

The Effects of Intention and Risk Awareness on Household Waste Management Behavior During Covid-19 Outbreak

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Abstract. *Coronavirus Disease 2019 (Covid-19) Pandemic had been hitting throughout the world since early 2020. Indonesia faces severe impacts, including the deaths of millions of people and vast virus transmission through a bad waste management system. Since the government applied lockdown in many regions, household waste increases and led to various problems. This research aims to explain household waste management intention during Covid-19, especially in a metropolitan city like Jakarta. This research adopts the Theory of Planned Behavior and examines the impacts of pandemic awareness, knowledge, and religion. Participants were involved in this study are 314 respondents. Questionnaires were gathered through emails, messenger applications, and social media. We use Structural Equation Modelling, particularly Confirmatory Factor Analysis, to analyze data and utilize LISREL 8.80. Results show that household waste management behavior can be encouraged through intention and pandemic risk awareness. Meanwhile, perceived behavioral control and household expenditures have to impact to intention to manage household waste. Moreover, government support also plays an important role in enhancing the intention of managing household waste. Therefore, social media and religious activities can be used to raise the level of risk awareness.*

Keywords: *Risk awareness; COVID-19 Pandemic; Confirmatory Factor Analysis; Household Waste Management; Theory of Planned Behavior.*

I. INTRODUCTION

Waste is a byproduct that is hardly avoided by almost all human activities (Tsai et al., 2020). Along with the massive urbanization and development and population and consumption increase, the amount of waste generation is increasing. One of the significant contributors to generating waste is households. Household waste generation has gained increasing attention both in developed and developing countries. Poor waste handling might cause air, soil, and atmosphere pollution and significantly impact public health (Rajesh, 2019). Furthermore, the negative impact of household waste generation on the environment is also predicted to increase considerably in 2030 (Savelli et al., 2019).

The problem of household waste

management is then intensified by the global condition of Coronavirus Disease 2019 (COVID-19) Outbreak which has the potential for household waste and medical waste generation to increase. COVID-19 is a respiratory disease caused by the virus named SARS-CoV-2 and has been detected in 216 regions, which reaches 4,258,666 cases worldwide. Current information suggests that the two main transmission routes of the COVID-19 virus are respiratory droplets and physical contacts (OMS, 2020). Respiratory droplets are generated when an infected person coughs or sneezes (OMS, 2020). Meanwhile, droplets may also land on surfaces where the virus could remain viable; thus, the immediate environment of an infected individual can serve as a source of transmission (OMS, 2020).

The rapid pathogen transmission and its significant impact on people's health increase personal protective equipment (PPE) such as masks and gloves by citizens to hinder further transmission. These medical wastes will possibly be discarded as domestic waste and thus require special care not to endanger the environment and health. The spread of the coronavirus may be increased by inadequate waste management, highlighting poor handling conditions associated with inappropriate use of personal protective

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equipment and other unfavorable conditions presented mainly in developing countries (Knickmeyer, 2020; Sands et al., 2018; Trpchevska et al., 2017; Wang et al., 2017). In addition, governments worldwide apply daily activity restrictions or lockdown and advocate citizens to perform activities from home to cope with the pandemic situation. This condition makes people spend most of their time at home, which might increase the amount of waste generation, especially household waste (Wang et al., 2017).

Furthermore, the panic over daily needs availability during the pandemic might cause large or even excessive amounts of necessities buying by citizens. These issues also potentially affect household waste generation during the pandemic. Therefore, household waste management during the COVID-19 pandemic should get more concerned.

In Indonesia, the government has issued Presidential Regulation Number 97 the Year 2017 concerning Policies and Strategies for Household Waste (SRT) and Household-like Waste (SSRT) Management. In Addition, due to the current pandemic situation, the government, as represented by the Ministry of Environment, has also appealed a proper household medical waste management. Nevertheless, successful household waste management relies on government intervention and requires active participation from individual citizens as the main actors in this management process. Furthermore, regarding community involvement in the household waste management process, understanding behavioral and psychological factors influencing citizens to participate in waste management is important (Hebrok & Boks, 2017; Luttenberger, 2020; Trpchevska et al., 2017; Ye et al., 2020). This can be a reference in formulating effective waste management programs as well as input for the formulation of government strategies to solve household waste problems (Hebrok & Boks, 2017; Knickmeyer, 2020; Meng et al., 2019; Safari et al., 2018; Zhang, Lai, Wang, & Wang, 2019). Hence, this study aims to examine the behavior of Indonesian citizens towards household waste management given the situation of the COVID-19 pandemic, particularly on the identification and

evaluation of factors that influence people's intention towards participation in household waste management.

