Exploring the knowledge and participation of university students on waste-to-wealth program in Surabaya

Hanjaya Siaputra *

Petra Christian University, Indonesia

*Corresponding authors' email: tjunhan@petra.ac.id

ABSTRACT

University activities have a significant impact on the environment. The sustainable development paradigm has emphasized the importance of sustainable waste management practices at all organizational levels, including the implementation of waste-to-value initiatives. This study was conducted to investigate the level of understanding and engagement of students regarding wasteful initiatives for asset improvement. Convenience sampling was used to collect data from 382 students at Petra Christian University (PCU), which were then analyzed using descriptive and inferential analysis. Results showed varying levels of understanding among students based on demographics and overall understanding of waste to asset initiatives was good (mean score = 4.21/6). However, the participation of most students in these initiatives is low (71.47%). This study shows that their knowledge and demographic background (year of study, education level, income) influence students' participation in waste to asset programs. These findings suggest that more efforts are needed to increase student participation in waste-to-wealth initiatives.

1. INTRODUCTION

The management of waste is a significant challenge faced by many countries around the world, including Malaysia, Philipine and Indonesia (Chen et al., 2021; Browning et al., 2021). Indonesia, a rapidly developing nation in Southeast Asia, has experienced a steady increase in solid waste generation due to population growth, urbanization, and industrialization (Oktavio & Indrianto, 2019). According to the Coordinating Ministry for Human Development and Cultural Affairs report (Deputi 5, 2023), Indonesia generated approximately 21.1 million tons/year in 2022. This alarming figure has necessitated the exploration of innovative waste management strategies to mitigate environmental pollution and promote sustainable development. The focus group discussion participants included representatives from various government agencies at the national, regional, and local levels, as well as people's organizations (Andalecio et al., 2022).

In recent years, the concept of waste-to-wealth has gained prominence as a sustainable solution to address the environmental and economic issues associated with waste management (Sarpong & Alarussi, 2022). In the higher education sector, universities have the potential to play a pivotal role in fostering waste-to-wealth practices through research, innovation, and knowledge dissemination (Sani et al., 2024). Furthermore, incorporating waste-to-wealth initiatives into the curriculum and university activities can equip students and its staff with relevant skills and knowledge in sustainability and resource management (Lebreton & Andrady, 2019). The economy is rapidly growing, causing consumers to shift their food preferences from fresh to safe, which has led to a demand for pollution-free and environmentally friendly food (Cheng et al., 2022).

In Indonesia, the enhancement of the sustainable campus idea is generally focused on reducing the amount of solid waste generated. However, Anthony Jnr (2021) mentions, due to insufficient ecological stewardship and a lack of commitment to environmental care among the campus community, this approach poses a risk for several universities in Indonesia. Campuses are one of the contributors to plastic waste. Referring to research in America some time ago, each student produces an average of 640 pounds or 290.56 kg of solid waste each year, including 500 used drink bottles, 320 pounds or 145.28 kg of paper waste (Saturi, 2020).

The difficulty encountered by the concept of student's participation in waste-to-wealth program, which is frequently perpetuated by the unwillingness of certain stakeholders with an agenda to maintain a status quo that limits the involvement through centralization of authority, elite domination, poor information sharing, and a contemptuous professional attitude toward equipping locals with the necessary skills to meaningfully participate. This is due to inadequate legal and regulatory structures designed to protect and defend the interests of students to enable genuine participation in planning, development, and management (Andjarwati, et al. 2023; Purwadi et al., 2023).

