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Determinants of Zero Waste Lifestyle Adoption Among Generation-Z

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Abstract

Research on green consumption has two streams, the stream about how consumers consume green products (consume differently) and the stream about how to consume less. Most research focus on the stream about consume differently, therefore this study would like to contribute to the latter research stream by understanding the determinants of zero waste lifestyle adoption. The 3R theory (Reduce, Reuse, Recycle) is used in this study. The object of this study is generation-Z who live in Indonesian big cities, aged between 15 - 24 years. Data collection is done by using online questionnaire to 322 respondents. This study uses descriptive research design and judgemental sampling to collect the data. Data analysis is done by using structural equation modelling. Variables used in this study are attitude toward zero waste lifestyle, social norm, personal norm, altruistic motivation, and social media activity. The findings of this study are social media activity significantly influence reduce, reuse, and recycle behavior, social norms significantly influence recycle behavior only, while other factors do not significantly influence zero waste lifestyle adoption of generation-Z. This study gives insight that social media has significant role in changing consumer behavior to be more sustainable.

Keywords: zero waste, sustainable consumer behavior, generation-Z

I. INTRODUCTION

Covid-19 pandemic has caused several impacts, not only economic and social impact, but also environmental impact [1]. The policy of national lockdowns and home quarantine have stimulated an increased on online food delivery and other packages which has contributed to an increase in plastic packaging waste generation [2]. One approach that has been suggested to overcome the problem of waste generation is the concept of “zero waste” [3].

Zero Waste is defined as “The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human

health." [4]. Zero Waste principles contribute to the circular economy [5], [6]. According to Kirchherr [7], circular economy is an economic system that replaces the 'end-of-life' concept with reducing, reusing, recycling and recovering materials in production, distribution and consumption phase of their life cycle.

An understanding of how the zero-waste lifestyle can be adopted at the individual or household level is important because the value chain of a product will end up at the consumers, so consumers must be included in the waste management strategies [6]. Zaman [8] proposes that waste management strategies are the responsibility of consumers, which means avoiding over-consumption and encouraging sustainable-consumption.

Based on the 2020 Population Census, there are 270.20 million Indonesians which is dominated by generation-Z (27.94% of the population). Generation-Z is a population born between 1997 – 2012 with an estimated age of 8 – 23 years [9]. Since generation-Z is currently the dominant generation in Indonesia, the research question of this study is: What are the determinants of zero waste lifestyle adoption among generation-Z? By adopting zero waste lifestyle, individuals will do responsible consumption which in the end will have a major impact on the environment, for example reducing the effects of global warming.

There are previous studies about Indonesian young generation (millennial generation and generation-Z) and their sustainable consumption behavior [10]–[12]. Those studies use purchasing green product as one indicator of sustainable consumption behavior. According to Peattie [13], green consumption research can be subdivided into research about consuming differently and research about consumption reduction. The focus of researchers has mostly been on research about consuming differently, while research about consumption reduction is still a less-explored area [14]. Therefore, this study contributes to the strand of research about consumption reduction by adopting zero waste concept.

In this study, zero waste lifestyle is measured by applying 3R theory (Reduce, Reuse, and Recycle). Several studies use 3R principles as the dimensions of waste management or zero waste lifestyle [4], [15], [16]. The Reduction principle is defined as minimizing the amount of waste through reducing consumption and waste avoidance [4], [5]. The Reuse principle refers to using again a product or a component/material of the product according to the original purpose (European Parliament 2008 in [4]). While the recycle principle refers to the recovery operation when waste is reprocessed into products or materials, it could happen for the original or other purposes. It includes the reprocessing of organic materials too (European Parliament 2008 in [4]).

Several studies have identified the determinants of zero waste lifestyle adoption. In general, these factors are divided into external factors and internal factors [10]. Săplăcan and Márton [4] identified several factors: attitude toward zero wasters, social norms, personal norms, altruistic motivation, egoistic motivation, and social media activity. Cole and Fieselman [17]

identified community factors in influencing individual behavior change related to the act of reducing and recycling paper at Pacific University, USA. This study uses some determinants which are used by Săplăcan and Márton [4]. The internal factors include attitude toward zero waste lifestyle, personal norm, and altruistic motivation. While the external factors used are social norms and social media activity. Those factors are chosen since Theory of Planned Behavior (TPB) are widely used by many studies related to green behavior [15]. Other than that, social media activity is chosen since generation-Z are exposed to modern technologies like the Internet and social media [44].

