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Is It Possible to Implement the Same Circular-Economy Concept in Rural and Urban Areas? Study on Willingness to Pay for Household Waste

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Abstract: Household waste management is still a problem that has not been fully solved in various countries, regions, and even in households, due to various factors from within and outside the individual. Nevertheless, efforts to improve waste management continue, including the Willingness to Pay (WTP) model for better waste management. The research hypothesizes that various important factors that influence WTP can lead to a circular economy. The research data is collected through an online survey with a total of 255 respondents, which overall discusses waste and the strategies in its management. Based on factor analysis, the area of residence (rural or urban areas) and the income of respondents have a significant effect on WTP decisions. Furthermore, the WTP decision is tested through respondents' perceptions of various aspects of the circular economy that have an impact on health, awareness, desire, ability, and marketing prospects of waste which, when tested using the Spearman correlation, shows correlation between all aspects. We recommend these results to stakeholders to improve the management system of household waste management in both rural and urban areas through the WTP system, to achieve a circular economy.

Keywords: waste management; zero waste; willingness to pay; circular-economy concept; waste mitigation

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1. Introduction

Waste is a problem that has always been discussed, contested, and is a dilemma for all communities, stakeholders, and researchers. The waste problem is an issue that continues to look for a solution, because various regions have different social and demographic characteristics. Rural areas also experience contamination due to waste, including agricultural waste [1], while in rural Lebanon, household waste management through a sorting system is still very minimal, with a percentage of 26% [2]. In urban areas, the problem of waste management also lies in the fact that waste disposal facilities are too far away from the residence, so that individual interest in managing tends to decrease [3]. Household waste that is not handled properly can certainly cause various types of diseases, environmental pollution, and individual inconvenience, but if waste management is well organized, it may become an economic opportunity.

Various studies have offered a circular-economy (CE) model of waste management. The existence of CE in household waste management means that waste will be segregated through a circular concept that can reuse waste so that it has economic value and reduce hazardous waste and negative effects on the environment. CE is clearly in line with the concept of Sustainable Development Goals (SDGs) [4–7]. However, in urban areas the transition from linear to CE is still largely ignored [4], and CE compliance research in rural areas is still minimal. Furthermore, the global strategy towards CE in waste management is

still being pursued [8]. The CE strategy in Europe (EU) is applied with a closed-loop system with recycling and the reuse of waste [9,10]. CE strategies in waste management mainly in rural and urban areas simultaneously need to be studied in developing countries due to different social and demographic characteristics, so there may be many influencing factors. Studying developing countries, the prevalence of low-income regions, unemployment, a lack of collection, and free waste management are the key reasons why the informal sector may operate in all of these worldwide situations [11].

The waste management strategy in this study uses a willingness to pay (WTP) system to achieve CE in rural and urban areas. WTP in this study involves the community contributing through money, based on their willingness to appreciate waste management services that have collected and sorted household waste. Several previous studies examined rural areas in West China which showed a WTP decision of 73.72% [12], and positive responses in individuals in urban areas in Ethiopia [13]. The implementation of urban household solid-waste management in Germany has been analyzed for its high success rate; based on research, Germany has three concepts for waste management, namely, through clear laws, public education through campaigns, and financial investment to support waste management [14]. Another country, Taiwan, has a strategic plan and a target for 2025, by when all newly manufactured plastic containers, unless they are used for food storage, must have 25% recycled content, as its commitment to CE implementation [15]. However, the social and demographic characteristics of each region can influence individual WTP decisions [16]. This causes a gap in WTP application between rural and urban areas in using household waste management methods, coupled with the application of CE in waste management, which involves high technology in urban areas. The application of CE requires models, technology, and high skills [5,17]. However, the traditional method of waste management in most rural areas is by burning and disposal in landfills [18]. This has a negative impact on the waste crisis, and contributes to pollution due to combustion, which is why the linear economy is now being abandoned in favor of CE [19]. Another strategy adopted by the state of Egypt is that, instead of CE, it depends on the volume of household waste generated to be weighed, so that each individual pays a management fee according to that volume [20].

Various factors and individual perceptions of waste management are certainly related to the WTP decision to implement CE. In fact, individual perceptions show different results, because they are influenced by the environment, so that it is important to analyze waste management in the CE framework in specific regions, to make the proposed strategy successful. Previous research shows that the perception of norms on the negative effects of waste generates the actions of household waste reduction [2]. Furthermore, positive perceptions of waste management are also associated with government policies that regulate waste [21]. In the end, waste management policy recommendations are emphasized in government assertiveness and strict regulations regarding household waste systems are very important in various aspects in various places [13,16,22,23].