Learning from Malaysian waste management activities, another major issue is a lack of student's cohesiveness at the local level, which has harmed local people's interests and commitment levels to engage in various activities. The major causes for insufficient garbage disposal are financial and institutional restrictions, particularly where municipal governments are weak or underfunded and population increase is high (Abas et al., 2023). Furthermore, lack of time is also one of the issues in lack of participation among universities students in waste-to-wealth initiative (Andalecio, 2024). Multiple risk factors, some of which may be interrelated, may frequently be experienced by young individuals (Baba-Nalikant et al., 2023),

In Abas et al. (2023), the issues of ineffective waste-to-wealth program in higher education is because of lack of awareness and engagement with the campus community. Waste-to-wealth initiatives require active participation and engagement from students, faculty,

and staff. However, there is often a lack of awareness and understanding about the potential benefits and opportunities associated with waste-to-wealth in Indonesia's higher education institutions. This lack of engagement hinders the effective implementation and sustainability of waste-to-wealth practices. Besides that, effective waste-to-wealth initiatives require collaboration among various stakeholders, including universities, industry partners, government agencies, and local communities. However, in Indonesia's higher education system, there is a lack of structured collaboration and networking opportunities (Oktavio et al., 2023), which limits the scalability and impact of waste-to-wealth projects.

Waste-to-wealth initiatives hold tremendous potential for higher education in addressing its solid waste management challenges, reducing environmental pollution, and unlocking economic opportunities. However, the successful implementation of these initiatives requires a comprehensive approach that addresses low campus community awareness, knowledge, and participation (Nomishan, et al., 2024). Therefore, this study been conducted to explore level of knowledge and examine the participation level among the students on waste-to-wealth initiatives.

2. METHODOLOGY

Study Area

The study area of this research is Petra Christian University (PCU) which located at the East Java, Indonesia. The total number of students in PCU is around 8,000, which come from distinguish ethnics and regions in Indonesia. Entrepreneurship is the PCU thrust where all students are equipping with entrepreneurial skills. The initiative of waste-to-wealth is one of entrepreneurial activity in PCU that involve students and staffs. Therefore, PCU was selected as a study area.

Sample Size and Sampling Technique

The entire population size is important before determining the sample size. In this study, a total number of 382 respondents participated which exceed minimum numbers of respondents (368). Convenience sampling was adopted to select the respondents. This sampling method helps in achieving a relatively sample size faster than the probability sampling technique. The instrument design has the benefit of investigating the respondent participation in waste-to-wealth initiative. The questionnaire has three sections for the responder to complete: Section A - Socio-demographic, Section B - Level of knowledge among students, and Section C - Level of participation in waste-to-wealth initiatives. There are two types of measurement: nominal, ordinal, Nominal scale data were used to characterize the variables in terms of their category. The quantitative instrument is used to collect data through

semi-structured interviews. The respondents were given a design question with a yes or no and an open-ended question. It was performed by an interview guide who had three sections that explained the demographics, level of knowledge and level of participation (Boateng et al., 2015).

The extent to which measuring instruments are relevant and operate as a representation of the target concept is referred to as the validity test or content validity. The validation test is carried out by submitting a sample of the questionnaire to an expert. Regarding this study, the expert oversees all the questionnaires to ensure that the material is specific and thoughtful enough for all the respondents. The experts have gone through all the questionnaire items to ensure their clarity, comprehensiveness, and trustworthiness before deciding which questions will be included in the final questionnaire.

A pilot study is a method for testing the questionnaire with a smaller sample size than what is anticipated which was for only 30 respondents. Pilot study conducted to assess the precision of the guidelines to be measured. After that, the reliability test was conducted by using Cronbach alpha coefficient that was most widely used for internal-consistency coefficient. It was suitable to determine whether the scale was reliable or not commonly for multiple Likert questions in a questionnaire that had a scale. If alpha was high, it indicated the greater reliability of the scale. Any measurement's reliability refers to the extent to which it is a consistent measure of concept and Cronbach's alpha is one way to measure the strength of that consistency. In exploratory research, values between 0.6 and 0.7 can be accepted as moderately good (Taber, 2018). The internal consistency can be analyzed by using Cronbach's alpha in SPSS Statistics software. The level of knowledge is (0.729) and the level of participant value is (0.813) which within the acceptable range of alpha Cronbach.