Meanwhile, related to the behavioral study, the Theory of Planned Behavior (TPB) is a widely recognized theory by the researcher in behavior-based studies. TPB provides a theoretical framework in conducting systematic investigations related to the intentions and behavior in various fields, one of which is related to the environment (Heidari et al., 2019; Meng et al., 2019; Yuriev et al., 2020) and widely used in the context of entrepreneurship (Sulung et al., 2020). Several studies have been conducted related to behavioral studies on household waste management under the TPB approach, such as in Iran (Salem et al., 2020), Macedonia (Trpchevska et al., 2017), China (Fan et al., 2019), and Africa (Strydom, 2018; Udofia et al., 2017).

In Indonesia, environmental behavior also has been discussed in several studies. Jauhari (2016) conducted a survey to identify influencing factors of household waste sorting behavior in Depok. Similar studies were also conducted by Santoso & Farizal (2019) for DKI Jakarta and Depok. Meanwhile, the study was also undertaken to identify the determinants of reducing, reuse, recycle activities, and citizen readiness for solid waste management in communities in Semarang (Susanto et al., 2019). But there is no research about TPB linked to household waste management behavior during the COVID-19 pandemic. Previous studies stated that risk awareness relates to several behaviors such as electrical usage, medical treatment, and others (Fukuda et al., 2020; Udoh & Alkharashi, 2017). Meanwhile, knowledge and religion were found out as important factors that affected risk awareness (Abdelradi, 2018; Allison, 2019; Wang et al., 2017)

In conclusion, this research aims to examine TPB in the context of household waste management intention and behavior, which also enriches knowledge and religious variables as a predictor of risk awareness. This research divides into some parts: first, an explanation of the research background and several theoretical frameworks; second, a description of research

methods; third, data analysis and discussion; and finally, conclusion and further research. This research is conducted in Greater Jakarta, Indonesia, from March-May 2020.

II. LITERATURE REVIEW

Theory Planned Behavior (TPB)

TPB, intentions as a direct antecedent of behavior, is defined as a readiness of a person to perform a specific behavior (Pakpour et al., 2014). Furthermore, TPB places three determinant factors that influence intention, which indirectly affects behavior. The first predictor is called an attitude towards behavior, defined as a person's assessment of the intended behavior concerning whether the behavior will give good results (Soorani & Ahmadvand, 2019). Someone's beliefs determine attitude (ATB) towards behavior about the behavior, where a belief is defined as the subjective probability that household waste management will produce specific outcomes. Specifically, each outcome contributes directly to the person's subjectivity that particular behavior will have appeared. A positive attitude towards household waste management will make a person aware of the importance of household waste management (Barone et al., 2019; Neff et al., 2015; Park et al., 2002; Rajesh, 2019; Savelli et al., 2019; Taylor & Todd, 1997).

The second predictor relates to social factors called subjective norms, which refer to the perceived social influence in performing the intended behavior (Soorani & Ahmadvand, 2019). Subjective norms (SN) refer to the belief about whether most people approve or disapprove of the behavior to manage household waste. It relates to a person's ideas to engage in household waste management behavior. The greater the social exposure to engage in household waste management, the stronger their willingness to participate (Witzel et al., 2018; Loan et al., 2019; Meng et al., 2019; Xu et al., 2017a).

The third predictor is perceived behavioral control, defined as the ease or difficulty felt by someone in carrying out the intended behavior (Soorani & Ahmadvand, 2019). Perceive behavioral control (PBC) regards the convenience

or difficulty of performing the particular household waste management behavior (Salem et al., 2020). It is linked to controlling beliefs, which refers to ideas about factors that may facilitate or impede household waste management behavior. This research argues that the more confident to manage household waste, the more vital willingness to participate.

Furthermore, TPB is still debatable of additional predictors if the different predictors can help increasing variance in the model and the predictors are chosen based on behavior or context (Soorani & Ahmadvand, 2019). Therefore, to develop the potential of the existing TPB model in predicting behavioral intentions and to adapt to the context of the global conditions of the COVID-19 Pandemic, several additional predictors were considered in this study, those are government support, expenditure of household needs, COVID-19 pandemic risk awareness, knowledge, and religion. Based on the above arguments, the proposed hypotheses are as follows.