II. LITERATURE REVIEW

2.1. Attitude Toward Zero Waste Lifestyle

The study about sustainable consumer behavior was developed from Theory of Reasoned Action (TRA) by Fishbein and Ajzen [18] and Theory of Planned Behavior (TPB) by Ajzen [19]. Based on these two theories, attitude towards the action and social pressure are the main causes of the desire to act. In addition, according to TPB, perceived behavioral control is also an important predictor of the intention to take an action.

The attitude towards the action reflects how favorable a behavior is perceived by consumers [19]. In several studies on sustainable consumer behavior, it has been found that a more positive attitude results in a higher likelihood of engaging in recycling actions [15], [20]. So, the hypotheses in this study are:

H1a: Attitude toward zero waste lifestyle has a positive effect toward Reduction activity.

H1b: Attitude toward zero waste lifestyle has a positive effect toward Reuse activity.

H1c: Attitude toward zero waste lifestyle has a positive effect toward Recycle activity.

2.2. Social Norm

The next factor is related to the consumer's perception of social pressure from people around him that will affect the consumer's actions. This factor is called social norm. Many studies have demonstrated the role of social norms in explaining various social behaviors in general, and pro-environmental behavior in particular [16], [21], [22]. More specifically to the issue of household waste management, social norms were found to be significant in explaining recycling and reuse behaviors such as the use of plastic bags in supermarkets [23] . So, the hypotheses in this study are:

H1a: Social norm has a positive effect toward Reduction activity.

H1b: Social norm has a positive effect toward Reuse activity.

H1c: Social norm has a positive effect toward Recycle activity.

2.3. Personal Norm

Social norms can be internalized and developed into an internal source of behavior or what is called a personal norm [24], [25]. A study found that stronger personal norms increased attention to environmentally friendly packaging in the purchasing decision process [26]. Another study from Cecere *et al* [27] found that sustainable consumption and behavior patterns which lead to waste reduction are seldom socially oriented and exposed to peer pressure, and is thus dependent on individual attitudes. So, the hypotheses in this study are:

H1a: Personal norm has a positive effect toward Reduction activity.

H1b: Personal norm has a positive effect toward Reuse activity.

H1c: Personal norm has a positive effect toward Recycle activity.

2.4. Altruistic Motivation

In addition to the above factors, Li *et al*. [28] also explains that motivation is one of the factors that influence pro-environmental behavior. Exploring the motivation behind waste reduction is an important step for designing effective solutions to the waste problem [29]. One of the motivations associated with environmental concern is altruistic motivation, which explains that a person will do environmentally conscious behavior when he/she is aware of the harmful consequences for others because of the current state of the environment [30]. So, the hypotheses in this study are:

H1a: Altruistic motivation has a positive effect toward Reduction activity.

H1b: Altruistic motivation has a positive effect toward Reuse activity.

H1c: Altruistic motivation has a positive effect toward Recycle activity.

2.5. Social Media Activity

Generation Z which is the object of this study, has several characteristics: using technology in all aspects of life, prefer to socialize, learning faster because of open access to information, being confident, like freedom, and tend to behave instantaneously [31], [32]. Since they use technology in everyday life, Generation Z will get lots of information from the internet or social media. Bedard and Tolmie [33] found a positive relationship between the level of social media use and the level of purchase intention of environmentally friendly products. According to Fuentes *et al* [34], social media accounts that focus on zero waste are important sources of inspiration which can motivate other users to follow the example of zero waste influencers. So, the hypotheses in this study are:

H1a: Social media activity has a positive effect toward Reduction activity.

H1b: Social media activity has a positive effect toward Reuse activity.

H1c: Social media activity has a positive effect toward Recycle activity.

2.6. Research Framework

Based on the hypotheses proposed earlier, the research framework is presented in Figure 1 below:

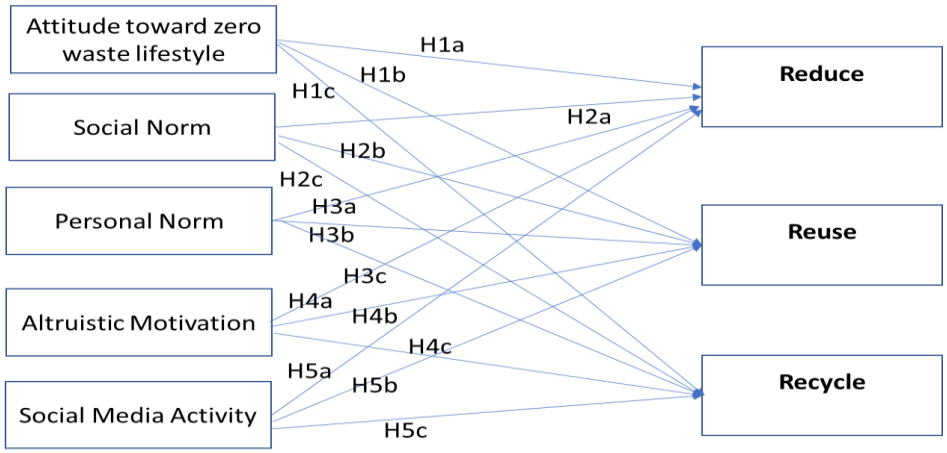

Figure 1. Research Framework

III. RESEARCH METHOD

The object of this study is generation-Z live in Indonesian big cities (Jakarta, Bogor, Depok, Tangerang, Bekasi area), aged between 15 – 24. Since there is no sampling frame for generation-Z in Indonesia, the sampling method used is non-probability sampling, specifically judgemental sampling. The sample used in this study is 322 respondents. The data collection was undertaken in August – September 2021 through online questionnaire.

A total of 27 indicators were used in this study for eight variables: attitude toward zero waste lifestyle [35], social norm [36], [37], personal norm [38], altruistic motivation [39], [40], social media activity (focus group discussion with one community), and reduce, reuse, recycle [4]. A Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was employed. The data were analyzed using partial least square-structural equation modelling (PLS-SEM), which is a suitable method to analyze a complex model and can estimate data that is not normally distributed [41]. The measure of all variables and indicators are described in Table

Table 1. Measurement and Outer Loadings

Variable	Code	Indicator	Outer Loadings
Attitude	**ATT1**	**I prefer a zero-waste lifestyle over a lifestyle that doesn't care about the environment**	0,849

	ATT2	I am willing to adopt zero waste lifestyle	0,915
	ATT3	I feel good when I adopt zero waste lifestyle	0,902
Social Norms	SN1	My friends influence me to adopt zero waste lifestyle	0,796
	SN2	Discussion with friends influence my opinion about zero waste lifestyle	0,767
	SN3	My parents influence me to adopt zero waste lifestyle	0,878
	SN4	I follow my parents in adopting zero waste lifestyle	0,897
Personal Norms	PN1	In my opinion, adopting zero waste lifestyle can reduce global warming impact	0,688
	PN2	I am concern about the environment, so I adopt zero waste lifestyle	0,904
	PN3	I do not want to pollute more by adopting zero waste lifestyle	0,920
Altruistic Motivation	ALT1	Adopting zero waste lifestyle is coherent with my values	0,817
	ALT2	I am willing to adopt zero waste lifestyle because it gives positive impacts to the environment	0,882
	ALT3	Adopting zero waste lifestyle gives better influence to people all over the earth	0,795
Social Media Activity	SMA1	I follow social media accounts which provide information about zero waste lifestyle	0,849
	SMA2	I participate in environmental related challenges/events held by social media accounts	0,863
	SMA3	I share information about zero waste lifestyle in my social media account	0,886
Reduce	RED1	I always bring my own shopping bag when shopping	0,745
	RED2	I always bring my own water bottle when I go out	0,718
	RED3	I do not use plastic straw	0,771
	RED4	I refuse plastic bags from merchants	0,804
Reuse	REU1	I print documents on used papers	0,746
	REU2	I'm willing to use second-hand products	0,726
	REU3	I prefer product from recycled material (for example: recycled bag or water bottle from recycled plastic)	0,784
	REU4	I reuse plastic packaging as food container	0,740
Recycle	REC1	I separate organic and anorganic waste in my house	0,858
	REC2	I compost organic waste in my house	0,900
	REC3	I collect anorganic waste to the nearest waste bank	0,879

IV. FINDINGS AND RESULTS

4.1. Sample Characteristics

The sample comprises of 38% male and 62% female respondents. The majority of respondents are college students aged between 18-22, with the percentage of 44%. Since most of the respondents are high school and college students, most of their income source is from their parents (55%). In term of personal expenditure, most of them spend less than IDR 500.000 per month (40%).

Table 2. Respondent's Profile

	Percentage
Gender	
Men	38%
Women	62%
Age	
15-17	28%
18-22	44%
23-24	28%
Personal Expenditure	
< IDR 500.000	40%
IDR 500.000 - IDR 1.000.000	18%
IDR 1.000.000 - IDR 1.500.000	11%
IDR 1.500.000 - IDR 2.000.000	11%
IDR 2.000.000 - IDR 2.500.000	4%
IDR 2.500.000 - IDR 3.000.000	4%
> IDR 3.000.000	11%
Income Source	
Own business	6%
Full time employment	23%
Part time employment	10%
Parents	55%
Others	6%

4.2. Validity and Reliability of Measurement

This research employed a variance-based method Partial Least Square with Smart PLS 3.0 as a tool to have two-stage analytical procedures [42]. This two-stage systematic procedure consists of measurement model analysis and structural model analysis. This study would assess the reliability, convergent validity, and discriminant validity.