Normality tests was applied to determine whether a data set is modelled for a normal distribution in statistics. kurtosis and skewness were adopted to determine the normal distribution by measure how differently formed a distribution's tails are from the tails of the normal distribution. Kurtosis concentrates on the tail form, whereas skewness concentrates on the overall shape. A normality test will be performed using the Skewness and Kurtosis tests to see whether the data being gathered are distributed normally across independent and dependent variables (Khatun, 2021). Skewness is a metric for symmetry or the lack of. A normal distribution has a zero skewness, which compares the sizes of the two tails before calculating the kurtosis. The result of skewness and kurtosis that the respondent's knowledge was approximately normally distributed for all the section in the questionnaire with a skewness value is 1.026 and -1.1004 and kurtosis value is 1.235 and -0.672 respectively which result that all is in within -2.0 to 2.0. This prove that all data collected is normally distributed.

Descriptive statistics is a tool used to summarize large amounts of data in a more understandable way. It provides basic information relevant to any quantitative data analysis and helps determine the normality of the distribution. Central tendency includes the mean, median, and mode, while the measure of variability includes the standard deviation and range. Descriptive analysis was used to measure students' level of understanding and participation in the waste to asset initiative in terms of applied percentage, mean and standard deviation of each variable or component. According to Rahman and Muktadir (2021) the degree of knowledge can be gauged on a 5-points, with 1-2 indicate a low level of knowledge, 3-4 a moderate level, and 5-6 is a high level of knowledge. This information was used to assess the level of knowledge of students on waste-to-wealth.

Three types of participation levels that use by the Arnstein (2019) used are, Non-participation, Tokenism and Citizen Power. The Question Ladder Template for problems can be completed using this Arnstein theory, which can also assist highlight the question ladder's advantages and disadvantages. This question ladder's goal is to aid in asking the proper questions, and as such, it serves as one phase in a larger process of compiling and assessing data and supporting evidence. Null hypothesis for this study is there is no relationship between different socio-demographic with the participation level among PCU's student in waste-to-wealth initiatives. The independent variables of this study are socio-demographic factors (gender, age, year of study, faculty of study, and household income). Besides that, the dependent variable is the participation level of PCU's student in waste-to-wealth initiatives.

The T-test was utilized in this investigation as a statistical test. This test was used to investigate maximum 2 groupings of subjects such as the gender, age, and household income of the students. This test can detect level of knowledge and level of participation. This test is meant to investigate which gender influenced the dependent variable, knowledge of waste-to-wealth. By comparing the mean between genders, they are connected. Aside from gender, the level of knowledge acts as an independent variable that influences respondents' participation of the waste-to-wealth initiative. It was used to measure the factors that influence the participation among students.

ANOVA is a statistical technique used to compare the means of more than 3 categories in subjects. It is a method of comparing distinct samples in different contexts by utilizing a single dependent variable. In this study, ANOVA is utilized to compare means and highlight the association between more than two variables' groups. The outcome will accept or reject the null hypothesis depending on the circumstances. The ANOVA test is used to describe the components of respondent type and age that become variables in influencing the measured dependent variable. In this study, ANOVA was used to analyze between the students' participation of waste-to-wealth in PCU and the factors affecting participation.

3. RESULTS AND DISCUSSION

Demographic Profile of Respondents

Table 1 shows that most of respondents is female (67,02%) with age range 20-22 years old (82,72%). Moreover, majority of respondents are in year 3 of study (40,05%) and they are from School of Business and Management (31,68%) and Faculty of Civil Engineering and Planning (29,32%). 36,91% of respondents are come from family with IDR 15,000,001 - 20,000,000 for household income.

