and Paik 2011). Subjective norms are the basis of social expectations models for accurate prediction of activity social. Subjective norms are perceptions of social pressure in the decision-making process that demonstrated the importance of explaining the waste separating behavior of the population (Fan et al. 2019). Subjective norms for assessing how easy and useful behavior choices are to perform separating waste (Bamberg and Möser 2007). Perceived Behavioral control can predict behavior (Latif et al. 2012). Based on the research of Ofstad et al. (2017), the most important characteristics and predictors of waste separating behavior is intention, perceived behavior control, habits, and subjective norm. Attitude, perceived behavioral control, and moral norms significantly positively impact intention to sort waste (Shen et al. 2020). Subjective norms, perceived behavioral control, and intentions significantly predict household waste separating behavior (Xu et al. 2018). People are more likely to recycle if they have a concern for the environment, but individual behavior will perform consistently if he has a positive attitude towards the problem environment. Family, friends, neighbors who can influence the behavior of positive environmental problems that are proportionate to laziness or lack of interest in protecting the neighborhood from neighbor's actions can significantly influence recycling behavior among householders. Recycling's actions, attitudes, and motivations are more individual than community (Ulhasanah and Goto 2018). How the variables are related to the behavior is formulated below:

Hypothesis 3-a: Attitude positively affects plastic waste separation behavior.
Hypothesis 3-b: Subjective norms positively affect plastic waste separation behavior.
Hypothesis 3-c: Perceived behavioral control positively affects plastic waste separation behavior.
Hypothesis 3-d: Habit positively affects plastic waste separation behavior.
Hypothesis 3-e: Personal norms positively affect plastic waste separation behavior.

Situational factors are determinants of behavioral intentions (Shen et al. 2020). Factor situational also has a significant influence on intentions and behavior. Partial intention mediates the relationship between situational factors and behavior. The fewer the facilities are given, the more uncomfortable they feel in the recycling process, the lower the participation in recycling. Respondent's intention to recycle have a significant influence on their actual recycling behavior. Conclusively, this study found that the intention to recycle partially mediates the relationship between situational factors with recycling behavior (Latif et al. 2012). Intentions positively impact plastic waste recycling behavior (Khan et al. 2020, Strydom 2018). Behavioral intention waste separation has a significant positive effect on waste separation behavior. Behavior towards separation-based systems of municipal solid waste systems can be improved by increasing intention (Ulhasanah and Goto 2018). The impact of situational factors is then formulated in the following hypotheses:

Hypothesis 4-a: Situational factors positively affect the intention.
Hypothesis 4-b: Situational factors positively affect plastic waste separation behavior.
Hypothesis 4-c: Intention positively affects plastic waste separation behavior.
Hypothesis 4-d: Situational factors positively affect plastic waste separation behavior through intention.

Based on the description of previous research, the hypothesized model of this study is formulated as shown in Figure 1.
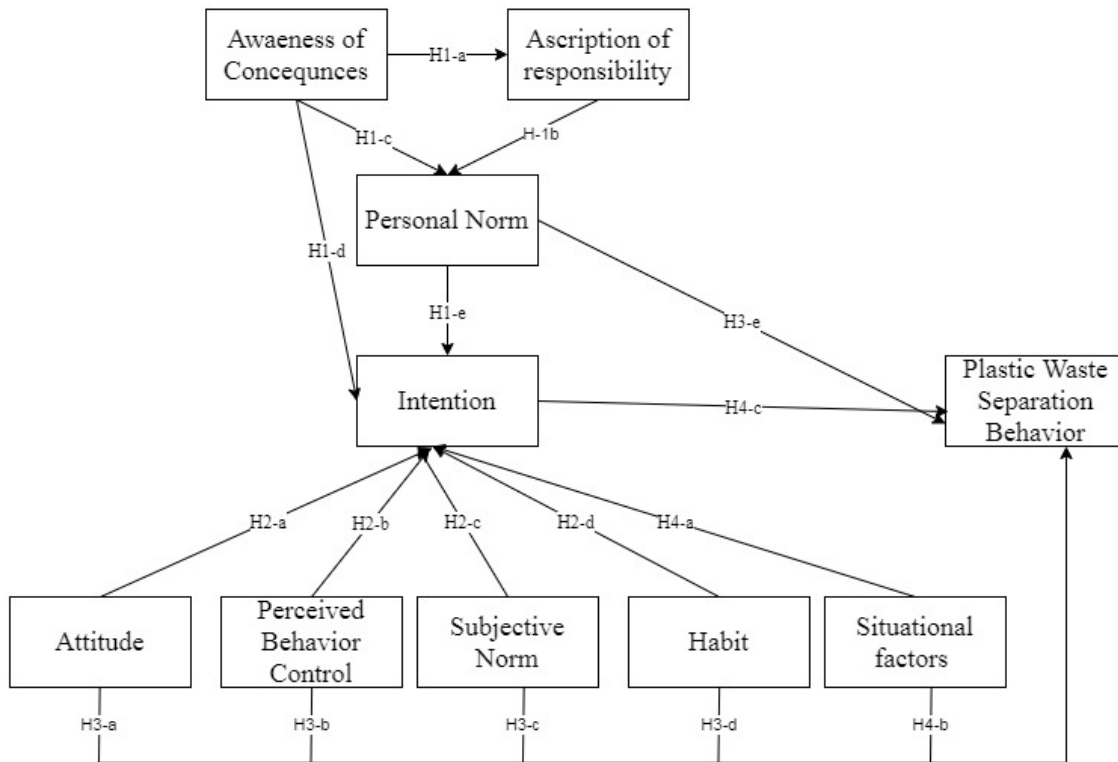
Figure 1. Conceptual Model

