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WILLINGNESS OF ISLAND COMMUNITY TO PARTICIPATE IN THE WASTE-TO-WEALTH PROGRAM: A CASE STUDY IN TELUK RENJUNA, TUMPAT, KELANTAN, MALAYSIA

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Abstract

This manuscript explores Teluk Renjuna communities' willingness to participate in the waste-to-wealth program. Waste-to-wealth is an initiative to reduce the environmental impact of waste disposal. The total number of respondents who participated in this study was 118 respondents. Analysis indicated a reasonable waste disposal practice among respondents, with moderate knowledge and high awareness of the waste-to-wealth program. Besides that, this study found no significant sociodemographic impact on the knowledge and awareness of respondents on the waste-to-wealth program, except for age, income, and marital status. A Pearson Correlation test assessed the significance between knowledge, awareness, practices, and willingness. The results indicated a weak relationship between practices and willingness. A moderate relationship was found between knowledge and willingness, and a strong relationship was observed between awareness and willingness. The findings of this study are crucial to help government agencies or NGOs in planning suitable waste-to-wealth programs for the island community.

Keywords: Waste-to-Wealth, Waste Disposal Practices, Knowledge, Awareness

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INTRODUCTION

Unsustainable solid waste management directly threatens the environment, public health, and economic stability (Cayumil et al., 2021). Globally, 33% of the 2.01 billion tons of solid waste generated annually remains uncollected, with predictions of reaching 3.40 billion tons by 2050 (Guo et al., 2021). Efficient solid waste management is essential to alleviate the negative impacts on rural communities' social, economic, and environmental well-being due to population growth (Hoang & Fogarassy, 2020). In rural areas of Kelantan, Malaysia, waste disposal methods involve burial and burning, facing challenges like insufficient collection coverage, inconsistent services, and lack of knowledge, contributing to poor waste management. The success of waste management initiatives like Waste to Wealth relies on community engagement, practices, and public acceptability. Waste to Wealth transforms waste into valuable resources through recycling, upcycling, composting, and the 3R program (Egun, 2012). Composting, for instance, offers an alternative to waste disposal in the baking sector (Govindaraju et al., 2021). Implementing waste-to-wealth programs in Malaysia, such as recycling e-waste, has economic potential, though challenges like low awareness persist (Ismail & Hanafiah, 2021). Similarly, opportunities for generating resources from organic acids in the palm oil industry face challenges due to a lack of awareness and environmental concerns (Mumtaz et al., 2010). Addressing increasing solid waste, like plastic bottles, through recycling activities requires raising awareness, as seen in the Serdang community (Utiti et al., 2021). This study aims to assess the willingness of the Teluk Renjuna Community to participate in the 'Waste to Wealth' program, emphasising the importance of community engagement for environmental, economic, and social well-being.

LITERATURE REVIEW

Community Willingness to Participate in Waste-to-Wealth Program

Socio-demographics, including gender, age, education, and income, are crucial in influencing community participation in Waste-to-Wealth. Knowledge and awareness are linked to daily human activities and are impacted by socio-demographic factors. Research by Wang et al. (2020) suggests that individuals with favourable socio-demographic backgrounds are more likely to participate in household solid waste recycling programs, despite having less knowledge of recycling. Conversely, previous studies indicate that low-income households may not contribute to recycling practices due to financial constraints compared to higher-income households. Issock et al. (2020) found that young females with low to medium income and high knowledge levels are more inclined to engage in environmental programs like household waste separation.

Good practices play a role in fostering willingness to engage in sustainable programs (Yusoh et al., 2023). Waste disposal practices, including recycling, composting, source reduction, landfills, and animal feeding, are gaining attention in the environmental community. Funding from local authorities in Nigeria has been identified as a significant factor contributing to effective waste disposal practices, impacting sustainable waste management (Ogu, 2000). Conversely, a lack of funding results in challenges such as the inability to purchase new waste collection vehicles, inadequate workforce, poor vehicle maintenance, and unsubsidised waste storage containers, leading to increased solid waste generation (Abila & Kantola, 2013). The increased knowledge provides an understanding of the natural and social worlds, impacting attitudes to participate in environmental programs. In a study by Almulhim (2022), communities with high knowledge of e-waste management showed willingness to participate in e-waste recycling programs, while a lack of knowledge was linked to an increase in solid waste. Factors contributing to the lack of knowledge include limited communication channels, such as mass media and posters, leading to low community exposure to waste recycling and disposal methods (Abila & Kantola, 2013). Individuals with a high level of knowledge are more likely to participate in public recycling programs and are willing to fund solid waste collection and management (Babaei et al., 2015). However, a lack of interest in knowledge and responsibility can contribute to low willingness, establishing a culture of non-participation in decision-making processes and little environmental care (McAllister, 2015). Conversely, Bashir et al. (2018) found a high level of community willingness to participate in composting in Kampar district, Malaysia, attributed to knowledge provided by local authorities.