Based on the description above, it is indicated that it is important for individuals, communities, and the government to work together in determining and implementing strategies for managing household waste that is produced every day. Therefore, is it possible that the concept of CE in household waste management in rural and urban areas can run simultaneously with the same results? WTP may be applicable to rural and urban areas, so the research will determine the factors that influence WTP decisions in implementing CE in rural and urban areas and identify community perceptions and their correlation with household waste management. This study will analyze the factors that influence the community's WTP decision in household waste management in both rural and urban areas. The contribution of this study is expected to reduce the negative impact of household waste and recommend an implicative strategy for the government in the framework of SDGs, analyzing the differences in perceptions of rural and urban communities towards the concept of CE in waste management through WTP, determine

the concept of a waste-management-mitigation strategy through WTP, and provide an estimation of WTP in rural and urban area.

The limitation of the research is that the survey method was carried out only in the form of an online survey, which made it difficult to observe directly the feelings and physical and physiological conditions of the respondents. A comprehensive method of carrying out t field research is to conduct surveys through questionnaires and interviews by visiting the respondent's house and observing the surrounding environment better. Finally, the method in this study also has the advantage of obtaining responses quickly from respondents, by including those on both a rural and urban national scale, so that conclusions can be drawn, and the value estimated, regarding the WTP method in household waste management in the context of CE.

2. Materials and Methods

Data were obtained from cross-sectional surveys conducted online in October 2022, with a total of 255 household respondents. Respondents came from 26 provinces, consisting of rural and urban areas in Indonesia. The number of samples taken is based on data from the Indonesian Central Bureau of Statistics, Indonesia [24], which shows that Indonesia's population in urban areas in 2020 is 56.7%, and the projection in 2025 is that the remaining 60.0% will be in rural areas. Therefore, the composition of the study for a sample of respondents who live in urban areas is based on the range 56.7–60.0%. However, due to research limitations and the number of respondents, the number of respondents from cities exceeds the predetermined range, and the percentage of respondents in the urban area of the study is 60.4%. The research was conducted in October–November 2022 with an online survey (virtually), by applying questionnaires within the national scope of Indonesia as a developing country.

This survey is divided into 2: namely, socio-demographic characteristics and respondents' perceptions of the concept of CE waste management through WTP. The questionnaire used a Likert scale to facilitate data processing. This study analyzed data using IBM SPSS 25.0 software (IBM Corporation, Armonk, NY, USA). To examine the dependent variables (support for WTP in the waste management using the CE concept) age, gender, ethnicity, etc., were employed as socio-demographic predictor variables. Data were processed using descriptive statistics, the chi-square test, linear regression, analysis of variance (ANOVA), and the Spearman test. Descriptive statistics were used to summarize the frequency and socio-demographic percentage of the respondents. Linear regression was preceded by a normality test of data, followed by significance analysis. ANOVA was used to determine the simultaneous influence between factors, through the analysis of a significant relationship between factors on WTP decisions in the rural and urban area. The study used a level significant at α = 5%. The factors used in the study are the origin of respondents (rural/urban areas), the number of family members in the house, the income of respondents, and the waste-sorting behavior at home, analyzed using linear regression.

Perception uses an Likert scale with a value of 1: strongly disagree, 2: disagree, 3: undecided, 4: agree, and 5: strongly agree, so the appropriate test uses the Spearman correlation test. In the correlation test, CE perception was studied from various aspects, namely the effect of waste management with the CE concept on health, awareness, desire, ability, and marketing prospects for waste. The details of the perception referred to in the questionnaire are (1) health: the perception that waste causes human health problems; (2) awareness: every individual has a responsibility in managing waste, waste can be managed with the 3Rs (reuse, reduce, recycle), and individuals know that waste has an economic value; (3) individual desire to: sort waste at home, reuse waste, and sort waste for reuse; (4) individual ability: waste-processing technology can be utilized by the community, mobilize the community in managing waste, and obtain information about waste; and (5) marketing prospects for waste: waste can be a choice of resources in the production process of certain products and the market for recycled products is in demand from the community.