- H1. Attitude (ATT) positively affect intention to manage household waste (IMHW)
- H2. Subjective norm (SN) positively affect intention to manage household waste (IMHW)
- H3. Perceive behavioral control (PBC) positively affect intention to manage household waste (IMHW)

Government Support (GS)

Government support defines as the policy that implements penalties and rewards of household waste management, not only during the ordinary time but also during the pandemic period. Unfortunately, there is a lack of government support evidence related to household waste penalties and rewards. During waste management dissemination, the government also informs about policy updates, and opinions from the public are also acceptable at the same time. This research argues that government intervention plays an essential role in enhancing people's intention to manage household waste (Knickmeyer, 2020; Ye et al., 2020; Zhang et al., 2019). Thus, the proposed

hypothesis is as follows.

H4. Government support (GS) positively affect intention to manage household waste (IMHW)

Household needs expenditure (HNE)

The act of expending something, especially funds; disbursement; consumption that relates to daily needs. This expenditure usually is influenced by internal factors such as knowledge and external factors such as income, number of families, etc. (Abdelradi, 2018). Previous research argues that the more a person's spending on household needs expenditure, the less their awareness of household waste management (Aschemann-Witzel et al., 2018). Therefore, this research proposes that:

H5. Household needs expenditure (HNE) positively affect intention to manage household waste (IMHW)

Intention to manage household waste (IMHW), Household waste management behavior (HWMB), and COVID pandemic risk awareness (PRA)

Intention to manage household waste is defined as a desire to plan actions of managing household waste when someone believes that he or/ she can do the household waste management. Environmental factors (such as household rules, waste recycling facilities, etc.) can affect someone's ability to do a particular action. The firm intention will increase the engagement in household waste management (Allison, 2019; Neff et al., 2015; Park et al., 2002; Udofia et al., 2017; Ulhasanah & Goto, 2018). Based on the previous arguments, the proposed hypothesis is as follows.

H6. Intention to manage household waste (IMHW) positively affect household waste management behavior (HWMB)

Household waste management behavior refers to the processes someone goes through when handling household waste and reactions towards household waste management. It also

relates to personal needs and motivations. This construct regards the understanding of COVID-19 pandemic links to symptoms, preventions, and overall situation during the pandemic. In this situation, awareness also includes receiving information that government also issues essential policies related to COVID-19 (OMS, 2020). Paulo and Mol (2020) argue that the more a person aware of the pandemic risk, the stronger their engagement in household waste management. Therefore, the proposed hypothesis is as follows.

H7. Pandemic risk awareness (PRA) positively affects household waste management behavior (HWMB)

Knowledge (KNWL) and Religion (RLG)

Knowledge is often thought to be the property of individuals. A great deal of knowledge is both produced and held collectively (Wang et al., 2017). Such knowledge is readily generated when people work together in the tightly knit groups known as "communities of practice." This research argues that the more a person holds knowledge about COVID-19 Pandemic, the higher their awareness about pandemic risk (OMS, 2020; Sands et al., 2018).

Meanwhile, religion defines as a social-cultural system of designated behaviors and practices, morals, worldviews, texts, sanctified places, prophecies, ethics, or organizations that relate humanity to supernatural, transcendental, or spiritual elements. Religions tell people to do the right things and will be rewarded heaven of God. In reverse, when people do evil things, they will be a sinner and punished by God (Audretsch et al., 2013; Dodd & Seaman, 1998). This research argues that the more a person obeys their religion. Their higher awareness about pandemic risk. Therefore, we proposed hypotheses as follows.