Table 3. Construct Reliability and Validity

	No. of Indicators	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Attitude	3	0,867	0,918	0,790
Social Norms	4	0,857	0,903	0,700
Personal Norms	3	0,796	0,880	0,712
Altruistic Motivation	3	0,782	0,871	0,692
Social Media Activity	3	0,833	0,900	0,750
Reduce	4	0,757	0,845	0,578
Reuse	4	0,739	0,837	0,562

Recycle	3	0,853	0,911	0,774

The examination of convergent validity is the first step in the measurement model evaluation process. The outer loadings of each indicator and Average Variance Extracted were used to test convergent validity in this study (AVE). The value of outer loadings for each indication in Table 1 exceeds the minimal criterion of 0.7. The Average Variance Extracted (AVE) number is likewise higher than 0.50. Table 3 demonstrates the measurement model has sufficient convergent validity.

The Composite Reliability (C.R.) and Cronbach's Alpha are used in this study to assess the variables' reliability. If the score surpasses the minimum requirements of 0.7 for C.R. and 0.7 for Cronbach's Alpha, the questions measuring research variables will be considered reliable. As depicted in Table 3, all of the items are trustworthy because their scores are higher than the minimum requirement. Furthermore, for all variables, the variance inflation factor (VIF) values are less than 5. This finding implies that the independent variables employed in this investigation are not multicollinear [43].

Table 4. Discriminant Validity (Fornell-Larcker Criterion)

	Altruistic Motivation	Attitude	Personal Norms	Recycle	Reduce	Reuse	Social Media Activity	Social Norms
Altruistic Motivation	0,832							
Attitude	0,768	0,889						
Personal Norms	0,682	0,668	0,844					
Recycle	0,192	0,271	0,287	0,880				
Reduce	0,401	0,398	0,405	0,418	0,760			
Reuse	0,397	0,397	0,390	0,426	0,424	0,749		
Social Media Activity	0,297	0,341	0,352	0,553	0,513	0,451	0,866	
Social Norms	0,310	0,357	0,395	0,514	0,341	0,338	0,445	0,837

After that, the Fornell-Larcker criterion was used to determine discriminant validity, which stated that each construct's AVE should be greater than the squared correlation with another construct [43]. As shown in Table 4, this condition is met by all variables. Moreover, the loadings of each item are also compared to the total cross-loadings in this study. As informed in the Table 4 each item's loadings are higher than cross-loadings with items from other constructs, indicating discriminant validity [43].

4.3. Hypotheses testing and result

This examination would survey basic model to test research hypotheses utilizing the bootstrapping method with 5000 resamples to examine each of path coefficients value [43]. Based on table 5 and figure 2, out of 15 proposed hypotheses, 4 (four) were proved to be significant.

Table 5. Path Coefficient

	Beta	T Statistics >1,96	P Values <0,05	Result
Attitude -> Reduce	0,060	0,680	0,497	Rejected
Attitude -> Reuse	0,085	0,953	0,341	Rejected
Attitude -> Recycle	0,080	0,953	0,341	Rejected
Social Norms -> Reduce	0,062	1,163	0,245	Rejected
Social Norms -> Reuse	0,090	1,387	0,166	Rejected
Social Norms -> Recycle	0,326	3,937	0,000	**Accepted**
Personal Norms -> Reduce	0,101	1,368	0,172	Rejected
Personal Norms -> Reuse	0,085	1,164	0,245	Rejected
Personal Norms -> Recycle	0,047	0,626	0,531	Rejected
Altruistic Motivation -> Reduce	0,153	1,819	0,069	Rejected
Altruistic Motivation -> Reuse	0,155	1,636	0,102	Rejected
Altruistic Motivation -> Recycle	-0,122	1,294	0,196	Rejected
Social Media Activity -> Reduce	0,384	6,667	0,000	**Accepted**
Social Media Activity -> Reuse	0,307	4,660	0,000	**Accepted**
Social Media Activity -> Recycle	0,401	5,772	0,000	**Accepted**

