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Factors Affecting the Intention of Returning Electronic Waste to Reverse Logistics System in Jakarta

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ABSTRACT

This study aims to examine the factors that affect the intention of the community/consumers to participate in returning electronic waste. Moreover, trying to combine public intentions and awareness of the environment supported by government programs in terms of electronic waste collection. This study investigates the behavior of e-waste return using the theory of planned behavior (TPB). The factors influencing intention and behavior are explored when it comes to e-waste returns in Jakarta. We included attitude, social norms, perceived behavioral control, intention, environmental concern, and a government program to pick up e-waste as additional variables in the model. A survey was used too. Collect a sample of 111 people, and the data were statistically evaluated using structural equation modeling (SEM). The intention was not found to be significantly associated with personal attitudes However, the relationship between environmental concern, electronic waste pick-up service, and perceived behavior control to return intention was found. The higher a person's concern for the environment will encourage perceived behavioral control of intentions in the return of electronic waste. The electronic waste pick-up service that has been created by the DKI Jakarta government is currently also a significant factor in encouraging the desire of residents in returning electronic waste. The findings have aided in determining the relative magnitude of variables of intention for e-waste return that lead to returning behavior.

KEYWORDS – Reverse Logistics, Theory of Planned Behavior (TPB), E-Waste, Environmental Concern

1. INTRODUCTION

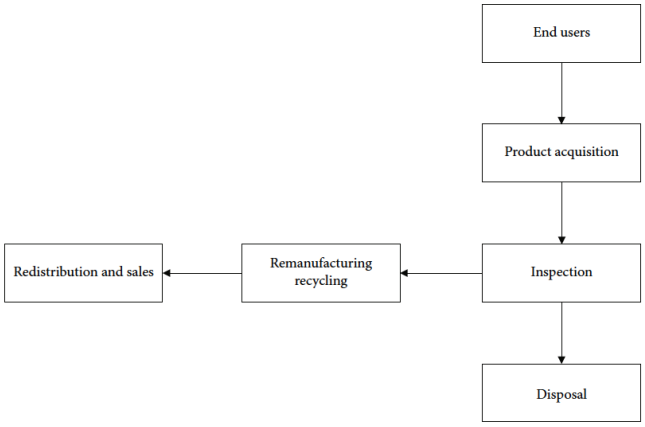
The rapid development of technology and the economy in the last few decades has led to a more diverse choice of electronic products at an affordable price, thus increasing their consumption (Andarani., et. al. 2014). When people's consumption of electronic products increases, the potential for e-waste also rises. Electronic waste (e-waste) management has become one of the most challenging problems worldwide, especially in developing countries (Arya., et. al. 2020). This is because it is one of the fastest-growing waste categories globally, reaching an annual growth rate of 3–5% (plankton., et. al. 2018). Electronic waste (EEE) or e-waste is a term used for any type of device along with other parts of an electronic item that has been disposed of without any intention to be reused (Adrian., et. al. 2014). Estimated 53.6 million tons (Mt) of e-waste is generated worldwide, but only 17.4% percent is well documented and recycled (Forti, et al., 2020). The Global E-waste Monitor 2020Quantities, Flows, and Resources state that the e-waste produced by the Indonesian population is estimated to have been 1.274 million tons or an average of 4.9 kg per capita in 2016. These data position Indonesia as the 9th producer of e-waste worldwide report also states that Asia is the largest e-waste producer worldwide. Indonesia is also included among the 10 largest electronic waste-producing countries (e-waste monitor, 2020), and based on the latest research it is estimated that 3.2 million tons of e-waste will be collected in Indonesia in 2040 with the largest contribution coming from Java Island amounting to 56 percent of the total amount in 2021 (Mairizal, et. al. 2021).