2.2 Data Collection

The data collection process is done after the pilot study, so the research instrument is already valid and reliable. The questionnaire distribution is done in May until June 2021. Researchers used questionnaires survey to collect data which required in the research. The questionnaire distribution is done by google form and using online social media platform such as instagram, twitter, facebook, and whatsapp. The subject of this research is people in Indonesia. The sample selection in this research is using the purposive sampling technique. The chosen respondents are based on the island where the respondent lives. The number of samples is determined using the Slovin formula, where the number of populations in Indonesia is 270,2 million people with 5% degrees of freedom. It obtained the results of the minimum number of samples is 400 respondents. According to BPS (2020), from the population percentage, the respondent from Java Island should be 224 respondents, Sumatra Island 87 respondents, Sulawesi Island is 7,36% or 29 respondents, Kalimantan Island 25 respondents, Bali and Nusa Tenggara 22 respondents, Maluku and Papua 13 respondents. The data collection in this research is by the distribution of research questionnaires. The questionnaires distribution is using a google form, which is spread online. The data used to be processed is from 400 respondents based on the proportion of the respondent's area distribution. The survey consists of several questions which aimed to be answered by the respondents, and from their answer, it become the fundamental analysis and result discussion. This survey has 11 sections. The first section is about demography, the section 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11 is in

Likert typing scale, to assess every construction in respondent's perspective. According to the research objective, the data is gained from the survey result which considering factors needed to integrate SEM. The question items in the questionnaire are 51 items with a 5 Likert scale.

2.3 Evaluation Methods

The data processing method is using SEM based on Partial Least Square (PLS). PLS-SEM is a technique of SEM multivariate analysis that can use non-normal data distribution. The model evaluation of SEM is done by:

a. Outer Model

The evaluation of the measurement model (outer model) can be done by convergent validity, discriminant validity, and internal consistency reliability. Convergent validity can be done by seeing the AVE value is more than 0,5. In discriminant validity, the AVE value in every latent construct should be higher than the squared correlation of the highest construct with another latent construct (Fornell Larcker criteria). Then, the loading indicator value should be higher than the whole of cross-loading. The internal consistency reliability can be seen by the composite reliability value which is used for how far a tool can be trustworthy to rely on. The composite reliability value should be more than 0,70 to be accepted. Besides, the reliability is measured by the Cronbach's alpha value, which presents the reliability estimates based on the observed intercorrelation of indicator variables. Reliability is measured from Cronbach's alpha. A construct or variable is said to be reliable if it gives a Cronbach's alpha value > 0.70.

b. Inner Model

The structural model evaluation (inner model) can be done by Variance Inflation Factor (VIF), Coefficient of Determination (R^2 Value), and Predictive Relevance (Q^2). The Variance Inflation Factor value can be used to evaluate multicollinearity. The proposed VIF value is recommended to be less than 5. The structural model is evaluated using R-square for dependent construct and t-test also the significance of the structural path parameter coefficient. In assessing the model with PLS, it starts from the R-square value in the latent dependent variable. The R^2 value in 0,75 has a substantial degree of accuracy, then R^2 value in 0,50 has a moderate level of accuracy, and R^2 value in 0,25 has a weak accuracy level. The predictive relevance (Q^2) value is used to know the relative influence of the structural model on the measurement of observations for endogenous latent variables. If the $Q^2 > 0$, it shows evidence that the observed values have been appropriately reconstructed so that the model has predictive relevance. However, if $Q^2 < 0$, then it shows no predictive relevance (Hair et al. 2017).