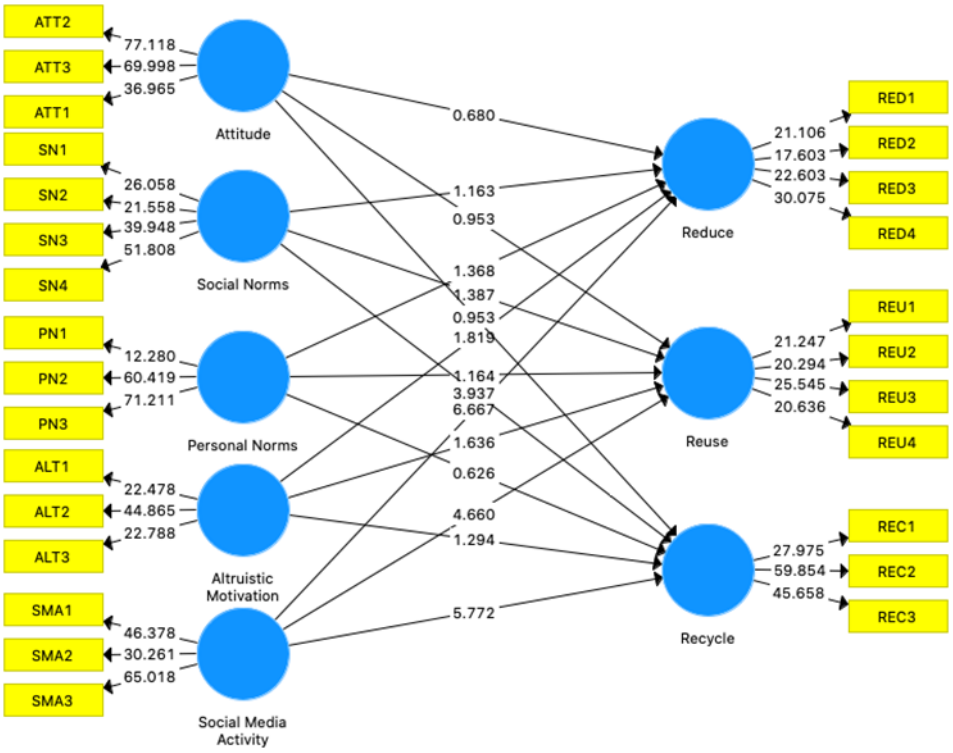

Figure 2. Structural Model (Bootstrap)

Based on the beta value, social media activities have a significant role to reduce, reuse and recycle behavior. Moreover, the social norms also have a positive impact to the recycle behavior. This research also calculates the R^2 of the proposed model. The adjusted R^2 of reduce, reuse, and recycle are 0.334, 0,286, and 0.391, respectively. Meanwhile, the remaining number of variations is attributed to external variables that were not included in the model. The results indicate that the proposed research theory can be used to examine the determinants of zero waste lifestyle adoption of generation-Z.

V. DISCUSSION

This study concludes that social media activity is the biggest predictor of zero waste lifestyle adoption among generation-Z, especially for recycle behavior. This result is consistent with previous studies [4], [34]. According to Fuentes *et al* [34], social media accounts which promote zero waste lifestyle are sources of inspiration for their followers. These social media accounts show that sustainable practices are possible and motivate their followers to follow their examples.

With regard to attitude toward zero waste lifestyle, this study has found that attitude has no significant effect to zero waste lifestyle adoption. This result is in line with the study of Whitmarsh

et al [16] which found that attitude did not have significant effect to recycling and waste reduction activities at home. According to that study, the possible reason of this insignificant result is because there are some barriers to translate intentions into action (for example lack of recycling facilities and lack of information).

As for social norm, this study shows that social norm has significant effect to zero waste lifestyle in term of recycle. This result is supported by the study of Mintz *et al*. [22] that concludes social norm has significant effect to recycling activity in Japan, Germany, and Israel.

In term of personal norm and altruistic motivation, this study concludes that those factors do not significantly impact zero waste lifestyle adoption of generation-Z. This result is similar to the study of Whitmarsh *et al* [16] which found that personal norm and motivation are not significant predictors of recycling behavior at home. In that study, the positive predictors are perceived behavior control and knowledge. Therefore, the reason behind insignificant result of personal norm and altruistic motivation is because belief and motivation to adopt zero waste lifestyle must be complemented by knowledge and also situational factor such as availability of recycling facilities.

VI. CONCLUSION

This study provides an insight that social media plays important role in supporting zero waste lifestyle adoption among generation-Z. This finding contributes practical implication for brands of green products and environmental related communities. Brand or communities may create social media contents that educate generation-Z about zero waste lifestyle and practical ways to do sustainable behavior. Brand or communities can also conduct several challenges related to zero waste lifestyle in social media where generation-Z may participate in the challenges and share their participation in their personal account. However, as a limitation, this study doesn't specify which social media channel is mostly used by generation-Z. So, the suggestion for further research is to analyze which social media channel is more preferable by generation-Z.

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