Awareness of solid waste management involves basic knowledge and an understanding of the effects of solid waste (Debrah et al., 2021). However, awareness is distinct from knowledge. Chang and Chou (2018) demonstrated that consumers' willingness to participate in the "Bring Your Shopping Bags" reuse program in Taiwanese supermarkets is highly influenced by their awareness and behaviour. In Malaysia, Omran et al. (2009) found higher participation in recycling campaigns, such as 'recycling days,' when there was public knowledge.

A study of households in Nigeria by Momoh and Oladebeye (2010) revealed that households with low awareness of solid waste disposal practices have a lower willingness to participate in solid waste recycling programs. Similarly, a research study at Universiti Kebangsaan Malaysia found that nearly half of the students (65.9%) had low awareness of solid waste practices, leading to cleanliness and hygiene issues among students (Desa et al., 2011). While students possessed knowledge of solid waste practices, they lacked awareness of the impact of poor solid waste management. Awareness and knowledge are

crucial indicators and tools to gauge willingness to participate in the Waste-to-Wealth program.

METHODOLOGY

Study Area

This research focuses on the rural area of Teluk Renjuna (6°12'06° N, 102°13'34° E), a sub-district in Tumpat, Kelantan. The primary source of community income is fisheries. There is no waste management coverage or services provided by the local authority in this area. Therefore, Teluk Renjuna was chosen for the study due to its strategic location and potential for sustainable solid waste management.

Data Collection

This research determined the sample size of 118 respondents using the Krejcie and Morgan method. This method allowed flexibility in selecting margins of error and confidence levels, providing everyone in Teluk Renjuna an equal chance to be a respondent (Abas et al., 2020). The convenience sampling technique was applied. The questionnaire, consisting of five sections, covered socio-demographics, waste generation, disposal practices, knowledge, awareness, and willingness to participate in the Waste to Wealth program. Data on sociodemographics, waste types, practices on waste disposal, knowledge, awareness, and willingness to participate in waste-to-wealth programs were collected using nominal and ordinal data types, respectively. Experts performed validation to ensure content clarity and comprehensiveness. A pilot study was conducted in Kampung Gemang, Jeli, with 30 participants. The questionnaire's reliability test was measured using Cronbach's Alpha. The results, shown in Table 1, indicated strong reliability for all variables—practices, knowledge, awareness, and willingness—with Cronbach's alpha exceeding 0.7.

Table 1: Cronbach Alpha Reliability Test Result

Variables	Cronbach Alpha
Practices	0.761
Knowledge	0.720
Awareness	0.827
Willingness	0.965

Data Analysis

The normality test (Skewness and Kurtosis) was used to assess whether the collected data followed a normal distribution. The results in Table 2 indicated that the data was normally distributed. Descriptive statistics, including frequency,

percentage, mean, median, standard deviation, and range, were used to analyse the willingness of the local community in Teluk Renjuna to participate in Waste-to-Wealth programs, such as recycling, composting, and upcycling. Awareness was classified into categories of 'very high,' 'high,' 'medium,' 'low,' and 'very low' based on the scores obtained. At the same time, knowledge was categorised as 'high,' 'medium,' or 'low' according to the scores (Reinau et al., 2012).

Table 2: Normality Test Results

Variables	Skewness	Kurtosis
Practices	0.905	0.652
Knowledge	-0.216	-0.994
Awareness	-0.603	0.623
Willingness	-0.245	-0.907

The analysis incorporated independent sample t-tests and ANOVA to assess the significance of differences in willingness based on socio-demographic factors. If the p-value was <0.05, the null hypothesis was rejected, signifying a significant difference. Inferential analysis, specifically Pearson correlation, gauged the relationship between practices, knowledge, awareness, and the willingness of Teluk Renjuna communities to participate in the Waste to Wealth program. Pearson correlation values, ranging from -1 to +1, indicated the strength and direction of linear relationships. The null hypothesis, formulated to test whether study findings show an effect, was assessed based on various parameters, including the p-value. Rejection or acceptance of the null hypothesis depended on the p-value, with values <0.05 leading to rejection.

Null Hypothesis (H₀): Sociodemographics do not influence the willingness of respondents to participate in the waste-to-wealth program.