3. Results

A total of 43.1% of respondents sorted their waste at home, while 56.9% did not. Based on the origin of the area, both rural and urban showed a higher percentage in the behavior of not sorting waste (63.4% and 52.6%), but respondents who came from urban ares (47.4%) were dominant in sorting waste, compared to rural (36.6%). While the chi-square test showed 2.884 with a *p*-Value of 0.089, which indicates that there is no relationship between the origin of the respondent and the waste-sorting behavior, this is shown in the *p*-Value > α (0.005), meaning that the relationship is not significant (Table 1). Figure 1 shows that respondents from rural and urban areas in all income brackets mainly have no waste-segregation behavior, which means that both rural and urban areas in developing countries of Indonesia in this study, of low or high income, still have a low awareness of waste segregation.

Table 1. Participation of respondents from rural and urban areas in household waste segregation.

Origin (*n* = 255)	Waste Sorting (*n*;%)		Total (%)	Chi-Square	*p*-Value
	Yes	No			
Rural	37 (36.6)	64 (63.4)	39.6		
Urban	73 (47.4)	81 (52.6)	60.4	2.884	0.089
Total (%)	43.1	56.9	100		

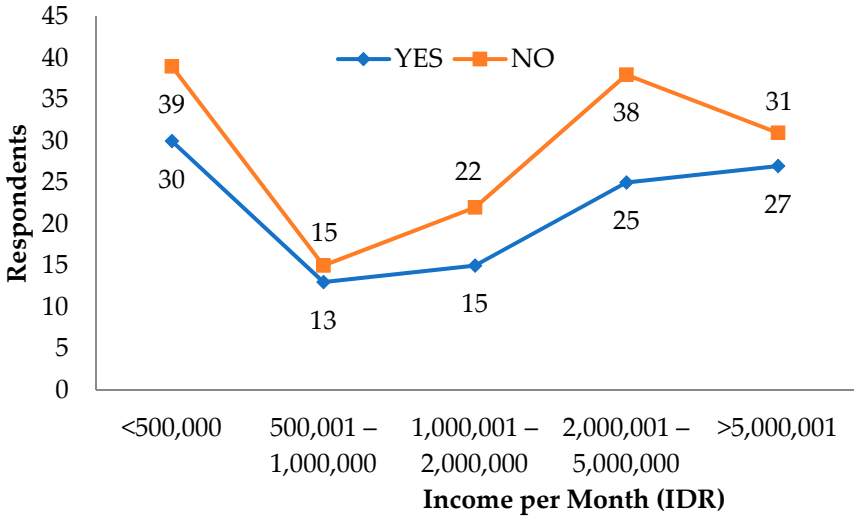

Figure 1. Comparison of income level and waste-segregation behavior. Note: <500,000 (USD < 32.67); 500,001–1,000,000 (USD 32.67–65.34); 1,000,001–2,000,000 (USD 65.34–130.68); 2,000,001–5,000,000 (USD 130.68–326.71); >5,000,001 (USD > 326.71). 1 United States Dollar equals 15,384.62 Indonesian Rupiah, 21 March 2023 at 18:34 UTC+7.

Based on the survey results (Table 2), there were 255 respondents, consisting of men (27.5%) and women (72.5%) of various ages. Respondents were also spread across 26 provinces in Indonesia, consisting of villages (39.6%) and cities (60.4%). Data on the number of respondents' family members were also included in the survey, with the most data showing >4 people (38.4%) in one house. Furthermore, the income of respondents in Indonesian rupiah (IDR) was also asked for, the most dominant income being in the range of IDR 2,000,001–5,000,000 (USD 130.68–326.71), with a percentage of 24.7%. Respondents' behavior in waste sorting shows the dominant result being that of not sorting waste at home, with a percentage of answers not amounting to 56.9%; specifically, the separation is based on organic and inorganic waste.

Table 2. Socio-Demographic Characteristics and Respondents' Background.

Characteristic	Categories	N	%
Sex	Male	70	27.5
	Female	185	72.5
Age	<20	15	5.9
	20–30	187	73.3
	31–40	40	15.7
	41–50	9	3.5
	>50	4	1.6
Place of Residence	Village	101	39.6
	City	154	60.4
Family Members (including respondents)	1	0	0
	2	17	6.7
	3	45	17.6
	4	95	37.3
	>4	98	38.4
Income per Month (IDR)	<500,000 (USD < 32.67)	69	27.1
	500,001–1,000,000 (USD 32.67–65.34)	28	11
	1,000,001–2,000,000 (USD 65.34–130.68)	37	14.5
	2,000,001–5,000,000 (USD 130.68–326.71)	63	24.7
	>5,000,001 (USD > 326.71)	58	22.7
Segregation of household waste	Yes	110	43.1
	No	145	56.9

Note: 1 United States Dollar equals 15,384.62 Indonesian Rupiah, 21 March 2023 at 18:34 UTC+7.