H8. Knowledge (KNWL) positively affect pandemic risk awareness (PRA)

H9. Religion (RLG) positively affect pandemic risk awareness (PRA)

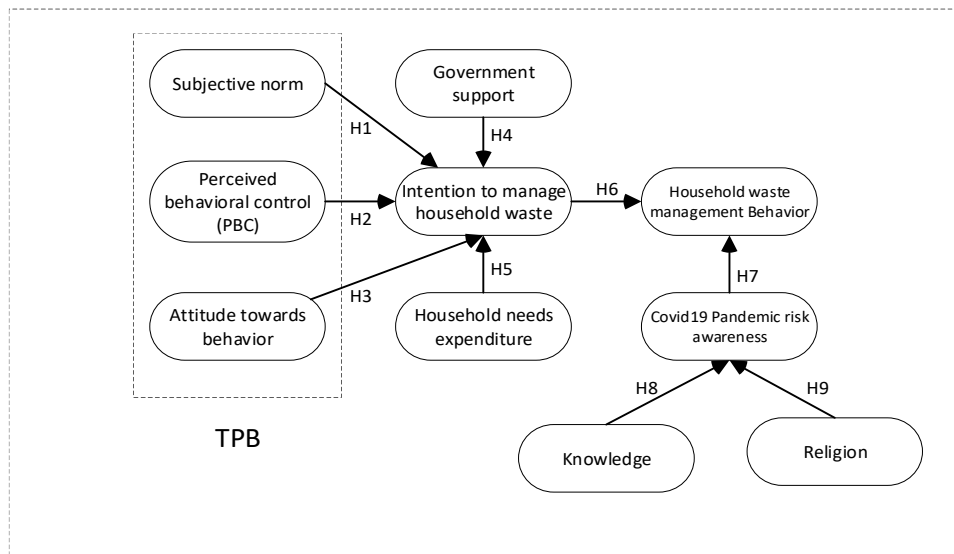


Figure 1. Proposed Model

Based on the mentioned hypotheses, this research constructs the proposed model as seen in Fig.1.

III. RESEARCH METHOD

Design and Participants

As the concern of this research is the epicentrum area of the COVID-19 Pandemic, this research adopted the purposive sampling method. Participants were citizens who live in Greater Jakarta (Jabodetabek). Data gathering was held between March until May 2020 by blasting through email, chat groups, and social media. The questionnaires were developed based on our abductive reasoning and underlining literature review mentioned above. Before collecting data, questionnaires were initially tested to 30 respondents through private and forum discussion to check their applicability-exact interpretation and comprehensiveness. Questionnaires were revised as suggested by the respondents. Furthermore, participants were asked to answer 61 questions with a four-point Likert Scale ranging from strongly disagree (1) to strongly agree (4) (Hair et al., 2016).

Measurement

Overall, there are 10 latent variables in the research model. 7 independent latent variables

such as SN, PBC, ATB, GS, HNE, KNWL, and RLG. Three dependent variables are IMWH, HWMB, and PRA. The TPB in this model consisted of three latent variables: SN (6 questions), PBC (6 questions), and ATB (10 questions). We adopted the three variables from several studies, and there were 22 questions to measure these variables. Then, the GS variable was assumed from Ye et al. (2020) and Xu et al. (2017b). Six questions assessed it. The variable of IMHW was adopted from Xu et al. (2017a) and Yu et al. (2020) and consisted of 6 questions. Independent variable of HNE constructed from several past kinds of research (Loan et al., 2019; Abdelradi, 2018) and measured by 8 questions. We used some previous researches (Ye et al., 2020; Xu et al. 2017a; Yu et al., 2020) to form the HWMB variable with 8 questions. Moreover, variable PRA adopted from Safari et al. (2018) and OMS (2020) consisted of 5 questions. Variable of KNWL was constructed through researches of Safari et al. (2018), Meng et al. (2019), and Abdelradi (2018). Lastly, the RLG was adopted from Abdelradi (2018) and Allison (2019); 3 questions measured both KNWL and RLG.

Demographic Variables

Participants responded to the questionnaires are 314 persons, with a success rate of complete