3. Results and Discussion

The data processing and testing from the questionnaire result is done by SmartPLS3 software.

3.1 Evaluation of Measurement Model (Outer Model)

The outer model analysis is done to make sure that the measurement used is valid and reliable.

a. Convergent Validity

The loading factor value (outer loading) testing results with a value below 0.70 is 8 items. The indicator which has a value lower than 0.7 will be deleted. After deleting one by one, there are seven invalid indicators, which lead to the outer loading value of more than 0.70 in every indicator. The remaining indicator items on the model are 44 indicators.

Convergent validity can be measured by the AVE (Average Variance Extracted). If a model has AVE value of more than 0.5 then the model is categorized as having high convergent validity (Hair et al. 2017). AVE value in every variable is more than 0.5, which shows that the data has high convergent validity. Combining the outer loading assessment and the AVE test indicates that this study is convergent valid and meets the requirements to be carried out to the discriminant validity testing stage.

b. Discriminant Validity

Based on data processing by SmartPLS3 software, discriminant validity testing used the Fornell larcker criterion of this study is observed as shown in Table 1.

Table 1. Results of discriminat validity test

	Situa-tional Factor (SIT. FAC)	Habit (HAB)	Awarness of Conceque-nces(CONSO)	Perceived Behaviour Control (PBC)	Inten-tion(INT)	Person-al Norms(PERS.NORM)	Subjective Norms(SUB.NORM)	Plastic Waste Separati-on Behavior (BEH)	Ascrip-tion of response-bility (RESP)	Attitude(ATT)
Situational Factor (SIT.FAC)	0.792									
Habit (HAB)	0.233	0.809								
Awarness of Concequences (CONSQ)	0.182	0.277	0.804							
Perceived Behavior Control (PBC)	0.290	0.707	0.339	0.788						
Intention (INT)	0.299	0.420	0.533	0.436	0.822					
Personal Norms (PERS.NORM)	0.350	0.433	0.494	0.522	0.577	0.874				
Subjective Norms (SUB.NORM)	0.290	0.366	0.269	0.357	0.363	0.449	0.868			
Plastic Waste Separation Behavior (BEH)	0.355	0.453	0.530	0.465	0.812	0.578	0.303	0.793		
Ascription of responsibility (RESP)	0.291	0.368	0.609	0.470	0.628	0.716	0.398	0.592	0.788	
Attitude (ATT)	0.211	0.273	0.521	0.352	0.470	0.424	0.222	0.483	0.458	0.861

The steps taken to evaluate discriminant validity are through cross-loading and the Fornell-Larcker criteria. Based on the value of cross-loading on each indicator, the variable has a greater value than the other variables. It can be concluded that there is no problem with discriminant validity. All indicators have a higher correlation coefficient value for each variable than the indicator correlation coefficient value for other variables. The discriminant validity testing used the Fornell larcker criterion to obtain good discriminant validity from a research mode. It can produce a higher value of the root of the AVE in the construct than the correlation of the construct with other latent variables. It can be concluded that all indicators in every variable are fulfilled the discriminants validity criteria.

c. Internal consistency reliability
Based on data processing by SmartPLS3 software, construct realibility and validity of this study is observed as shown in Table 2.

Table 2. Construct realibility and validity

Variable	Cronbach's alpha	Composite Reliability	AVE
Situational Factor	0.825	0.870	0.628
Habit	0.744	0.849	0.654
Awarness of Concequences	0.862	0.901	0.646
Perceived Behavior Control	0.794	0.867	0.621
Intention	0.920	0.936	0.675
Personal Norms	0.896	0.928	0.763
Subjective Norms	0.918	0.938	0.753
Plastic Waste Separation Behavior	0.851	0.894	0.628
Ascription of responsibility	0.794	0.867	0.621
Attitude	0.826	0.896	0.742

The internal consistency reliability criteria can be seen from the composite reliability (CR) value. The CR value should be higher than 0,70 to be accepted. Besides that, reliability was also measured from Cronbach's alpha value. A construct or variable is reliable if it has Cronbach's alpha value > 0.70 (Hair et al. 2017). All latent variables have CR value and Cronbach Alpha more than 0,7 so all latent variables in the model stated to have internal consistency reliability.