Table 1. Socio-Demographic Profile of Respondents, N= (382)

Demographic	Frequency	Percentage
Gender		
Male	126	33 %
Female	256	67 %
Age		
19 years' old	24	6 %
20 years' old	126	33 %
21 years' old	143	38 %
22 years' old	47	12 %
23 years' old	36	9 %
24 years old	6	2 %
Year of study		
Year 1	28	7 %
Year 2	132	35 %
Year 3	153	40 %
Year 4	63	16 %
Year 5	6	2 %
Name of Faculty		
Faculty of Civil Engineering and Planning	112	29 %
Faculty of Industrial Technology	86	22 %
School of Business and Management	121	32 %
Faculty of Teacher Education	18	5 %
Faculty of Humanities and Creative Industries	45	12 %
Household Income (IDR)		
< IDR 4,500,000	18	5 %
IDR 4,500,001 - 10,000,000	53	14 %
IDR 10,000,001 - 15,000,000	102	26 %
IDR 10,000,001 - 15,000,000	141	37 %
IDR 15,000,001 - 20,000,000	68	18 %

Source: Compilation by the Author (2024)

More students are interested in waste-to-wealth than are actually participating in waste-to-wealth projects. We need to do more environmental activities at PCU and have programs to help people understand how to manage waste-to-wealth better. It's important to look into the things that have affected the waste-to-wealth project. We want to make it better and reduce the environmental problems caused by a bad waste-to-wealth project. It's important to get young people involved in waste-to-wealth because they are creative and have new ideas to make waste-to-wealth projects better. People who know a lot about turning waste into valuable things are more likely to get involved in waste-to-wealth activities to learn more about how to

do it. Indonesia's colleges and universities can help a lot with managing waste and making society more environmentally friendly.

More students are interested in waste-to-wealth than taking part in waste-to-wealth projects. PCU needs to do more activities or programs to help people understand how to manage waste-to-wealth better. We need to investigate what factors might have affected the waste-to-wealth program so we can make it better and reduce its environmental impact. It's important to get young people involved in waste-to-wealth because they have great ideas to make it better. People who know a lot about turning waste into valuable resources are more likely to get involved in projects that turn waste into wealth because they want to learn more about how it can be done. By solving these problems, universities in Indonesia can help to manage waste and move towards a society that uses resources more wisely.

Level of Knowledge about Waste-To-Wealth

Table 2 shows PCU students' reactions to statements about wasting wealth. The number one statement was tied to the fact that recycling has the potential to be a source of secondary income and received 351 correct answers from respondents (91.88%). The second question related to food waste composting had 359 correct answers (93.98%). There were 353 people (92.41%) who answered correctly and 29 people (7,59%) who answered incorrectly for questions related to buying and selling used cooking oil. There were 364 (95,29%) correct answers; Meanwhile, the incorrect options were 18 (4,7%) for question number 4. 256 respondents (67,02%) correctly answered the last question that related upcycling initiatives will increase the amount of solid waste processed in landfills. The rest of respondents, 126 people (32,98%), answered incorrectly.

An effective waste management system can create valuable resources for reuse. This can lead to cost savings, new jobs and business opportunities. Reducing, reusing and recycling waste can be financially beneficial and beneficial to the environment. The study examined the knowledge of waste and wealth of students. The study found that the respondents knew that they were wasting and wealth because they only knew the general knowledge when applying it to their lifestyle. On the other hand, some respondents did not have basic knowledge about waste and wealth. However, there is a need to develop students' knowledge about waste-to-wealth conversion. Respondents acknowledged that sustainable waste management is a shared responsibility of government and community members. The key recommendation of the study is that more efforts need to be made to increase students' awareness through awareness programs that can bring about significant changes in their attitudes and perceptions towards education. with waste of wealth (Amasuomo & Baird, 2016).

Knowledge level was determined using a three-point scale, indicating high, medium, and low levels. This was used to understand the knowledge level of PCU students in the waste-to-wealth initiative. Descriptive statistics show awareness of the waste-to-wealth initiative among PCU students. The high score shows 79.9% (294) correctly answered all questions related to knowledge of waste-to-wealth. In summary, university students were knowledgeable about waste and asset management, while 19.6% (72) had moderate knowledge. This can be improvised by guiding students to carry out well-informed campaigns or programs as educational activities.