Improper handling of e-waste can cause environmental pollution, so it is necessary to design an appropriate e-waste management system to minimize the impact on the environment and increase the economic value of e-waste itself. The right e-waste processing manufacturers and reverse logistics management need to be implemented. Reverse Logistics (RL) reuses used products to reduce waste and improve industrial environmental performance (Diabat, ET, al. 2013). Goods and information flow in the opposite direction of the usual logistics activities, which support products and return goods for recycling, production, reuse, or

destruction (de Brito, ET, al. 2003). Reverse supply chains are one of the most important ways for inter-organizational adoption of circular economy ideas

Figure 1 depicts an e-waste return logistics system. Materials and supplies would be transferred to the following stage, reverse logistics, after the used products have been retrieved. Returning products to facilities for inspection, sorting, and disposition is part of this process. This business includes transport, inventory, and distribution processes. Most of the overall cost of a reverse logistics operation is typically made up of transportation costs.

Figure 1. Reverse Logistic system



A closed-loop supply chain, which involved both forward logistics and reverse logistics including product and information movements to produce a continual flow of products, also includes a reverse supply chain. Several researchers have looked into the impact of attitudes, social norms, perceived behavioral control, incentives, and trust on the willingness to return e-waste goods (Kumar, et al, 2019). According to (Giampietri, ET, al, 2018), two theories that characterize consumer behavior are the theory of reasoned action (TRA) and the theory of planned behavior (TPB). The theory of planned behavior explains both behavioral intention and actual conduct, whereas the theory of reasoned action predicts any behavioral intention (Kumar, 2013). The collection and processing of e-waste is an effort to create a sustainable supply chain. Therefore, an e-waste RL management network is needed, the implementation of which is also supervised by the government. Consumers play an important role in the success of e-waste management. Whether or not the e-waste management network operates depends on the willingness of consumers to participate as suppliers of the e-waste. Model Theory of Planned Behavior TPB is a method that is often used to analyze consumer behavior. Several studies related to the use of TPB in analyzing consumer behavior related to environmental issues, Santoso and Farcical (2019) used TPB to measure community participation in household waste management, while Chen and Deng (2016) used TPB to analyze environmentally friendly behavior.

2. LITERATURE REVIEWS

Supply Chain Management

According to Jay Heizer et al., (2017), Supply Chain Management is the coordination of all supply chain activities involved in increasing customer value. All of these activities include purchasing and outsourcing activities, adding another important function to the interaction between the suppliers who use them. Supply chain management includes all activities in the form of planning and management of all related activities at the time of procurement of raw materials, to all logistics activities in management (Ghofar et al., 2020). Creating the best Supply Chain requires money, time, talent, energy, focus, commitment, and courage. Supply Chain Management concerns not only manufacturers and suppliers, but also the shipping process, warehouses, distributors, and also the customer itself (Chopra, 2019). But the most important thing is to coordinate and collaborate with partners or suppliers, intermediaries, third-party service providers, and consumers. In essence, supply chain management in its activities needs to integrate the company's supply chain and internal and external demands (Ghofar et al., 2020).

Reverse Logistics

Reverse logistics operations are very different from the usual logistics. Where to get a collection point to receive goods from the end consumer or move assets from the supply chain selling efficient use of inventory/materials as a whole can be achieved. And it requires packaging and a storage system that ensures that the entirety of the

value or benefit of the goods is still there, fit for use, and not lost due to rigor in its handling. Dispositions can include returning assets to inventory or storage warehouses, returning production items that are still good for the exchange of payments by the company, selling production goods on a second-hand market, recycling production goods returned by consumers, or combining them to produce maximum sales value for the returned goods.

The Theory of Planned Behavior (TPB)

Competitive The Theory of Planned Behavior (TPB), introduced by Icek Ajzen in 1985, extends the Theory of Reasoned Action (TRA) by adding perceived behavioral control. TPB is used to predict intent, which is the central dependent variable of the TPB. The intention is the best predictor available for human behavior and is at the core of the TPB framework (Yadav R, et al, 2017). They show a person's readiness to behave in a certain way (Ajzen et al, 1991). This means a conscious plan of action, which specifically requires behavior and motivation (Patch et al, 2005). Some studies only predict intention, assuming that intention is a predictor of good behavior and fully mediates the impact of attitudes, subjective norms, and perceived behavioral control (Macovei, 2015). TPB has been used to predict recycling behavior, eco-friendly behavior, purchase of environmentally friendly products, and conservation energy (Arifani et al, 2018), Several studies conducted in developing countries in the Southeast Asian region have used SDGs to analyze intentions to adopt climate change mitigation behaviors, green buying behaviors, and recycling behaviors (Macovei, 2015)

3. CONCEPTUAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

By The consumer plays an important role as a supplier in logistic activities. Upside down. An action taken by a consumer has an impact on reverse logistics activities (Hazen et al., 2012). In particular, consumer behavior affects the effectiveness of reverse logistics activities, including reuse, recycling, and waste remanufacturing, as well as participation in waste management (Budijati, 2016). The intention of behaving in a certain way is the stage where a person desires to perform a certain action or behavior. It is a direct antecedent of behavior (Azjen, 2002) and is accepted as the best predictor because it represents the motivation of a person to exert effort to act or behave in a certain way (Somer, 2012). According to Verma et al. (2019), environmental concerns are influenced by the new environmental paradigm (NEP). In this study, personal traits were used, especially the integration of personal attitudes. Environmental concern is also a variable that has a direct effect on behavioral intentions and indirect effects by passing the TPB variable first, including attitudes, subjective norms, and control of perceived behavior. In this study, accessibility variables to e-waste collection facilities and e-waste pick-up service programs provided by the government will also be used as mediators of consumers' intention to re-collect e-waste.

A research model is developed to examine the factors that affect the intention of the community/consumers to participate in electronic waste collection. Moreover, trying to combine public intentions and awareness of the environment supported by government programs in terms of electronic waste collection. According to Verma et al. (2019), environmental concerns are influenced by the new environmental paradigm (NEP). In this study, personal traits were used, especially the integration of personal attitudes. Environmental concern is also a variable that has a direct effect on behavioral intentions and indirect effects by passing the TPB variable first, including attitudes, subjective norms, and control of perceived behavior. In this study, e-waste pick-up service programs provided by the government will also be used as mediators of consumers' intention to re-collect e-waste. Figure 2 shows the structure of the proposed framework.

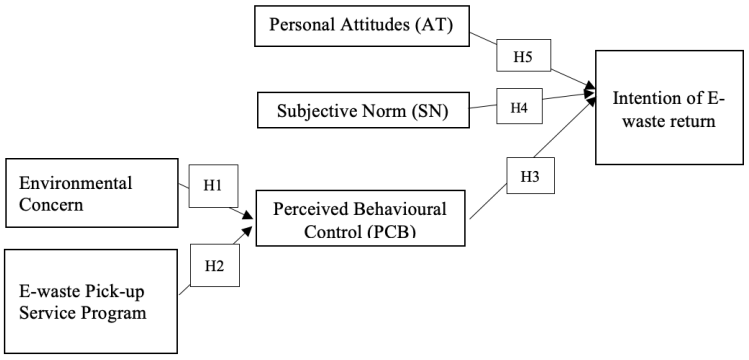


Fig. 2 Conceptual Framework

Hypothesis Development

Environmental Concern and Perceived Behavior Control

Environmental concern is the degree to which people are aware of environmental problems and their willingness to solve them (Maichum 2016) and contribute personally to their solutions. These issues have long been considered important predictors of ecological decisions. Therefore, individual care is a valuable driver of environmentally conscious behavior, which ranges from eco-friendly buying and recycling behaviors to energy conservation (Macovie, 2015). Previous studies have proven that environmental concerns affect consumer attitudes. According to Maichum et al.(2016), environmental concern also influences subjective norms and perceived behavioral control, leading to buying intentions. Therefore, it is hypothesized that:

H1: Environmental Concern Affects the Perceived Behavior Control

Electronic Waste Pick-Up Service Program and Perceived Behavior Control

According to the TPB model, perceived behavioral control, which refers to the individual's perception of their ability to perform certain behaviors, is one of the main predictors of behavioral intentions. Accessibility is an objective condition for implementing certain behaviors. The accessibility of the facility sometimes affects the perceived control of behavior, for example when a person is aware of it. The location of the facility plays an important role in establishing a financially sustainable waste management system (Yadav et al (2018). Distance and perceived pick-up. Service is important factors influencing recycling behavior. Shorter distances and easier access to sorting facilities save time in recycling waste and encourage personal behavior. Having adequate space for the temporary storage of sorted materials can improve waste sorting rates and recycling behavior (Ando et al, 2005). Therefore, it is hypothesized that:

H2: Electronic Waste Pick-Up Service Affects Perceived Behavior Control

Perceived Behavior Control and Intention to Return Electronic Waste

The TPB antecedent is perceived behavioral control, that is, the ease or difficulty that a person feels in carrying out certain behaviors. Behavioral control and perceived motivation determine behavior (Zhou Y et al, 2013). According to Coskun et al (2018) the most important predictor of the intention to reduce food waste among all the independent variables of the SDGs. There is a positive relationship between perceived behavioral control and waste sorting behavior associated with household kitchens in Beijing, China (Yuan Y et al, 2016). Similarly, Nguyen et al (2020) proved that there is a significant relationship between perceived behavioral control and the intention to separate household waste in developed countries using case studies in Vietnam. Nadlifatin et al (2015) and Persada et al (2015) said that perceived government regulations/support regarding environmental factors positively affect environmental behavior. Perceived government regulation has a strong indirect effect on takeback intentions through government programs. Therefore, it is hypothesized that:

H3: Perceived Behavioral Control Affects a Person's Intention in Returning Electronic Waste

Personal Attitude and Intention in Returning Electronic Waste

Attitude towards a behavior refers to the degree to which a person has a pleasant or unpleasant assessment of a certain behavior (ajzen, 1991). It is the interaction in memory between a given object and a summary of its evaluation. Attitudes are psychological emotions directed through consumer evaluation. Behavior tends to be more positive if the psychological emotions are positive. Personal norms are intrinsic factors that reflect the subjective desires of the individual and relate to self-expectations and individual attitudes derived from related norms and values regarding certain behaviors (zhang et al, 2019). Personal norms significantly influence behavioral intentions to reduce the consumption of clothing and buy green products According to Liu et al. (2017) The integration between personal attitudes and norms has a significant positive effect on decreasing car travel intent and increasing waste sorting intentions. Therefore, it is hypothesized that:

H4: Personal Attitude Affects to a Person's Intention in Returning Electronic Waste

Subjective Norms and Intention to Return Electronic Waste

In the TPB model, the second antecedent of behavioral intentions is a subjective norm, which is the perceived social pressure to do or not do something (Maichun et al, 2016), highlighting the influence of others close/important to the actor, such as family, close friends, relatives, and colleagues. Consumers with positive subjective norms often have the intention of behaving positively. Subjective norms promote the intention to recycle agricultural waste in China (Jiang L et al, 2018) and encourage behavioral intentions to recycle plastic waste in developing countries. Therefore, it is hypothesized that:

H5: Subjective Norms Affect a Person's Intentions in the Return of Electronic Waste

4. METHODS AND SAMPLES

The research design used in this study is hypothesis testing with cross-sectional data and individual analysis units. The study examined this study examines the factors that affect the intention of the community/consumers to participate in returning electronic waste. In this study, data collection was carried out with a questionnaire

using a questionnaire. Data collection through questionnaires is usually used to collect large amounts of quantitative data and then spread can be done online or sent directly to respondents (Sekaran & Bougie, 2016). Respondents were asked to answer questions related to the factors that influenced them in returning the electronic waste they had. The method of collecting data directly to obtain primary data, which means that the data was obtained by researchers without using intermediaries, through the dissemination of questionnaires based on data from people who have collected e-waste in Jakarta Province. Within Hair's rule of thumb, the minimum sample size is 100 – 200 samples, meaning that the 111 responses obtained were sufficient for this study.