The analysis of socio-demographic characteristics was not sufficient to determine the potential of CE in rural and urban areas. Factors such as the origin of the respondent (rural/urban areas), the number of family members in the house, the income of the respondent, and the waste-segregation behavior at home were analyzed, using linear regression. Table 3 shows that the factors of origin (rural/urban areas) and respondent's income had a sig. of $0.017 < \alpha$ and $0.01 < \alpha$, respectively, with a value of $\alpha = 0.05$, which means that each factor singly (through the *t*-test) has an influence on WTP in household waste management. For the factors of the number of family members and the behavior of sorting waste at home, each showed a sig. value of >0.05, meaning that there is no influence of either factor on the WTP decision.

Table 3. Results of regression analysis of factors affecting willingness to pay by the community, in household waste management.

Factor	SD	t	Sig.
Origin (rural/urban)	0.164	2.41	0.017 *
Number of Family Members (people)	0.09	1.874	0.062
Income (IDR)	0.053	2.597	0.01 *
Waste-Sorting Behavior (yes/no)	0.161	−1.243	0.215

* significant at $\alpha = 5\%$.

The origin factor (rural/urban areas) and respondent income presented in Figure 2 shows that respondents from rural areas predominantly have an income of IDR < 500,000 (USD < 32.67), while urban areas are IDR > 5,000,000 (USD > 326.71). This shows that there is an income gap between rural and urban areas, which may be due to the type of work and also the minimum wage in each region.

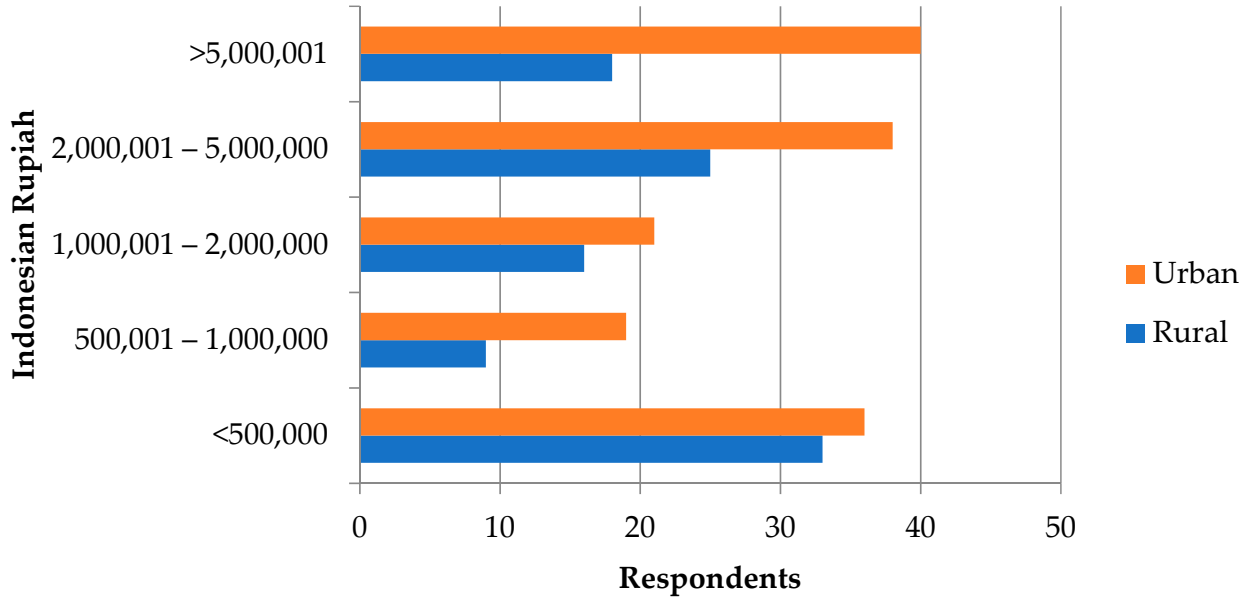

Figure 2. Income diagram of respondents in rural and urban areas. Note: <500,000 (USD < 32.67); 500,001–1,000,000 (USD 32.67–65.34); 1,000,001–2,000,000 (USD 65.34–130.68); 2,000,001–5,000,000 (USD 130.68–326.71); >5,000,001 (USD > 326.71). 1 United States Dollar equals 15,384.62 Indonesian Rupiah, 21 March 2023 at 18:34 UTC+7.