Null Hypothesis (H₀): Waste disposal practices, Knowledge and awareness do not influence the willingness of respondents to participate in the Waste-to-Wealth program.

FINDINGS AND DISCUSSION

Respondent's Profile

Table 3 displays sociodemographic variables, their frequency, and percentages. Females aged 26 to 35 contribute the most (19.5%). Teluk Renjuna primarily consists of Malay (100%) and Islamic (100%) respondents. Marital status is dominated by marriage (64.7%), followed by single (18.6%) and widowed

(18.6%). Regarding education, secondary school is the highest (45.8%), with higher education levels showing reluctance to join sustainable programs.

Most respondents have 4 to 6 household members (49.2%), and the primary head of household employment is in the self-employed sector (61.9%). Most respondents fall into income group B1 (<RM2500) (90.7%). The study provides insights into the sociodemographic characteristics of the Teluk Renjuna community, indicating potential areas for targeted waste-to-wealth programs.

Table 3: Socio-demographic Profile of Respondents

Sociodemographic	Frequency/ Percentage (%)	Sociodemographic	Frequency/ Percentage (%)
Gender		Education Background	
• Male	36 (30.5%)	• Primary School	31 (26.3%)
• Female	82 (69.5%)	• Secondary School	54 45 (45.8%)
		• Certificate	7 (5.9%)
		• Diploma	6 (5.1%)
		• Degree	20 (16.9%)
Age (Mean: 3.55, SD: 1.69)		Number of Household (Mean:1.92, SD: 0.78)	
• 17year--25year	16 (13.6%)	1--3	37 (31.4%)
• 26year--35year	23 (19.5%)	4--6	58 (49.2%)
• 36year--45year	20 (16.9%)	7--9	19 (16.1%)
• 46year--55year	19 (16.1%)	≥10	4 (3.4%)
• 56year--65year	19 (16.1%)		
• >65year	21 (17.8%)		
Ethnic		Number of Person Working in Household	
• Malay	118 (100%)	• 0	7 (5.9%)
		• 1	55 (46.6%)
		• 2	36 (30.5%)
		• 3	7 (5.9%)
		• 4	5 (4.2%)
		• ≥5	8 (6.8%)
Religion		Head Household Employment	
• Islam	118 (100%)	• Self-employed	73 (61.9%)
		• Government	3 (2.5%)
		• Non-government	15 (12.7%)
		• Not Working/ Housewife	27 (22.9%)
Marital Status		The number of years settled in the present residence.	
• Marriage	74 (62.7%)	• ≤5 years	5 (4.2%)
• Single	22 (18.6%)	• 6 years – 10 years	5 (4.2%)
• Widow/widower	22 (18.6%)	• 11 years –15 years	9 (7.6%)
		• 16 years – 20 years	4 (3.4%)
		• ≥ 21 years	95 (80.5%)

Sociodemographic	Frequency/ Percentage (%)	Sociodemographic	Frequency/ Percentage (%)
Household Income			
• B1 (<RM2500)	107 (90.7%)		
• B2 (RM2501-RM3170)	9 (7.6%)		
• B3 (RM3171-RM3970)	0 (0%)		
• B4 (RM3970-RM4850)	2 (1.7%)		

Waste Disposal Practices

In this study, waste disposal practices in the Teluk Renjuna community were explored. For the statement 'I burn the waste generated,' 90.7% of respondents answered 'Yes,' and only 9.3% answered 'No.' In the statement 'I buried the generated waste,' 76.3% disagreed ('No'), while 23.7% agreed ('Yes'). Statement 'I throw away the waste into the drain,' 61.9% disagreed ('No'), and 38.1% agreed ('Yes'). Additionally, for 'I throw the waste into the river,' 89% answered 'No,' and only 11% answered 'Yes.' Regarding 'I throw the waste into the trash bin provided,' 77.1% answered 'No,' while 22.9% answered 'Yes.' The results indicate moderate waste disposal practices among the Teluk Renjuna community. The total mean score for all questions in this survey is 2.03, reflecting a moderate level across the five waste disposal practices. According to the categorisation from a previous study, 30.5% exhibited poor practices, the majority (64.4%) demonstrated reasonable practices, and the lowest percentage (5.1%) showed good practices. This classification aligns with the reasonable practices level, according to Lietz (2010), who suggests creating an index based on score values to identify variable levels. The Teluk Renjuna community's waste disposal practices are reasonable and influenced by willingness and community dynamics. Previous studies suggested that the perception of good or moderate practices depends on community willingness and external influences like neighbours (Syahid et al., 2023).

