



Identification of Factors Driving Household Intention to Implement Circular Economy

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Abstract

Indonesia's waste problem leads to severe effect such as economic, environment and social consequences in Indonesia as second largest contributor of plastic waste in the world. Most of the plastic waste source in Indonesia is from household sector. This phenomenon then can be further analysed with variables related to perception and behavior of humans. This study investigates determinants of residents' participation intention and behavior to implement circular economy for their plastic waste in a framework that incorporates Extended theory of planned behavior (TPB). Structural Equation Modeling (SEM) then was used to analyse all the variables correlation, The results of this study are that there are 5 significant correlations between variables, namely Descriptive Norm and Attitude have a significant and negative effect on Intention to Use. This study also found that the factors Perceived Behavioral Control, Individual concern and perceived economic use had a positive and significant effect. In addition, other findings are that Perceived Usefulness and Perceived Effectiveness and perceived environmental knowledge do not have a significant effect on Intention to Use.

Keywords: Circular Economy, Extended Theory of Planned Behaviour, Plastic Waste Management, Structural Equation Modelling

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INTRODUCTION

Indonesia, a massive country with over 275 million people in it was combating with plastic

waste emergency. This phenomenon alarmed the Ministry of Indonesian Forest and Environemnt who estimated that average use of plastic waste to

be 0.07 kg per person (8% of the total waste rate, or 0.87 kg per person per day) (Chakraborty, 2018). According to this information, plastic garbage amounted to 7 million tons were generated, of which 4.9 million tons were claimed to have been improperly managed and released into the natural reservoir. (Jambeck et al, 2015).

Being listed as one of the largest producers of plastic marine litter worldwide (Singh et al, 2018) policy maker substantially increases the awareness regarding plastic pollution by applying regional waste management strategies with the goal of reducing solid waste at source by 30% by 2025, in accordance with Presidential Decree No. 97/2017 on National Policies and Management Strategies for Domestic and Similar Wastes (Jakstrada) (Surya et al, 2020).

Another thing to address is about our single-use plastics waste (shopping bags, straws, polystyrene wrappers, etc.) (Chakraborty, 2018). One initiative to address this issue is the introduction of a circular economy. The circular economy is defined as a system of economics that holds materials and goods in use for as long as feasible to maximize used resources and minimize waste (Yu Ren et al, 2023).

Circular economy has three distinctive characteristic which are trying to do restoration rather than efficiency of waste, engineered out sustainability concept from waste and pollution and try to eliminate waste and pollution as much as possible (Nittono, 2016) Another circular economy principle is keeping products and materials in use through repair, reuse and recycling. (Miftahorrozi et al, 2022). Restoring and regenerating natural systems to ensure that next generations will have chance to benefitted from their resources, such as woods, energy, streams, and soil (Garcia-Muina, 2018). The circular economy seeks to replace the linear

"take, make, dispose" model with a "reduce, reuse, recycle" framework that is more environmentally friendly.

Thanks to the circular economy, the environmental impact is reduced and there are opportunities for people to be creative and innovative to boost economic development (Bagastyo et al, 2022). In the past few years, the notion of economic circular has surfaced as a sustainability blueprint, the ability to regenerate itself, and the reevaluation of conventional production models that rely on excessive use of resources and the discarding of used items (Christopher, 2000).

This concept rethinking the entire chain of supply from concept to production, use, disposal and innovations and technologies that turn waste into resources. The circular economy means that company enables them to become more resilient and competitive to achieve their goals that have a positive impact on the environment (Hettich, 2021). Nonetheless, shifting to circular economy requires cooperation among educational and research institutions, industry, governments, and consumers.

The economic circular is diverse and involves all stakeholders. We need a shared vision for circular economic transition and need to bring stakeholders together to develop transformational strategies by Domenech et al (2019) The rapidly evolving of circular economic into a model of sustainability and a self-renewable economy (Merli, 2018). Industrialization has improved people's living standards, but it has also destroyed the environment through overconsumption and overproduction.

The circular economy is based on two main aspects, both biologically and technically. The goal of the circular economy is to minimize

polluting waste by preserving materials in closed-loop systems for as long as possible. Aspects of biology and technology play a major role in this system in enabling more resource-efficient use of those resources. Despite regulatory approaches, community engagement to reduce the amount of plastic waste is essential to solve the problem.

Determining the extent of community knowledge, attitudes, perceptions, and engagement is critical to effectively implementing a plastic waste reduction program. Although there have been some extensive studies of public attitudes, behaviors, and practices towards plastic waste. In fact, there is still a certain information gap in Indonesian society regarding attitudes and behavior towards plastic waste disposal.