3.2 Evaluation of Structural Model (Inner Model)
The inner model analysis is done to make sure the structural model built is accurate.

a. Variance Inflation Factor (VIF)
Variance Inflation Factor value can be used to evaluate multicollinearity. The VIF value suggested is less than 5 (Hair et al. 2017). According to the data processing result, VIF value for every latent variable has VIF value < 5 then it does not violate the multicollinearity assumption test.

b. Coefficient of Determination (R^2) dan Predictive Relevance (Q^2)
The determination coefficient (R^2) is a measure of the model's predictive power and is calculated as the squared correlation between the actual and predicted values of a particular endogenous construct. The predictive relevance value (Q2) is used to see the relative effect of the structural model on the measurement of observations for endogenous latent variables. If Q2 value > 0, it shows evidence that the observed values have been appropriately reconstructed; hence, the model has predictive relevance. Thus, according to the value of VIF, R^2, and Q^2, the structural model built is accurate.

c. Hypothesis Testing
Hypothesis testing can be seen in the path coefficients, showing the strength of the hypothetical relationship between variables. Path coefficients with values close to +1 mean that they have a strong positive relationship. However, a value close to -1 means a strong negative relationship. The value of path coefficients is declared significant if it has a p-value > 0.05 and t count > t table.

Result of path analysis is shown in Table 3. From Table 3, there are six relationships which are not significant, which are subjective norms to the intention, perceived behavior control to intention, situational factor to intention, subjective norm to plastic waste separation behavior, Perceived behavior control to the plastic waste separation behavior, and situational factor to the plastic waste separation behavior through intention. Figure 2 shows the Structural Model.