The method of statistical analysis of the data was selected and adapted to the research objectives. The statistical analysis of the data used in this study using the Structural Equation Modeling (SEM) method and the analysis tool used in this method is the Smart PLS 3.0 (PLS) software. PLS is an analysis tool that allows researchers to obtain latent variable values for prediction purposes. SEM consists of statistical methods that can help show the multiple relationships among latent variables by employing equations that are like multiple regression equations (Hair et al., 2019). PLS has the advantage of being able to estimate large and complex models with hundreds of latent variables and thousands of indicators. For prediction purposes, the PLS approach is more suitable. If a study is in a high-complexity situation and has a sample size of less than 200, then SEM analysis using PLS is more appropriate to apply.

5. RESULTS AND DISCUSSIONS

The results of the validity test indicated that all of the research instruments were declared valid. The reliability test showed that the Crombach Alpha coefficient for supply chain management, total quality management, competitive advantage, and organizational performance had values above 0.6 so that all variables in this study were declared reliable. All indicators are valid and meet the loading factor value > 0.5, which means that the indicators used in this study are valid or have met the requirements. Examining the internal consistency of the constructs revealed that all items had composite reliability above 0.6 as recommended. Convergent validity was assessed by examining the AVE and it was observed that AVE values were greater than 0.5, which is indicative of acceptable convergent validity (Hair et al., 2019). Item loadings, composite reliability, and AVE of constructs are represented in Table 1.

Table 1. Descriptive Statistics and Psychometric Properties Of Research Constructs

Construct	Items	Loadings	Composite Reliability	AVE
Environmental Concern	EC1	0.668	0.680	0.680
	EC2	0.880		
	EC3	0.888		
	EC4	0.828		
	EC5	0.838		
Electronic Waste Pick-Up Service	PP1	0.841	0.707	0.707
	PP3	0.865		
	PP4	0.841		
Perceived Behavior Control	PC1	0.874	0.600	0.600
	PC2	0.846		
	PC3	0.618		
	PC4	0.710		
	PC5	0.766		
	PC6	0.804		
Personal Attitude	PA1	0.861	0.719	0.719
	PA2	0.798		
	PA3	0.877		

The path coefficients and the research model were examined to assess the research hypotheses. The results of

the hypotheses tests are summarized in Table 2. The results of the analysis revealed that four hypotheses were supported and there is one hypothesis that is not supported.

Table 2. Hypothesis Testing

hypothesis	Coefficient	p-values	Decision
H1: Environmental Concern -> Perceived Behavior Control	0.367	-	Supported
H2: Electronic Waste Pick-Up Service -> Perceived Behavior Control	0.359	-	Supported
H3: Perceived Behavior Control -> Intention Returning E-Waste.	0.569	-	Supported
H4: Personal Attitude -> Intention Returning E-Waste.	0.094	0.236	Not Supported
H4: Subcjective Norms -> Intention Returning E-Waste.	0.154	0.062	Supported

Environmental Concern and Perceived Behavior Control

The study was conducted factors that affect the community on the intention of returning electronic waste in DKI Jakarta Province. Based on table 5 it is known that the magnitude of the coefficient of environmental concern is 0.367 which means that there is a positive influence between the two variables. Or it can be interpreted that the higher a person's environmental concern, the higher the behavior control in the return of electronic waste. The test results showed a p-value of 0.000 < 0.05 (alpha 5%) so it was concluded statistically at a 95 percent confidence level that there was a positive influence. Since the p-value ≤ α 0.05 then the hypothesis is accepted. The results of this study show that there is a positive and significant influence between environmental concern for perceived behavioral control, the higher a person's concern for the environment will encourage perceived behavioral control of intentions in the return of electronic waste.

Electronic Waste Pick-Up Service Program and Perceived Behavior Control

Electronic waste pick-up service is 0.359 which means that there is a positive influence between the two variables or it can be interpreted that the higher the Electronic Waste Pickup (PP), the higher the behavior control in returning electronic waste. The test results showed a p-value of 0.359<0.05 (alpha 5%) so it was concluded statistically at a 95 percent confidence level that there was a positive influence. this study show that there is a positive and significant influence between the government's pick-up of electronic waste strengthening the perceived behavioral control of intentions in the return of electronic waste.