As per 2012, Indonesia has a program called waste bank as a part of national solid waste management strategies in several TPS 3R (Szalavetz, 2019). The presence of waste banks may have improved socioeconomic empowerment, perspective, and community awareness of solid waste management. (Jacqueline, 2021). This study then investigated attitude, perception, household knowledge about circular and participation level on implementing circular economy and management.

RESEARCH METHODS

One of the behavioral model theories commonly used in behavior and perception-related research is Theory of Planned Behavior (TPB). TPB has been used specifically to analyze perception and habits in various studies around the world (Surya et al, 2020). Related to circular economy, Research by Zhang et al (2010) has developed the TPB variable into variables namely Attitude, Descriptive Norms, Perceived Behavioral Control, and Comfort. This TPB

variable can then also be combined with other theories regarding human perception such as the Protection Motivation Theory (PMT).

The combination of TPB and PMT can be seen in the study by Prasetyo et al, (2020) which examined the perception of the level of effectiveness of circular economy in the Philippines. PMT variables are Perceived Effectiveness and Perceived Vulnerability. In addition to TPB and PMT, several studies related to human behavior and psychology show an interesting fact that human psychology is equipped with individual concern (Ma et al, 2021). All these variables can then be analyzed for correlation with Structural Equation Modeling (SEM) which is an advanced statistical analysis technique related to the relationship between multi-variables in a tested model.

Based on the explanation, whether residential household will continue to implement circular economy, what factors influence this decision, and how policy makers can use this research to better prepare themselves in the face of waste crisis in the future are the questions that make this research important.

To the best of the author's knowledge, until now there has been very few research that specifically examines the motives for implementing circular economy in household residents' area. The results of this study are expected to be the basis of information for policy makers in making rules, especially related to the implementation of circular economy and waste management.

Research by Erdiaw-Kwasie (2023) which states that knowledge about circular economic, aspect of organisational factors, and the adoption of circular economy are related. Therefore, this study proposes: H₁: Perceived Circular Knowledge is significantly correlated with

intention to use Research by Nittono, (2016) also emphasizes the importance of forming a perception for everyone that an action, no matter how small, will have an impact and contribute to society at large.

This is important because there is a tendency for a person's perception that the larger the scale faced, the more ineffective the person's behavior will be. Therefore, this study proposes:

H2: Perceived Effectiveness is significantly correlated with Intention to Use Research by Singh (2016) which states that when an individual faces something that is considered significant economically or there is lack economic incentives, they will be motivated to perform behavior that can protect it. Things that are done such as taking preventive actions that can reduce the risk of these threats (Erdiaw-Kwasie, 2023).