answers is 100%. The proportion of males and females are 54.1% (170) and 45.9% (144) consecutively. The range of respondent's age is from 16 years old (y.o) to more than 40 y.o , in details : 16-20 y.o is 29% (91); 21-25 y.o is 51.3% (161); 26-30 y.o is 9.9% (31); 31-35 y.o is 4.8% (15); 36-39 y.o is 2.5% (8); and > 40 y.o is 2.5% (8). Since Greater Jakarta has a wide boundary, we classified it into two areas: Inside Jabodetabek and Outside Jabodetabek. People who lived outside Jabodetabek were near the borderline but in the outer area with a radius of one subdistrict. There are 242 respondents from Jabodetabek and 72 respondents from Outer Jabodetabek. The level of education varied from high school to postgraduate level. More details, there are 34.7% (109) respondents with High School level; 58.3% (183) respondents with Undergraduate Degree level; and 7% (22) respondents with Postgraduate Degree level. Meanwhile, their jobs entitled as civil servants (4.5%), private company employees (41.4%), entrepreneurs (4.1%), students (45.5 %), housewives (2.9%), and others (1.6%). From the income variable, most of the respondents have a monthly income at Rp. 1-5 million (205 respondents) and only 2 respondents stated their monthly income reached more than Rp. 20 million per month. Moreover, 88 respondents had Rp. 5,1-10 million of monthly salary; 14 respondents had Rp. 10.1-15 million of monthly salary; and 5 respondents stated with Rp. 15,1-20 million income salary per month. Most of the respondents, during stay-at-home, said that they stay with 1-5 family members (82.8%) and the rest (17.2%) stayed with 6-10 persons at home. Respondents with work-from-home are 52.9% or 166 people, then 39.5% (124 people) reported that they had been doing school-from-home, and the rest 7.6%, stated others.

IV. RESULT AND DISCUSSION

Variables observed are intangible or abstract. Therefore this research constructs several questions related to the factors using the LIKERT scale to quantify the measurement. The measurement model depicts the relationship between observed variables (indicators) and

latent variables. Validity and reliability test were conducted before we measured the overall research model. Hypothesized relations among proposed variables were tested using path analysis. It seemed that Structural Equation Modelling was the most suitable method for exploring the relationships between variables. We use LISREL 8.80 since it is accurate for samples more significant than 100 (Hair et al., 2016).

Measurement Model

At the initial phase, validity and reliability test are being conducted. This research applies Confirmatory Factor Analysis to validate construct variables in the theoretical models (Hair et al., 2016). Factor loading of indicators or observed variables indicates convergent validity, confirming that factor loadings > 0.5 are the acceptable convergent validity. First confirmatory measurement shows that several indicators do not have factor loadings > 0.5. These indicators are Q5 relates to NR; Q7, Q11, Q12 relates to PBC; Q14, Q18, Q19, Q20 relates to ATB; Q25, Q26 relates to GS; Q30 relates to IMHW; Q40, Q41, Q42 relates to HNE; Q44, Q48, Q49 relates to HWMB; and Q52 connects to PRA. Therefore, the overall measurement model is being respecified.

Then, for scale reliability, Convergent Reliability (CR) is being implemented to measure internal consistency (Khan et al., 2019). If the CR value is more significant than 0.7, then internal consistency is categorized as good. Table 1 shows that all the no constructs variables have CR less than 0.7. More details: SN (0.78), PBC (0.77), ATB (0.82), GS (0.79), IMHW (0.82), HNE (0.84), HWMB (0.82), PRA (0.80), KNWL (0.81), and RLG (0.821). To support convergent validity, average variance extracted (AVE) is also examined to measure construct validity using the friction of random measurement error (Hair et al., 2016). High validity constructs and variables appear when their AVE values equal to or greater than 0.5 (Hair et al., 2016). There are five variables with an AVE value of 0.5: SN, ATB, GS, IMHW, and HWMB. Moreover, PBC has an AVE value of 0.54; HNE has an AVE value of 0.52; PRA has an AVE value of 0.51; KNWL has an AVE value of 0.58, and RLG has an AVE value of 0.62. Finally, Cronbach's alpha as

Provided in Table 1 is also being measured to support the instrument's reliability test. Cronbach's alpha results show good reliability by exceeding 0.6 (Khan et al., 2019).

Table 1. Validity and Reliability Test Result

Construct	Items	Convergent Validity		Reliability		
		Factor Loading	Loading Average	Cronbach's α	CR	AVE
SN	Q1	0.66				
	Q2	0.67				
	Q3	0.76	0.65	0.62	0.78	0.5
	Q4	0.58				
	Q6	0.55				
PBC	Q8	0.55				
	Q9	0.76	0.72	0.63	0.77	0.54
	Q10	0.86				
ATB	Q13	0.55				
	Q15	0.69				
	Q16	0.76				
	Q17	0.73	0.66	0.73	0.82	0.5
	Q21	0.72				
	Q22	0.51				
GS	Q23	0.79				
	Q24	0.73				
	Q27	0.53	0.69	0.70	0.79	0.5
	Q28	0.74				
IMHW	Q29	0.62				
	Q31	0.76				
	Q32	0.77	0.69	0.71	0.82	0.5
	Q33	0.68				
	Q34	0.66				
HNE	Q35	0.75				
	Q36	0.68				
	Q37	0.72	0.72	0.72	0.84	0.52
	Q38	0.70				
	Q39	0.76				
HWMB	Q43	0.56				
	Q45	0.81				
	Q46	0.79	0.69	0.74	0.82	0.5
	Q47	0.73				
	Q50	0.58				
PRA	Q51	0.64				
	Q53	0.77				
	Q54	0.87	0.69	0.72	0.80	0.51
	Q55	0.51				
KNWL	Q56	0.75				
	Q57	0.72	0.77	0.71	0.81	0.58
	Q58	0.84				
RLG	Q59	0.71				
	Q60	0.94	0.78	0.72	0.82	0.62
	Q61	0.71				