Table 3. Results of path analysis

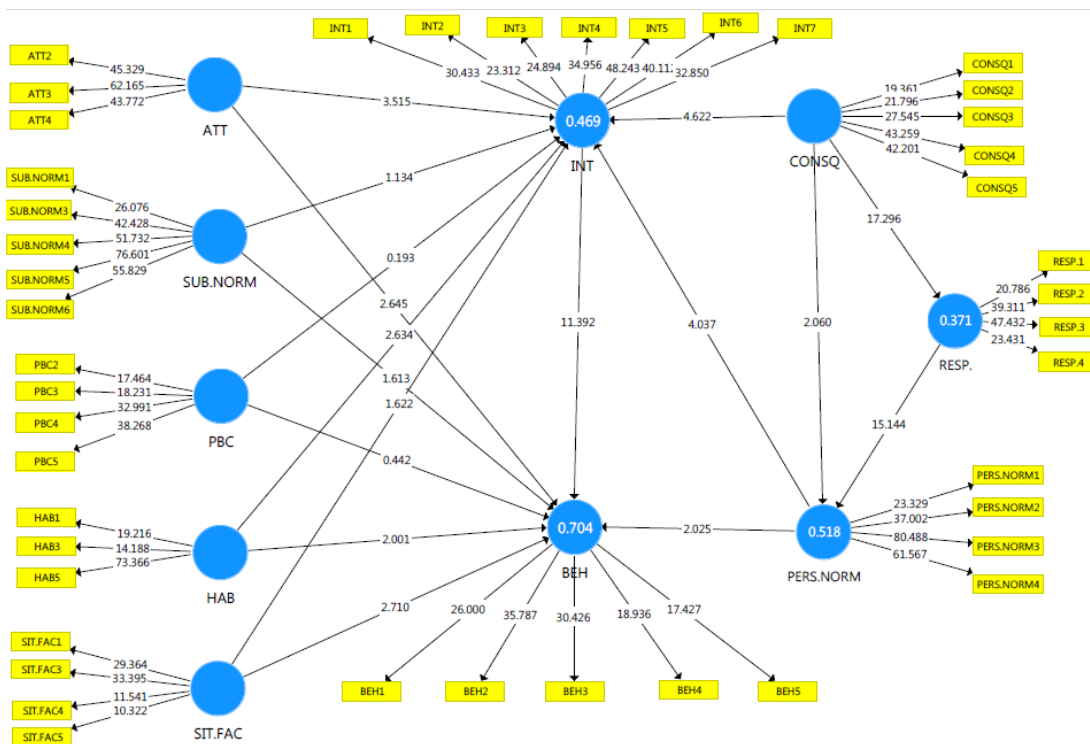| Hypothesis	Relationship	Path Coef	Mean	St. Dev	T	P Values	Information
H1-a	CONSQ -> RESP	0.609	0.613	0.035	17.194	0.000	Positive, Sig
H1-b	RESP-> PERS.NORM	0.661	0.658	0.046	14.368	0.000	Positive, Sig
H1-c	CONSQ-> PERS.NORM	0.091	0.095	0.045	2.010	0.045	Positive, Sig
H1-d	CONS -> INT	0.246	0.250	0.052	4.715	0.000	Positive, Sig
H1-e	PERS.NORM-> INT	0.266	0.264	0.066	4.058	0.000	Positive, Sig
H2-1	ATT-> INT	0.155	0.156	0.044	3.480	0.001	Positive, Sig
H2-b	SUBJ..NORM-> INT	0.064	0.059	0.059	1.087	0.277	Not Sig
H2-c	PBC-> INT	0.013	0.018	0.064	0.205	0.838	Not Sig
H2-d	HAB-> INT	0.145	0.140	0.054	2.675	0.008	Positive, Sig
H3-a	ATT-> BEH	0.092	0.092	0.034	2.695	0.007	Positive, Sig
H3-b	SUB.NORM-> BEH	-0.074	-0.068	0.046	1.609	0.108	Not Sig
H3-c	PBC-> BEH	0.022	0.019	0.050	0.452	0.652	Not Sig
H3-d	HAB-> BEH	0.094	0.092	0.046	2.043	0.042	Positive, Sig
H3-e	PERS.NORM -> BEH	0.109	0.107	0.053	2.058	0.040	Positive, Sig
H4-a	SIT.FAC-> INT	0.073	0.074	0.045	1.616	0.107	Not Sig
H4-b	SIT.FAC-> BEH	0.094	0.095	0.036	2.647	0.008	Positive, Sig
H4-c	INT -> BEH	0.655	0.658	0.058	11.280	0.000	Positive, Sig
H4-d	SIT.FAC-> INT -> BEH	0.048	0.050	0.031	1.524	0.128	Not Sig

Figure 2. Structural Model

3.3 Analysis of Hypothesis Testing Result

Based on the Norm Activation Model (NAM) framework for researching Indonesian household behavior against plastic waste sorting, the results of this study are in line with the previous study, Bamberg and Möser (2007); Wang et al. (2019), Bortotelo et al. (2012), Wan et al. (2014), Zhang et al. (2019). This study found that awareness of consequences has a relationship towards ascription of responsibility, sense of responsibility, and awareness of the consequences of having a positive and significant relationship with personal norms. Personal norms have a relationship with the intention and behavior of waste sorting. Awareness of consequences of society in sorting waste is significantly positively associated with the ascription of responsibility. Consequence awareness is significantly positively related to personal norms. Responsibility is significantly positively related to personal norms (Wang et al. 2019), and awareness consequences are related positively to the ascription of responsibility (Bamberg and Möser 2007). Individual awareness about the negative consequences of not separating waste in daily life can cause individuals to feel more responsible and activate moral obligation to do sort waste (Ma et al. 2018). Personal norms are found to have the greatest direct positive effect on citizens' waste separating intentions highlight the importance of personal norms and suggest that when citizens have the morale to separate the garbage, the intention to separate the garbage will be stronger (Bortotelo et al. 2012). Personal norms have a strong influence on behavior waste management such as waste prevention behavior, recycling and separating behavior garbage compared to subjective norms. Remembering personal norms positively influences intentions to sort waste, such as encouraging citizens to participate in the waste separating program and inviting citizens to highlight the importance of waste separating that can be done to foster a sense of moral obligation to sort waste (Wang et al. 2019). Personal norms have the most impact and suggest citizens to have a higher moral obligation to sort waste, so the citizens' intention to separate waste will be stronger. Whether the citizens participating in household waste separation mainly depends on individual personal norms (Zhang et al. 2019).