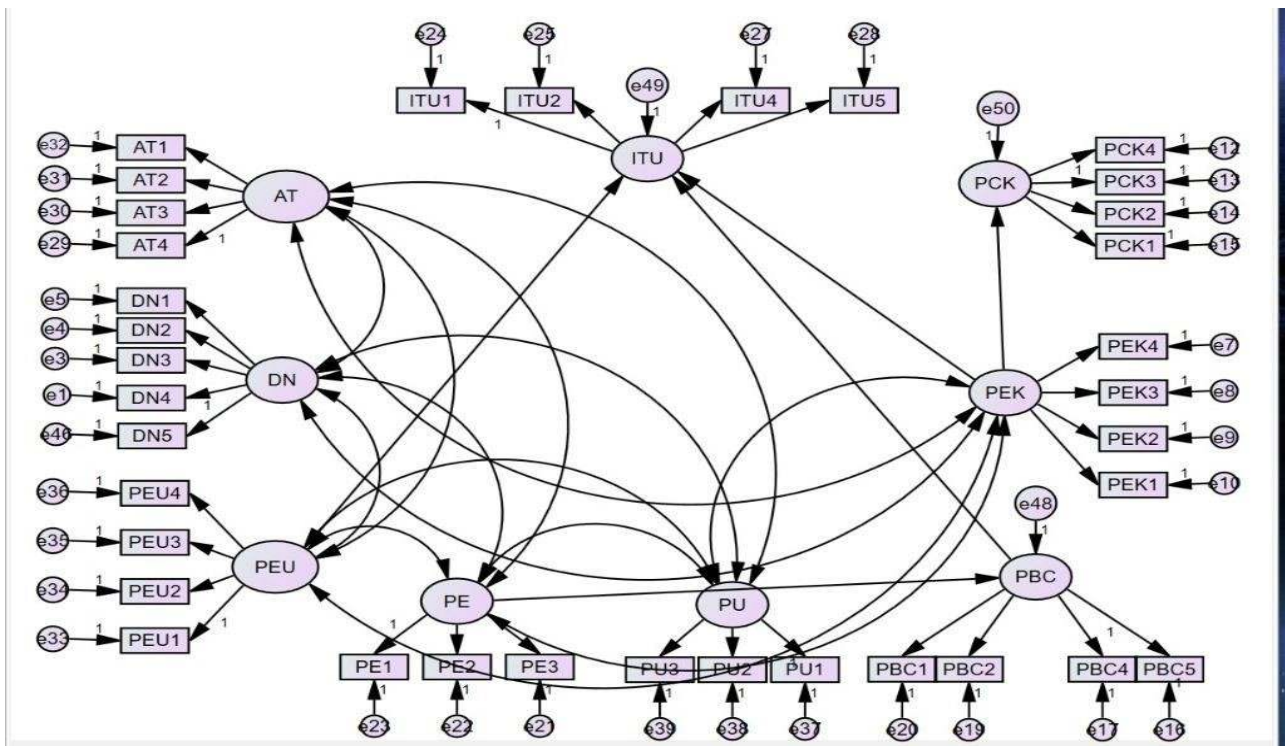


Figure 1. Structural Equation Model

Source, Data Processed, 2023

Therefore, this study proposes: H3: Perceived Economic Use is significantly correlated with Intention to Use Research by Chakraborty., (2018) where more than 40% of respondents felt something related to environment will stimulate them to use its product. Therefore, this study proposes: H4: Perceived Environment Knowledge is significantly correlated with Intention to Use Research by Kumar et al. (2012) which states that

self-efficacy has a significant impact on a person's capability in doing a task.

Self- efficacy means a person's belief and confidence in his own ability to successfully do something. Therefore, this study proposes: H5: Perceived Behavioral Control is significantly correlated with Intention to Use Research by Chan et al, (2005) confirms that individual behavior is influenced by the norms that exist in their community. Other research also confirms

that there is a strong relationship between norms and compliance behavior in an organization or society (Ho et al., 2017; Schepers and Wetzels, 2007; Grimes and Marquadsen, 2019).

Therefore, this study proposes: H6: Descriptive Norms have a significant correlation with Intention to Use Many studies confirm that people will comply with the rules, conditions and guidelines given if they have a positive attitude (Ng et al., 2009; Bulgurcu et al., 2010; Sasse et al., 2020). who ignore certain habits will not comply with the given guidelines (Pahnila et al., 2007; Myyry et al., 2009).

Therefore this study proposes H7: Attitude is significantly correlated with Intention to Use Perceived Usefulness is defined as "How far a person believes that a particular system can improve a person's performance" (Davis, 1986). This variable becomes the determining factor of a person's behavior towards something.

This means that if residents feel the satisfaction and benefits of implementing circular economy, they will continue to implement it based on their own wishes. Therefore, this study proposes: H8: Perceived Usefulness is

significantly correlated with Intention to Use. The research was conducted by selecting 320 residents in Solo for samples.

After the research was carried out, data were obtained and after going through validity and reliability testing 34 data were released so that the final number of respondents was 286 respondents. All of data then processed by Structural Equation Modelling in Software AMOS 22 that can be seen in figure 1.

RESULTS AND DISCUSSION

Figure 1 is modeling in AMOS based on the theoretical framework. From Table 1 the results of the data output above, it is known that there are five significant hypotheses, namely H₁ is Perceived Circular Knowledge (PCK) positively affects intention of use (ITU), H₃ is Perceived Economic Use (PEU) positively affects intention of use (ITU). H₄ is Perceived Environment Knowledge (PEK), and the interesting thing is H₆ and H₇ which rejects the hypothesis because Descriptive Norms (DN) and Attitude (AT) have a negative effect on intention of use (ITU).

Table 1. AMOS Results

			Estimate	S.E.	C.R.	P	Label	Description
ITU	<---	PCK	.220	.113	1.950	.051	par_26	Significant
ITU	<---	PE	.028	.109	.253	.800	par_27	Not Significant
ITU	<---	PEU	-.208	.108	1.928	.054	par_25	Significant
ITU	<---	PEK	.209	.111	1.880	.060	par_33	Significant
ITU	<---	PBC	.028	.139	.203	.839	par_34	Not Significant
ITU	<---	DN	-.102	.120	-1.740	.075	par_31	Significant
ITU	<---	AT	-.053	.130	-1.262	.089	par_32	Significant
ITU	<---	PU	.083	.096	.860	.390	par_35	Not Significant

Source, Data Processed, 2023

This study found that the Perceived Circular Knowledge (PCK) variable had a

significant and positive effect on residential households to implement circular economy.

These results are based on model testing with AMOS which produces a CR value of 1,950 from the standard 1.96, a P value of 0.051 from the standard 0.05 and an estimate of 0.220.