Perceived Behavior Control and Intention to Return Electronic Waste

The magnitude of the coefficient of perceived Behavioral Control is 0.569 which means that there is a positive influence between the two variables. Or it can be interpreted that the higher the perceived personal control, the higher the intention in the return of electronic waste. The test results showed a p-value of 0.569 < 0.05 (alpha 5%) so it was concluded statistically at a 95 percent confidence level that there was a positive influence. Since the p-value ≤ α 0.05 then the hypothesis is accepted, there is a positive and significant influence between perceived behavioral control and intention in electronic waste retention.

Personal Attitude and Intention in Returning Electronic Waste

The magnitude of the coefficient of Personal Attitude is 0.094 which means that there is a positive but not significant influence between the two variables. Or it can be interpreted that the higher the Personal Attitude, the higher the intention in the return of electronic waste, the higher. The test results showed a p-value of 0.094< 0.05 (alpha 5%) so it was concluded statistically at a 95 percent confidence level that there was no effect. Since the p-value is 0.236 ≥ α 0.05 then the hypothesis is rejected. This study's results show no influence between personal attitudes towards intention in the return of electronic waste.

Subjective Norms and Intention to Return Electronic Waste

The coefficient of responsiveness of the logistics process is 0.151 which means that there is a positive influence between the two variables. Or it can be interpreted that the higher the Subjective Norm that is perceived then the higher the intention in the return of electronic waste. The test results showed a p-value of 0.151<0.05 (alpha 5%) so it was concluded statistically at a 95 percent confidence level that there was a positive influence. Since the p-value ≤ α 0.05 then the hypothesis is accepted, there is a positive and significant influence between subjective norms and intention in the return of electronic waste.

6. CONCLUSSION, LIMITATION AND FURTHER RESEARCH

Conclusions

The study provides some implications for research and theory. Based on the results of research that has been carried out, it is known that the variables of Subjective Attitude Norms, Perceived Behavioral Control, environmental concerns, and government programs in the form of waste pick-up services have an influence on a person's intention to participate in making electronic waste returns. So that the implications of this research can provide benefits for several parties.

For the recycling industry, Citizen participation in electronic waste collection is an important part of the reverse logistics system. In the reverse logistics system, the community is considered as a supplier, in this case, the raw materials for recycling electronic waste, the involvement of residents in returning electronic waste will certainly help the recycling industry in meeting the needs of raw materials in production. The availability of this raw material is important for the sustainability of the supply chain of the electronic recycling industry for the recycling industry must pay attention to and encourage several things based on this research. This research shows that a person's concern for the environment and the availability of electronic waste pick-up services significantly reinforce a person's intention to collect and return electoral waste.

The government is an important part of the electronic waste management system, the government has a strong interest in being able to handle waste problems, especially electronic waste, this research provides an overview of how the government should encourage the community to instruments to make people return the electronic waste they have. This research can be a reference in developing policies to encourage this, based on this research, one of the positive and significant influences is the norms of subjective attitudes so that the government can disseminate information and promote people who have returned electronic waste so that it will make people who previously did not carry out electronic waste collection will be encouraged to participate in conducting return back. The government as a regulator must also immediately issue policies in encouraging citizens to collect e-waste. The electronic waste pick-up program that has been created by the DKI Jakarta government is currently also a significant factor in encouraging the desire of residents in returning electronic waste, so the government must maintain the program and innovate so that the convenience and availability of services for residents who want to make a better return.

Further Research

There are some limitations of the study. This study only discusses a person's intentions in the return of electronic waste this study only specifically discusses electronic waste the study used only 111 respondents Researchers fill out and distribute questionnaires online using the help of Google forms. The data obtained was less effective because the respondents were busy so filling out the questionnaire took a long time. This research is only limited to DKI Jakarta Province. Further research is expected to link more clearly how electronic waste collection affects the availability of recycled raw materials and has a significant impact on the supply of waste recycling industry

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