Based on the analysis of Table 4, which shows the single effect of each factor, it is not enough to see the simultaneous influence of the four factors, namely the origin of the respondent (rural/urban areas), the number of family members in the house, the income of the respondent, and the waste-sorting behavior at home; therefore, the results need to be further analyzed, using an analysis of variance (ANOVA) with F test analysis to determine the simultaneous influence of various factors on WTP decisions. Table 4 shows the sig. value of the factors simultaneously influencing the WTP decision to be 0.002 < 0.05.

Table 4. ANOVA results of factors on WTP decisions.

	Sum of Squares	df	Mean Square	F-test	Sig.
Regression	27.515	4	6.879	4.302	0.002 *
Residual	399.716	250	1.599		
Total	427.231	254			

* significant at α = 5%.

The analysis that has been presented has answered the WTP decision factors, but in answering the research objectives regarding CE through WTP it is necessary to analyze respondents' perceptions regarding CE in rural and urban areas. To find out the perception, a Spearman test was carried out, which came from a questionnaire with values of 1: strongly disagree, 2: disagree, 3: undecided, 4: agree, and 5: strongly agree. The perception of CE was studied from various aspects, namely the effect of waste management with the CE concept on health, awareness, desire, ability, and marketing prospects for waste tested, using the Spearman correlation. Based on the analysis of Table 5, all indicators show a sig. value of 0.00 < α, with a value of α = 0.005, meaning that the perception of CE on the influence of health, awareness, ability, and marketing is correlated.

The strength of the relationships among the perceptions of CE can be seen through the correlation coefficient value, which shows a very strong correlation between aspects of awareness with ability (0.870), awareness with marketing prospects (0.803), desire with ability (0.808), desire with marketing prospects (0.947), and ability with marketing prospects (0.947), whose value is very close to 1. Meanwhile, a strong correlation relationship is

shown in aspects of health with ability (0.724), health with marketing prospects (0.532), and awareness with desire (0.644), while, the aspects of health with awareness (0.485) and health with desire (0.313) show sufficient strength of correlation relationship. The overall correlation coefficient value shows a positive value, so the relationship between the two perceptions is unidirectional.

Table 5. Spearman's Rank Correlation Test Towards CE in Rural and Urban Areas.

		Health	Awareness	Desire	Ability	Marketing
Health	Correlation Coefficient	1	0.485 **	0.313 **	0.724 **	0.532 **
	Sig. (2-tailed)		0.00	0.00	0.00	0.00
Awareness	Correlation Coefficient		1	0.644 **	0.870 **	0.803 **
	Sig. (2-tailed)			0.00	0.00	0.00
Desire	Correlation Coefficient			1	0.808 **	0.947 **
	Sig. (2-tailed)				0.00	0.00
Ability	Correlation Coefficient				1	0.947 **
	Sig. (2-tailed)					0.00
Marketing	Correlation Coefficient					1
	Sig. (2-tailed)					

** Correlation is significant at the 0.01 level (2-tailed).

Furthermore, WTP was determined through a survey. Figure 3 shows that respondents from rural areas gave the strongest response to WTP with a value of IDR 1000–10,000, while urban areas amounted to IDR 10,000–30,000; this may be related to the economic power and income of rural communities and urban areas, shown in Figure 1. In general, the average community in both rural and urban areas mostly agreed to WTP, with a range of IDR 1000–20,000.