Based on the Theory of Planned Behavior (TPB), the results of the study found that attitude has a relationship with intentions and behavior. This is in line with Santoso and Farizal (2019) research, but subjective norms and perceived behavioral control have no relationship with intentions and behavior. An individual's attitude is a major predictor of behavioral intention to perform separation plastic waste (Liao et al. 2018, Santoso and Farizal 2019) Attitude has the highest positive relationship to waste separation behavior (Lee and Paik 2011, Oztekin et al. 2017, Man et al. 2018). Any increase in the level of household participation, as well as improving the quality of the sorted waste can be achieved through the creation of a more positive attitude on participating waste separation (Stoeva and Alriksson 2017). Individuals believe that separating plastic waste can create a better environment, which leads them to have the intention to sort waste according to the rules and carry out waste separating behavior. Individuals believe that plastic waste separating activities have benefits to protect the environment. It intends to sort waste consistently, be more effective, and be the best in everyday life. Subjective norms and perceived behavior control are not related to the intention (Santoso and Farizal 2019). Individuals who have the motivation to look at the views of others do not affect individual behavior to separating plastic waste. Views from family, neighbors, friends, society, and the people around it less influence the intention and behavior to do the waste separation. Perceived behavior control is not significantly related to intention to waste separation behavior. People do not make decisions about waste separation based on the ability or comfort that people feel. One of the reasons possible for this is that many citizens do not consider difficulty or ability related to waste separation as a problem and tend to hinder individual behavioral intentions. As long as there is sufficient environmental awareness, and strong responsibility towards separation the citizens' waste, people will ignore perceived behavioral control and demonstrate a strong intention towards waste separation (Zhang et al. 2019). Perceived behavior control is not significantly related to behavior (Man et al. 2018). Individual perception of the ease or difficulty of sorting plastic waste does not affect intentions and behavior to sort plastic waste. Intention significantly predicts household waste separation behavior (Khan et al. 2019, Latif et al. 2012, Ulhasanah and Goto 2018, Xu et al. 2018, Strydom 2018). If the individuals have the intention to sort waste, then they mostly will do the waste separation. Individuals with intentions to waste separation according to the rules and consistently in daily life will do that. Individuals will increase awareness, discipline, and sensitivity to the environment and do their best in waste separation activities.

This study adds habit variables and situational factors. The results of this study were obtained that habits have a significant influence on waste separation intentions and plastic waste separation behavior. Habits influence intentions and behavior. When individuals have past experiences in separating waste, they may have larger intentions to do it over and over again. In addition, past behavior shows that individual habits can also directly shape

future behavior. Therefore, when a person has past behavior in separating waste, the past turns into actual intentions and behavior (Xu et al. 2018). Situational factors significantly influence separating behavior plastic waste but have no effect on the intentions. Situational factors on the problem related to physical waste separation, such as time, space, and lack of cooperation family can significantly influence household behavior towards waste (Loan et al. 2017) The fewer facilities provided, the more uncomfortable you will feel by individuals in carrying out the waste separation process, the lower the participation in waste sort (Latif et al. 2012). On the other hand, the availability of waste collection facilities and the community likes local conditions to do waste separation will increase community participation in household waste (Stoeva and Alriksson 2017). Intention does not mediate situational factors and plastic waste separation behavior. External factors and situations that may facilitate or hinder waste separation do not affect waste separation behavior if through intention.

4. Conclusion

This study developed a theoretical model related to NAM, TPB, situational factors, and habits on plastic waste separation behavior in Indonesia based on a literature review from previous research. The data used to be processed is from 400 respondents based on the proportion of the respondent's area distribution. Based on the Norm Activation Model (NAM) framework, awareness of consequence has a relationship with the ascription of responsibility and awareness of consequences has a positive and significant relationship with personal norms; personal norms have a relationship with waste separation intentions and behavior. Based on Theory of Planned Behavior (TPB), the results of this study found that attitudes have relationship to intentions and behavior. But subjective norms and perceived behavioral control do not have a relationship to intentions and behavior. This study adds habit variables and situational factors. This study shows that habit has a significant influence on the intention and behavior of plastic waste separation. Situational factors influence a significant effect on plastic waste separation behavior but no effect on intention. Intentions do not mediate situational factors and plastic waste separation behavior. Some of the limitations of the study are that this questionnaire measures the behavior of people who self-reported rather than actual behavior, so it may lead to some bias for the results so that it can be an agenda in future research.

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