This means that if the residents have adequate knowledge about circular economy, it can help motivate residents to continue implement it. This study then implies that the

Attitude (AT) variable had a negative significant effect on the residential household to implement circular economy. These results are based on model testing with AMOS which produces a CR value of -1262 from the 1.96 standard, a P value of 0.89 from the 0.05 standard and an estimate of -0.53.

Table 2. Parameter Model

Goodness of Fit Index	Criteria	AMOS Result	Conclusion	Reference
Chi Square	Small Chi Square	578,750	Adequate fit	Mardyantoro(2011), Bagus (2016)
RMSEA	$\leq 0,08$	0,006	Excellent fit	Bagozzi & Yi (1988)
CMIN/df	$\leq 3,00$	1,008	Excellent fit	Mardyantoro(2011), Bagus (2016)
SRMR	$<0,08$	0,060	Excellent fit	Bentler & Bonett (1980)
CFI	$\geq 0,90 - 1$	0,996	Excellent fit	Bagozzi & Yi (1988)
IFI	$\geq 0,90 - 1$	0,996	Excellent fit	Bollen (1989)
TLI	$\geq 0,90 - 1$	0,996	Excellent fit	Mardyantoro(2011), Bagus (2016)
NFI	$\geq 0,90 - 1$	0,693	Marginal fit	Bentler & Bonett (1980)
PClose	$>0,05$	1,00	Excellent fit	Hu and Bentler (1999)

Source, Data Processed, 2023

This can happen because the behavior to implement circular economy is a new thing in Indonesia. Public and the community still has not fully implement circular economy as a habit. This study confirms that in the community, Attitudes related to the discipline of waste management and circular economy still need to be improved. This study also concludes that the descriptive norms variable had significant and negative effect

on the implement circular economy. These results are based on model testing with AMOS which produces a CR value of -1.740 from the 1.96 standard, a P value of 0.75 from the 0.05 standard and an estimate of -0.102.

This result can occur because social norms in the respondent's environment have not been formed to be disciplined in maintaining health and hygiene in general or implement circular

economy. This is in accordance with research by Chan et al, (2005) which confirms that individual behavior is influenced by the norms that exist in their community. The results of this study encourage the mental formation of the community to be disciplined in maintaining waste management.

This study also summarizes that the Economic Use variable had a significant and positive effect on resident's desire to implement circular economy. These results are based on model testing with AMOS which produces a CR value of 1.928 from the standard 1.96, a P value of 0.054 from the standard 0.05 and an estimate of 0.208.

This is in accordance with research by Singh (2020) which states that economical side and incentive is vital to implement circular economic. The result from Perceived Economic Knowledge also gives a similar result with CR value of 1.880 from the standard 1.96, a P value of 0.060 from the standard 0.05 and an estimate of 0.209. This means that society will motivate more to implement circular economy if they are benefit from it economically.

This study then discovered that the Perceived Usefulness variable had no significant effect on the resident's desire to implement circular economy. These results are based on model testing with AMOS which produces a CR value of 0.860 from the 1.96 standard, a P value of 0.39 from the 0.05 standard and an estimate of 0.083. This means that circular economy is still not considered useful by respondents. This study recommends being able to focus on increasing the perception of use value when implementing circular economy.

This study also detected that the Perceived Effectiveness variable had no significant effect on the resident's desire to implement circular

economy. These results are based on model testing with AMOS which produces a CR value of 0.253 from the 1.96 standard, a P value of 0.800 from the 0.05 standard and an estimate of 0.028. The results of this study indicate that people still feel that circular economics will not have significant impact.

This is also in line with the opinion of some residents who say that they implement it or not, the waste will still not processed or they won't be the same, Therefore, further research is needed to determine what indicators and variables can encourage increased perceptions of the effectiveness of waste programs, especially in the community.

CONCLUSION

This study obtain that the knowledge about circular economy and environment has a significant effect on residential decision to implement circular economic. This is because it creates a sense of satisfaction and is bound as an instant reward when they know they had implement something that they know it is good for them.

In addition, the perception of the ease to implement circular economy will boost the implementation as it will be easier for them to learn more about circular economy and sustainability. This study also made an interesting finding, namely the attitude and descriptive norms has negative impact. This can happen because they feel they do not need to do the implement circular economy as the social norm around them do not implement it.

This finding is important because the government can start increasing information about the importance of waste management and try to shift society habit to care more about environment. This study also found another

interesting fact, namely how the perception related to the effectiveness (Perceived Effectiveness) and usefulness is not giving significant result.

This means that residents feel circular economic somewhat useless and ineffective for them. This may happen because it is related with attitude and descriptive norms as they somewhat do not feel the urge to make circular economy as daily habit.

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