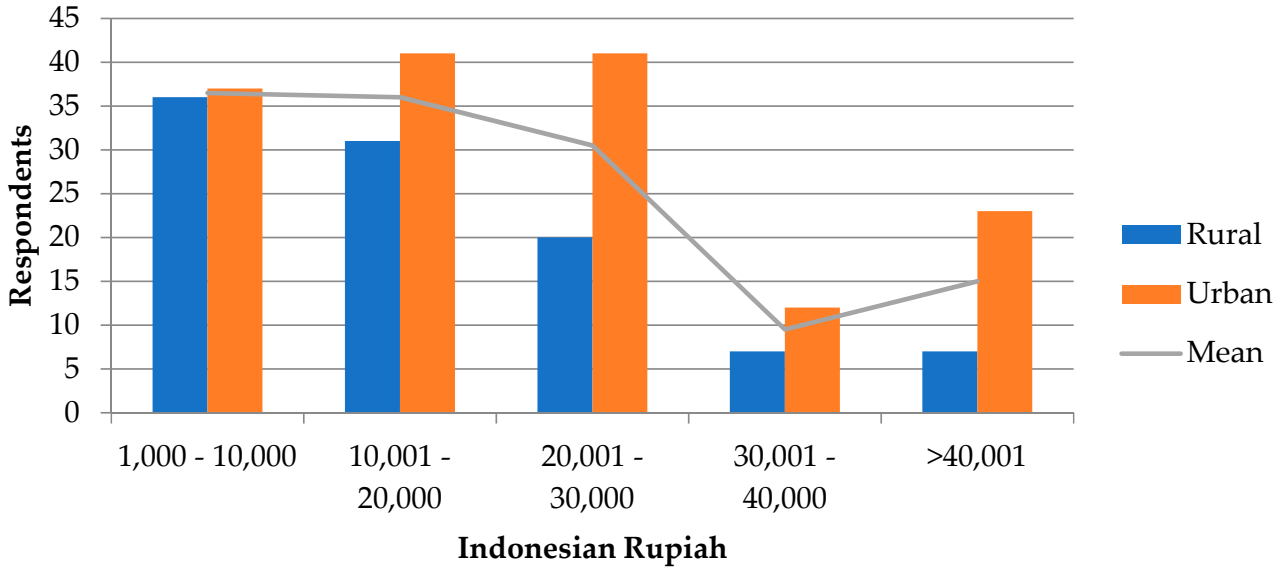

Figure 3. Demand for WTP in rural and urban areas with the implementation of CE. Note: 1 United States Dollar equals 15,384.62 Indonesian Rupiah 21 March 2023 at 18:34 UTC+7.

Based on Table 6, the estimated WTP for household waste management in rural and urban areas of Indonesia shows different estimated values. The estimated nominal expenditure for WTP per month in rural areas is IDR 16,534.7, and in urban areas it is IDR 20,551.9.

Table 6. Estimation of WTP receipts in rural and urban waste management.

WTP/Month (IDR)	Respondents		Median WTP	Estimated Receipt/Month (IDR)	
	Rural	Urban		Rural	Urban
1000–10,000	36	37	5000	180,000	185,000
10,001–20,000	31	41	15,000	465,000	615,000
20,001–30,000	20	41	25,000	500,000	1,025,000
30,001–40,000	7	12	35,000	245,000	420,000
>40,001	7	23	40,000	280,000	920,000
TOTAL				1,670,000	3,165,000
MEAN				16,534.7	20,551.9

Note: 1 United States Dollar equals 15,384.62 Indonesian Rupiah 21 March 2023 at 18:34 UTC+7.

4. Discussion

The study was conducted in rural and urban areas in Indonesia, to examine the factors that influence the decision of WTPs to implement CE. Based on the descriptive statistics in Table 1, both rural and urban areas showed a dominant attitude of 'no' to household waste segregation. This may be influenced by other factors and the socio-demographic environmental conditions where the respondents live. The chi-square test was 2.884, with a *p*-value of 0.089, indicating that there is no relationship between the origin of the respondent and waste-segregation behavior. This is in contrast to the chi-square test in other studies, where the significance between recycling practices and source separation was significant, with a *p*-value of 0.046 [25]. This may be due to the respondents' background and the socio-demographic conditions of their living environment.

Socio-demographic conditions are presented in Table 2. Respondents in the study were mostly in the age range 20–30, meaning that they are still quite young and it is easy for them to follow the development of household-waste-management strategies in this modern era. Furthermore, the income level of respondents mainly IDR < 500,000, with as many as 69 people, and IDR 2,000,001–5,000,000, with as many as 63 people; this income cannot reflect the overall economic level in the respondent's family, and it could be that the respondent is a family member who helps the head of the family (the main source of income). However, the respondent's income can be a factor in individual decisions to participate in WTP.