Table 2. Model Fit Indices

Fit Indices	Model Value	Acceptable Standard
χ^2	2378.02	-
NNFI	0.91	>0.9
CFI	0.95	>0.9
IF	0.95	>0.9
RSM	0.08	≤ 0.08
NFI	0.92	>0.9
Standardized RMR	0.032	<0.05

Table 3. Summary of Individual Hypotheses

Hypotheses	Path	T-Value	Std. Coefficient	Result
H1	SN → IMHW	2.31	0.27	Significant
H2	PBC → IMHW	-0.54	-0.04	Not Significant
H3	ATB → IMHW	7.38	0.66	Significant
H4	GS → IMHO	2.02	0.18	Significant
H5	HNE → IMHW	-1.13	-0.11	Not Significant
H6	IMHW → HWMB	6.65	0.53	Significant
H7	PRA → HWMB	5.35	0.39	Significant
H8	KNWL → PRA	6.16	0.49	Significant
H9	RLG → PRA	5.54	0.43	Significant

significant at $P < .05$

Testing the Structural Model

There are two criteria of proposed framework model evaluation: valuation of the overall model's goodness of fit and statistical significance of the model hypotheses parameters (Khan et al., 2019). According to the result of Goodness of Fit Indices of the structural model, it depicts that root means the square error of approximation (RSMEA) equal to 0.08, which means this research has a good fit model. RSMEA is also an adequate measurement of model fit, or it equals to "how well does the model fit the population covariance matrix." The other fit indices measure to determine goodness of fit are χ^2 , Non-Normed Fit Index (NNFI), Comparative Fit Index (CFI), Standardized RMR, Incremental Fit Index (IFI), Normed Fit Index (NFI). Table 2 shows that all fit indices are acceptable, which means that the research model is appropriate in describing the population covariance.

Furthermore, hypotheses of individual paths within the model are evaluated by defining t-

values and standard coefficients of relationships between independent and dependent variables. T-value illustrates that the corresponding course was significantly non-zero. Meanwhile, the coefficients represent the negative or positive relationship between two variables. The hypotheses in this research may be rejected due to T-Value is less than +/-1.96. There are two rejected hypotheses: PBC to IMHW (-0.54) and HNE to IMHW (-1.13). Through Table 3, it can be seen that attitude towards behavior has the most significant relationship to intention to manage household waste (0.66). Knowledge (0.49) slightly has a more substantial effect than religion (0.43) on pandemic risk awareness.

Overall, from Theory Planned Behavior and shown in Table 3, only subjective norm and attitude towards behavior affect intention to manage household waste. The government's support also has a significant relationship to the purpose of managing household waste even though it is less than 0.5 (0.18). Surprisingly, the