Table 2. PCU Students' Feedback on Waste of Wealth Statements

Statements	Frequency			
	Correct	Percentage	Incorrect	Percentage
Glass waste and plastic waste can be recycled and sold as a side income.	351	92 %	31	8 %
Food waste can be converted to compost that is useful for plants	359	94 %	23	6 %
Used cooking oil can be sell to vendor and can convert to useful things	353	92 %	29	8 %
I know the waste-to-wealth initiative gives skills and guidance to students to be creative in creating something that can be used from recycled materials	364	95 %	18	5 %
"Upcycling" initiatives will increase the number of solid wastes been disposed in landfill.	256	67 %	126	33 %

Source: Compilation by the Author (2024)

Few respondents expressed low levels of knowledge; only 5% (19) indicated they were unfamiliar with waste-to-wealth initiatives. The average total score is 2.67. Students are still in the learning process. This is evidenced by the mean scores of all knowledge items having a mean score of 3.00 or higher, meaning that their knowledge level is excellent. According to Abas et al. (2023), three demographic factors can influence the level of knowledge: gender age and education level. Therefore, lack of knowledge indicates a lower level of participation in wastefulness. In their research, Sun et al. (2018) stated that it is important for youth to know about waste-to-wealth initiatives, because they are more creative and have new ideas to improve waste-to-wealth initiatives.

Level of Student Participation in the Waste-To-Wealth Initiative

Table 3 shows that 163 (42,67%) of the respondents participated in an activity related to waste-to-asset, while 219 (57.33%) of the respondents did not participate. Second, for the statement regarding the information that the university organizes more initiatives related to waste-to-wealth, 154 (40,31%) of the respondents answered Yes and 228 (59,69%) responded No to this statement. For the statement regarding participating in the university's

waste-to-wealth initiative, 104 students (27.23%) answered Yes and 278 (72.77%) answered No for the statement. This dad. Regarding the statement "I participate in decision making for each activity related to waste-to-wealth assets at the university", 86 (22,51%) answered Yes and 296 (77,49%) answer No to this statement. The final statement concerned engaging in discussions with university administration to improve waste collection practices on campus, a statement to which several respondents, 48 (12,57%) answered yes, and 334 (87,43%) answer no. Most of the time the answer is no rather than yes. This shows that the results are clearly low due to low participation in wealth enhancement initiatives. To increase student engagement, staff or faculty should organize outdoor activities for students can participate. By exposing students to outdoor activities related to waste-to-wealth, they may be interested in learning more about turning waste and profit.

Table 3. PCU Students' Feedback on Waste of Wealth Statements

Statements	Frequency			
	Correct	Percentage	Incorrect	Percentage
I have participated in any activity related to waste-to-wealth organized by any university activities	163	43 %	219	57 %
I have informed the university to organize more initiatives related to waste-to-wealth	154	40 %	228	60 %
I have done a waste-to-wealth initiative with the university and students	104	27 %	278	73 %
I am involved in making decisions for every activity related to waste-to-wealth in the University	86	23 %	296	77 %
I was involved in discussions with the management of university to improve waste-to-wealth activities at the university	48	13 %	334	87 %

Source: Compilation by the Author (2024)

Participation by category has an overall average score Average is 1.78/3.00. There are three levels of category participation: Non-participation, Tokenism, and Citizen Control. Non-participation rate was 71.47 (273) students, meaning students were not willing to participate in the student wealth squandering program. It is displayed at a low level, as shown above. Additionally, tokenism shows 18,06% (69), which have higher proportional to citizens' ability to control. This shows that Citizen Control had lower levels of engagement in the waste-to-wealth initiative (Abas et al., 2020).