An individual's decision to participate in WTP is influenced by many factors. The factors of origin (rural/urban areas) and the income of respondents each separately significantly influenced the WTP decision (Table 3). This is in line with previous research, showing that income has an effect on household-waste-management attitudes; the more income increases, the more positive attitudes increase [26]. A factor also emphasized in the research of Tassie and Endalew [27] is that income per month has a statistically significant positive effect on household WTP. However, there is a large income gap, where respondents in rural areas have a dominant income of IDR < 500,000, while urban areas are IDR > 5,000,000 IDR (Figure 1). Each individual is encouraged in the WTP decision due to the sustainable influence of the future environmental factors [28]. On the other hand, WTP is important for waste collectors, because of the risk of coming into contact with dust, bacteria, and fungi, which can increase the potential for disease [29].

Furthermore, ANOVA testing to determine the role of factors simultaneously (the factors of rural/urban areas, number of family members in the house, respondents' income, and waste-sorting behavior at home), showed a significant influence on individual WTP decisions (Table 4). The rural- or urban-origin factor does show a different dominant income (Figure 1); if one family is aware of waste segregation it may affect the decision of other family members, but these four factors need to work together to decide on participation in WTP. Of course, the facilities in rural and urban areas for supporting waste management are also different, and this may be a consideration in individual decisions to participate in

WTP. For example, a lack of waste bins may result in littering, thus increasing the work of collecting the waste [30]. In fact, household waste generated daily in urban areas in large volumes, together with the willingness of urban communities to participate in WTP, is not accompanied by adequate waste-disposal facilities [31]. Infrastructure in waste management is an important fundamental aspect of considering how to maintain the waste-management cycle [32]. In fact, research using the deterministic model produced a model that recommends the addition of permanent and temporary facilities for waste management in urban areas [33]. Another recommendation was also made in previous research, namely, the building of more waste-collection facilities in every corner of the city, so that the city community can be motivated to dispose of waste and comply with WTP because of the clear concepts and the infrastructure [34]. Because more community education and communication are carried out regarding trash management, the Selective Waste Collection (SWC) door-to-door method in Australia can raise public knowledge of plastic waste products collected in the waste [35]. Therefore, what is the public perception of CE in rural and urban Indonesia?

Household determinants for better waste-management services are awareness and ability, based on Spearman's correlation test (on internal factors outside the CE concept of marketing aspects). Based on the results of research using the Likert scale, awareness is closely related to household responsibilities in managing waste, and the ability referred to is related to technology, information, and the ability to cooperate within households, to manage waste. Based on Table 5, results overall shows a correlation between perceptions, with a very strong, strong, and moderate relationship with a positive value, which means that if the response of perception 1 increases, it will increase the response to perception 2 towards the CE concept of waste management, through WTP. A very strong correlation is shown in the aspects of awareness with ability (0.870), awareness with marketing prospects (0.803), and desire with ability (0.808). Another study on urban communities in slums in developing countries in Uganda showed a high level of willingness to separate waste (76.6%), but its implementation needs encouragement from the government to increase participation, awareness, and willingness to actually sort waste [36]. The perceived awareness of each individual recognizes that waste is the responsibility of each individual that can be managed with the 3Rs, and still has economic value. The 4R system—reduce, recycle, reuse, and recover—comes with a sense of accountability and a personal understanding of the wisdom in considering the complete life cycle of plastic items in lessening the amount of garbage already existing [37]. The perception of desire in individuals is connected to sorting waste and reusing waste for the good of individuals, social and the environment. Meanwhile, individual ability is closely related to technology and information on waste management. At the present time, the dissemination of technology is the main challenge in both rural and urban areas as a whole, in the community. This is because the use of IoT has proven to be efficient in waste sorting, with an accuracy of 95.3125% [38]. The process of sorting waste is less than optimal [39], because individuals consider that sorting waste is a wasting of time [40]; therefore, in the future, it is predicted that technology can be a solution for better waste sorting. An urban smart waste-management system named CLSTRNN has the ability to analyze the details, properties, and types of waste materials with a 98.24% accuracy, based on IoT [41]. The key to the success of CE is waste segregation, which can improve resource efficiency [42].

One of the concepts included in CE is recycling, so that potentially recyclable waste can be separated by individuals from other waste to reduce greenhouse gases [43–45]. Based on the LCA analysis, combustion can contribute to gas emissions, pollute the environment, and harm health [46]. In EU countries, the concept of CE has been widely recognized by urban communities, with a recycling rate of 55%, which is due to the positive response of people to CE, and therefore this concept is developing in rural communities [47]. Where technology is not yet fully supported, perhaps small-scale household composting, recycling, and waste-minimization practices can be implemented [48].