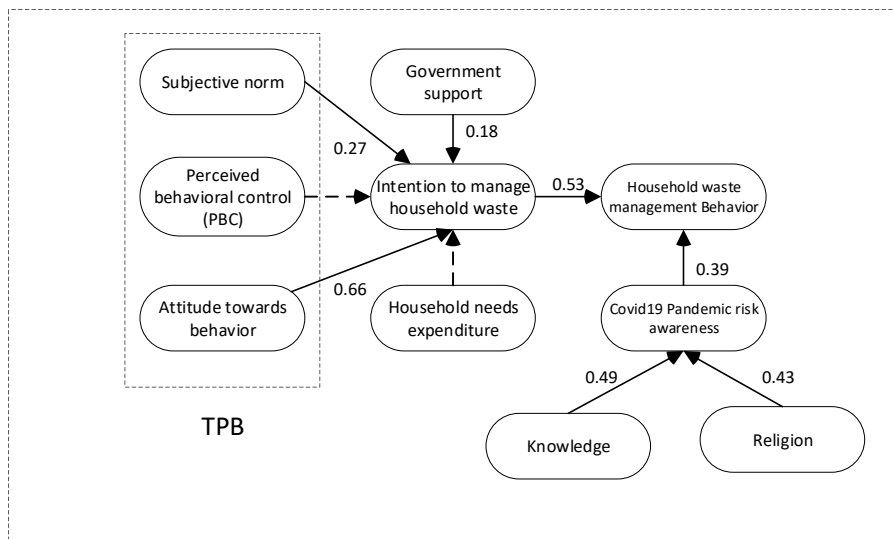


Figure 2. The Structural Model with Standardized Coefficients (*: significant at $P < .05$)

relationship between pandemic risk awareness and household waste management behavior considers as significant (0.39), despite the intention to manage household waste has a stronger relationship (0.43) to household waste management behavior.

This research is the first to conceptualize COVID-19 pandemic risk awareness that affects household waste management behavior and involving panic buying in the household needs expenditure variable. This concept offers a new perspective of how citizens, especially in Greater Jakarta, manage household waste during pandemic periods. It is believed that the result of this research supports previous researches in this domain.

COVID-19 pandemic makes everyone has to stay at home for at least more than a month. This occasion makes household waste increase significantly. From the research results, perceived behavioral control seems not to affect the intention to manage household waste. This phenomenon is similar to few previous kinds of research (Witzel et al., 2018; Barone et al., 2019; Heidari et al., 2018; Xu et al., 2017b). Perceived behavioral control defines as people believe in their confidence in doing particular activities (Abdelradi, 2018; Neff et al., 2015; Strydom, 2018; Ulhasanah & Goto, 2018) indication of 'the available resource and opportunities.' It shows

less opportunity supported by the least infrastructure resources to implement proper household waste management in Greater Jakarta. Although recently government disseminates infectious household waste management (Heidari et al., 2019; Meng et al., 2019; Trpchevska et al., 2017; Tsai et al., 2020; Zhang et al., 2019), the policy of household waste management is still lax. Several previous research also showed a non-significant relationship between perceived behavioral control and intention (Barone et al., 2019; Heidari et al., 2018; Knickmeyer, 2020; Strydom, 2018; Udofia et al., 2017)

On the other hand, statistical results show that subjective norm and attitude toward behavior have a solid relationship with household waste management intention. This phenomenon has similarities to past research results (Allison, 2019; Park et al., 2002; Xu et al., 2017b; Ye et al., 2020). Attitude, as an expression of the self, refers to someone's evaluation of behavior. Meanwhile, subjective norms as external influence refer to judgments of other household and community members to comply with certain behavior. It depicts that intention to manage household waste properly can be triggered by individual awareness and community beliefs to stay healthy, significantly to minimize the transmission of COVID-19.

Government support shows a significant

relationship to manage household waste. Scope of government support refers to government action through policies, and facilities to establish proper household waste management. It is also the extent to how well the government can educate citizen to follow appropriate rules of managing household waste (Hebrok & Boks, 2017; Jereme et al., 2016; Luttenberger, 2020; Taylor & Todd, 1997; van der Werf et al., 2019; Wang et al., 2017). Indonesia currently configurations a household and industrial infectious waste process, it had been issued by the Ministry of Health and Ministry of Environment and Forestry Form Letter 02/PSLB3/PLB.3/3/2020. Governments in Indonesia already coordinate with each municipal head in every region to encourage every household member to properly manage household waste, especially when they have a family member with COVID-19 symptoms. The first is to separate the infectious and non-infectious waste. This infectious waste consists such as disposable face masks, gloves, tissue, or shield clothes. And then, infectious waste should be wrapped most appropriately to notice the garbage collector be careful when processing the waste. Infectious waste must be processed with autoclave, but an incinerator is also an alternative solution. Thus far, in Indonesia, only hospitals take care of infectious waste with the incinerator.

Meanwhile, most landfills for household waste do not own or use incinerators to process infectious waste. During the COVID-19 pandemic, many local governments initiate facilitating landfills with incinerators, whether to rent from a third party or buy the new one. Many tourism areas and big cities in Indonesia have been concerned about household waste management during the pandemic COVID-19. The central and local governments are optimizing the use of social media to gain awareness of the importance of separating infectious and non-infectious waste. It is essential to educate the public and allow opinions from the public (Abdelradi, 2018; Strydom, 2018; Ye et al., 2020).