Knowledge and Awareness of Waste-to-Wealth Program

The statistics on knowledge of the waste-to-wealth program show that, on average, 55.1% of respondents answered 'Yes' to the statement that composting, recycling, and upcycling are examples of waste-to-wealth initiatives. For the statement 'Coconut waste cannot be reused as handicraft items,' 66.9% of respondents answered 'No,' while 70.3% believed the initiative could lead to profit. Regarding the perception of high costs, 78% answered 'No.' Additionally, 67.8% agreed that garden and food waste could be reused as valuable resources. These responses indicate a moderate knowledge level, with a mean score of 3.38. However, a previous study reported a low level of knowledge affecting participation in waste composting (Suandi et al., 2023).

The statistics indicate that 59.3% of respondents agreed that the initiative can benefit environmental well-being, and 46.6% agreed it can generate income. About 50.8% were either moderately aware or unaware of the challenges involved, while 44.1% agreed that most waste can be used for waste-to-wealth initiatives. Furthermore, 78.8% agreed that the waste-to-wealth practice needs to be improved in Malaysia, especially in Kelantan. The mean score for awareness is 3.59, indicating a high level of awareness among respondents. In a similar study, the urban community in Puchong, Selangor, showed high recycling awareness with a mean value of 4.08 (Sharaai & Yap, 2022).

Willingness of Community to Participate in Waste-to-Wealth Program

Most respondents expressed willingness (29.7%) or a moderate response (26.3%) to implement the waste-to-wealth initiative if given the opportunity and training. For composting-related initiatives, 28.8% responded moderately, while 26.3% agreed. Regarding producing handicrafts from coconut waste, 43.2% expressed willingness, 33.9% disagreed, and 22.9% responded moderately. The Teluk Renjuna community showed a moderate and willing attitude towards participating in the waste-to-wealth program, indicating awareness of its benefits. The mean score for willingness is 3.03. However, a study in Puchong demonstrated a relatively higher willingness to participate in the recycling program, with a mean value of 4.07 (Sharaai & Yap, 2022).

Factors Influence Willingness of Community to Participate in Waste-to-Wealth Program

Table 4 shows no significant difference in willingness mean scores between males and females, accepting the null hypothesis (p -value=0.226). Age (p -value=0.014), marital status (p -value=<0.001), and income (p -value=0.045) significantly influenced willingness, with respondents aged 46 to 55, married individuals, and those in the B4 income group showing higher willingness. However, no significant differences were found based on education background, number of households, employment, number of persons working, or residency duration. The study also revealed that those with a Diploma education level, 7-9 members in the household, two persons working, government employment, and income in the B4 group expressed higher willingness to participate in the waste-to-wealth program.

Table 4: T-test and ANOVA results

Socio-demographic	t-value	p-value	Status
Gender	-1.217	0.226	Not Significant
Socio-demographic	F-value	p-value	Status
Age	2.993	0.014	Significant
Marital Status	7.672	<0.001	Significant
Education Background	1.837	0.127	Not Significant
Number of Household	.203	0.894	Not Significant
Number of people working in Household	0.927	0.466	Not Significant
Head of Household Employment	0.434	0.729	Not Significant
Income of the household	4.698	0.045	Significant
The number of years settled in the present residence	0.548	0.701	Not Significant

Relationship between Waste Disposal Practice, Knowledge, and Awareness with the Willingness of Respondents to Participate in Waste-to-Wealth Program.

The findings revealed a weak positive correlation ($r=0.251$, $n = 118$, $p=0.006$, 2-tailed), indicating that higher practices were associated with greater willingness (Table 5). The result is statistically significant ($p < 0.05$), showing a connection between practices and willingness. However, it is noteworthy that high practices did not consistently translate to high willingness, as indicated by Fadhullah et al.'s (2022) research on waste segregation.

Table 5: Pearson Correlation Results

Pearson Correlation		Waste Disposal Practices	Knowledge	Awareness
		Willingness to Participate in Waste-to-Wealth Program	Correlation Coefficient, r	.251**
	Sig. (2-tailed)	.006	<.001	<.001
	N	118	118	118

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

The study found a moderate positive correlation between willingness and knowledge ($r = 0.472$, $n = 118$, $p < 0.001$, two-tailed), indicating that higher knowledge levels are associated with greater willingness. This significant link between knowledge and willingness is consistent with previous research. Additionally, a strong positive correlation ($r = 0.517$, $n = 118$, $p < 0.001$, two-tailed) was observed between willingness and awareness, suggesting that higher awareness is linked to greater willingness. This is evidenced by individuals actively participating in recycling and composting programs. While good waste

disposal practices are significantly associated with willingness, the correlation between practices and willingness is relatively weak and needs improvement. The study highlights a significant association between knowledge, awareness, and the willingness of the Teluk Renjuna community to engage in waste-to-wealth programs, emphasising a strong link between knowledge and awareness in the study area.