Socio-Demographic Factors Influence Student's Participation in Waste-To-Wealth Initiatives

Table 4 shows that the components that act as independent variables are socio-demographics. For gender t = (382), 6.512, p-value (<0.01), smaller than the p value. This

indicates that gender has a significant value of 0.01, meaning it is less than the p value = 0.05, so the variance is equal. This study rejects the null hypothesis that there is a significant relationship between gender differences (male and female) and participation in waste-to-wealth initiatives. Statistics show that male student's participation in waste-to-wealth initiatives are higher than female students.

Table 4. Statistical Result for Socio-Demographic Factors influences the Participation Level

Demographic	Mean (SD)	t/F value	p-value	Note
Gender				
Male	1.93 (0.83)	6.512	< 0.01	Significant
Female	1.01 (0.79)			
Age				
19 years old	0.29 (0.61)			
20 years old	0.73 (1.21)			
21 years old	1.43 (1.60)	11.349	< 0.01	Significant
22 years old	1.41 (1.62)			
23 years old	1.91 (1.83)			
>24 years old	2.60 (1.88)			
Years				
Year 1	0.95 (1.39)			
Year 2	1.62 (1.64)			
Year 3	1.78 (1.72)	17.464	< 0.01	Significant
Year 4	2.23(1.95)			
Year 5	2.34 (1.08)			
Faculty				
Faculty of Civil Engineering and Planning	2.01 (1.83)			
Faculty of Industrial Technology	1.94 (1.34)			
School of Business and Management	2.17 (1.84)	5.26	< 0.01	Significant
Faculty of Teacher Education	1.68 (1.38)			
Faculty of Humanities and Creative Industries	1.86 (1.43)			
Household Income (RM)				
< IDR 4,500,000	1.27 (1.43)			
IDR 4,500,001 - 10,000,000	1.54 (1.25)			
IDR 10,000,001 - 15,000,000	1.81 (1.41)	1.342	0.1069	Not Significant
IDR 15,000,001 - 20,000,000	1.98 (1.56)			
> IDR 20,000,000	1.31 (1.47)			

Source: Compilation by the Author (2024)

ANOVA test was conducted to determine the type of asset wasting initiatives by socio-demographics. Table 4 shows, ANOVA analysis of variance was performed to determine gender, age, year of study, faculty, and household income. Statistics show that different age groups have a significant influence on the participation level of PCU students [F=368. 11.349, p-value (<0.01)]. The p value is less than α=0.05, rejecting the null hypothesis that age has an impact on the level of student participation. Senior students (>24 years old) had a much

higher level of participation in the waste-to-wealth initiative than younger students (<23 years old).

Furthermore, this shows that a is significant when the p-value is <0.01, which is very significant and will reject the null hypothesis, F = (368. 17.464), p-value (<0.01)). Statistics show that the difference [F= (368. 5.26) p-value (<0.01)] affects the level of participation in waste-to-wealth. This indicates that the null hypothesis has been rejected. The results show that students of School of Business and Management have a higher level of participation in the program Turning waste-to-wealth than students from other faculties. Furthermore, this study shows that different household incomes do not have a significant effect on the participation level of PCU students [F = (368. 1.342, p-value = 0.1069].

4. CONCLUSION

Waste-to-wealth initiatives in the Indonesian higher education system have great potential in addressing environmental challenges while promoting sustainable economic development. However, the results show that PCU students' level of understanding about waste-to-wealth is higher than their level of participation in waste-to-wealth initiatives. Many environmental activities or programs need to be implemented at PCU to ensure better understanding between them for proper management of waste and wealth. Furthermore, it is important to study the factors that may impact the waste-to-wealth initiative with the aim of improving the situation and minimizing the environmental threat associated with the initiative. Converting waste into inefficient assets. Involving young people in waste-to-wealth activities is important because they are more creative and have new ideas to improve waste-to-wealth initiatives. People with higher waste-to-wealth knowledge tend to join waste-to-wealth to learn more about wasting wealth. By addressing these challenges, Indonesian higher education institutions can contribute significantly to waste.

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