To gain the intention of managing household waste, governments should form such as penalties and rewards and implement the rules

strictly. Strydom (2018) said that when the government does not impose the charge of mistreating household waste, the public would not be forced to put effort into waste separation.

Household needs expenditure does not show a significant relationship to gain intention of managing household waste. This result is supported by several previous research studies (Witzel et al., 2018; Barone et al., 2019; Strydom, 2018). According to Barone et al. (2019), saving money does not show a solid relationship to intention to recycle waste. It depicts that most financial motivation has no effect to waste management intention. During a pandemic, people will be more considerate about health than saving money. Some phenomena show that people tend to panic when put in a lockdown or stay at home for an extended period. It can be said that household expenditure factors can not increase the intention to manage household waste.

The intention is also the main predictor to enhance the behavior of household waste management (Abdelradi, 2018; Allison, 2019; Loan et al., 2019; Xu et al., 2017b; Yu et al., 2020; Zhang et al., 2019), especially during a pandemic. Not only by intention but behavioral factors are also strongly affected by risk awareness (0.39). COVID-19 risk awareness is broadly explained through official websites such as the world health organization and several ministries so people can keep their environment clean from the virus. Several seminars and announcements about handling the environment to avoid COVID-19 transmission are also held by the government and citizen association. Several studies also show that risk awareness has a significant relationship to behavior variables (Fukuda et al., 2020; Udoh & Alkharashi, 2017).

Moreover, knowledge and religiosity have substantial impacts (0.49 and 0.43, consecutively) on pandemic awareness. When someone has more knowledge about waste can harm the environment, they will consider implementing real action in diminishing wastes (Abdelradi, 2018; OMS, 2020; Wang et al., 2017). In a pandemic outbreak, it relates to the activity of managing wastes to minimize virus transmission. In addition,

the higher religiosity, the better someone protects the environment and cares about others. At this phase, people will be considered treating wastes properly, separating the infectious from non-infectious ones, and place them in a secure bin so it will not harm anyone who takes it.

Overall, current findings indicate that researchers should direct to norms and attitude towards behavior rather than particular perceived behavioral control when aiming to gain intention of managing household waste during a pandemic. Moreover, this study also extends to knowledge that prevails religion in affecting household waste management behavior. It means knowledge, and so faith can boost household waste management behavior through risk awareness. This research also emphasizes individual behavior due to intrapersonal, interrelation, community, institutional, and public policy factors in a social-ecological concept during the COVID-19 pandemic.

Since subjective norm also plays a predicting factor, collaboration with some influencer in the social media campaign for household waste management might be appropriate. On the other hand, driving characteristics of attitude towards intention behavior also need to be further explored. Thus, a proper intervention could be addressed to boost attitude towards household waste management.

V. CONCLUSION

This research is a preliminary study for the effects of pandemic risk awareness on household waste management behavior and how theory planned behavior affects the intention to manage household waste during the COVID-19 pandemic. The findings conclude that it is important to enhance collecting household waste and pandemic risk awareness to improve proper household waste management behavior, especially during the COVID-19 pandemic. The higher level of knowledge that most family members have, the more aware of the pandemic they will be. Further suggestions also state that government should support a decent household waste system by providing the infrastructures and

programs such as enhancing household waste management services, providing attractive and user-friendly household waste applications, implementing correct reward and punishment regarding household waste behavior, especially during the pandemic period. Precise household waste management is also the key to diminish virus or bacteria transmission. Therefore it can restrain the spread of the plague.

The first limitation of this study is self-report measures without interviews to crosscheck the pattern on the statistical result. Self-report measurement potentially shows bias standard method variance when estimating effects since bias can arise from social desirability, sampling approach, or selective recall (Hair et al., 2016).

In addition, the current research does not provide information on pandemic risk awareness based on several clustered zones, such as the red zone (high pandemic number) to the green site (none or lowest pandemic number). Since Indonesia has several pressed locations of the pandemic, future research must examine household waste management in each categorized area of the pandemic. And also, it is important to implement a longitudinal study to design proper household waste policy not just during a pandemic but also to improve environmental hygiene based on behavioral evidence.

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