This study shows that CE can be implemented through WTP by using household-waste transportation services. In general, the average community in both rural and urban areas predominantly agreed to a WTP of IDR 1000–20,000 (Figure 3), depending on the economic capacity of the individual. The use of any waste-collection service increased from 5% to 49% in the intervention communities [49]. However, WTP approval is indirectly related to community income. This is relevant to research that shows a significant positive relationship between the amount of WTP and the level of household income [50]. In contrast to other studies, income affects the WTP decision, which shows that the income of rural communities tends to be lower than urban communities, so that rural communities choose lower WTP values [51]. Among the various findings, the main feature of CE sustainability efforts through the concept of WTP is intervening in the form of socialization by educating the community about the dangers of waste, how to manage it, and mitigation strategies. Waste-education-campaign interventions have been proposed by previous studies [52].

Based on the research results, the dynamics of waste management with the concept of CE through the WTP system in rural and urban areas will definitely not be the same in the implementation. This is because the socio-demographic conditions, resources, facilities, perspectives, and economic conditions of the community in rural and urban areas are very different. The increase in domestic waste, especially plastic in rural areas, is a concern in developing countries, and therefore the involvement of rural communities is very important in realizing a CE to reduce negative impacts on health [53]. However, the low recycling rate in rural areas is due to the lack of recycling facilities and education on the urgency of environmental issues [51]. The lack of facilities has implications for rural communities that manage waste independently and conventionally through burning, stockpiling in an area, or dumping behind the house. These activities are commonly found in rural areas of developing countries [54]. This is because there are no regulations governing waste management at the village level, and these regulations are made with a different approach from that of urban areas [55].

The synergy of various parties in waste management is important so that they can work hand in hand. The central government can work holistically with governments in rural and urban areas through a decentralized system [56]. This is in line with previous research, which shows that the abundance of waste during the COVID-19 period can be dealt with by waste management within a decentralized system, which can be part of an extending government-led incentive program [57]. This allows local governments to manage and plan CE-system waste management well, in line with research that shows that household waste management that is entirely handled by a centralized system is at risk of causing a waste crisis [50]. The approach through a public space has a positive effect on waste management actions in rural areas, because the public space relies on social capital to improve the perception of villagers regarding the protection of natural resources and the environment [58].

Government targets in CE are important as serving as a reference and motivation for action. Planning decisions and targets can take lessons from the philosophy of countries that have successfully implemented CE. The success of WTP in waste management has been proved in rural areas in West China [12], with positive responses from individuals in urban areas in Ethiopia [13] and Germany [14], and with the arranged strategic plans of CE to manage their waste in Taiwan [15]. Regional governments can organize the development of a waste management system based on CE on the smallest scale, where each region can handle waste according to socio-demographic conditions to empower communities and entrepreneurs and create jobs that are suitable for rural and urban areas [59]. Indonesia has also started to see growth in the garbage-collection sector [60]. To broaden the reach of waste-collection services, a collaboration between start-ups and other parties such as the government and industry is crucial [61]. Another mitigation strategy is to involve producer companies in helping to invest and build waste recycling facilities as a form of responsibility for the waste generated by their companies [62,63].

5. Conclusions

The study analyzed various factors that influence the community's WTP decision in household waste management in both rural and urban areas. Of the four factors determined, two factors, namely origin (rural or urban areas) and individual income, provide a single response that affects the WTP decision. However, four factors (origin, income, family size, and waste-segregation behavior) simultaneously affect the WTP decision. WTP decisions are implemented by using waste-collection services that are expected to sort waste and implement CE. The perception of CE on the concept of WTP provides a positive correlation with a very strong, strong, and moderate relationship in various aspects of health perception, awareness, desire, ability, and marketing prospects. If one perception increases, it can increase other perceptions. Based on the study, mitigation of household waste management does not have to end with policy recommendations, but waste-management targets and planning need to be well organized. This study provides a tangible implementation strategy for mitigating CE-concept waste management through sustainable WTP through waste management services approved by the community in rural and urban areas. The implementation of CE in rural and urban areas cannot be equated, due to social geographical differences, and management should involve the local government in adapting to community conditions, involving the community, and utilizing existing resources.

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