CONCLUSION

Waste disposal practices in Teluk Renjuna need improvement through better waste management, including recycling and upcycling, for profit generation and reducing household waste. The study indicates moderate knowledge but higher awareness of waste-to-wealth programs. Although there is a weak relationship between current practices and willingness to participate, there's a moderate to high connection between willingness and actual participation. High-practice respondents may only sometimes be willing to participate, indicating a weak link between practices and willingness. To enhance the waste-to-wealth approach, the government, NGOs, and the public must play crucial roles by promoting recycling, upcycling, and composting for income generation and sustainable living. Specifically, the government should extend the efforts to rural areas like Teluk Renjuna by deploying more recycling bins and initiating community engagement campaigns for waste-to-wealth programs. Both governmental and non-governmental organisations should facilitate more accessible, cost-effective, and streamlined methods for the community.

REFERENCES

- Abas, M. A., Ibrahim, N. E., Wee, S. T., Sibly, S., & Mohamed, S. (2020). Disaster resilience education (DRE) programmes in schools: a case study in Kelantan, Malaysia. In *IOP Conference Series: Earth and Environmental Science* (Vol. 549, No. 1, p. 012078). IOP Publishing.
- Abila, B., & Kantola, J. (2013). Municipal solid waste management problems in Nigeria: Evolving knowledge management solution. In *Proceedings of World Academy of Science, Engineering and Technology* (No. 78, p. 292). World Academy of Science, Engineering and Technology (WASET).
- Almulhim, A. I. (2022). Household awareness and participation in sustainable electronic waste management practices in Saudi Arabia. *Ain Shams Engineering Journal*, 13(4), 101729
- Babaei, A. A., Alavi, N., Goudarzi, G., Teymouri, P., Ahmadi, K., & Rafiee, M. (2015). Household recycling knowledge, attitudes and practices towards solid waste management. *Resources, Conservation and Recycling*, 102, 94–100. <https://doi.org/10.1016/j.resconrec.2015.06.014>
- Bashir, M. J. K., Jun, Y. Z., Yi, L. J., Abushammala, M. F. M., Amr, S. S. A., & Pratt, L. M. (2020). Appraisal of student's awareness and practices on waste management

- and recycling in the Malaysian University's student hostel area. *Journal of Material Cycles and Waste Management*, 22(3), 916–927. <https://doi.org/10.1007/s10163-020-00988-6>
- Cayumil, R., Khanna, R., Konyukhov, Y., Burmistrov, I., Kargin, J. B., & Mukherjee, P. S. (2021). An Overview on Solid Waste Generation and Management: Current Status in Chile. *Sustainability*, 13(21), 11644. <https://doi.org/10.3390/su132111644>
- Chang, S. H., & Chou, C. H. (2018). Consumer Intention toward Bringing Your Own Shopping Bags in Taiwan: An Application of Ethics Perspective and Theory of Planned Behaviour. *Sustainability*, 10(6), 1815. <https://doi.org/10.3390/su10061815>
- Debrah, J. K., Vidal, D. G., & Dinis, M. A. P. (2021). Raising Awareness on Solid Waste Management through Formal Education for Sustainability: A Developing Countries Evidence Review. *Recycling*, 6(1), 6. <https://doi.org/10.3390/recycling6010006>
- Desa, A., Kadir, N. B. A., & Yusoooff, F. (2011). A Study on the Knowledge, Attitudes, Awareness Status and Behaviour Concerning Solid Waste Management. *Procedia - Social and Behavioral Sciences*, 18, 643–648. <https://doi.org/10.1016/j.sbspro.2011.05.095>
- Egun, N. K. (2012). The Waste to Wealth Concept: Waste Market Operation in Delta State, Nigeria. *Greener Journal of Social Sciences*, 2(6), 206–212. <https://doi.org/10.15580/gjss.2012.6.110112191>
- Fadhullah, W., Imran, N. I. N., Ismail, S. N. S., Jaafar, M. H., & Abdullah, H. (2022). Household solid waste management practices and perceptions among residents in the East Coast of Malaysia. *BMC Public Health*, 22(1). <https://doi.org/10.1186/s12889-021-12274-7>
- Govindaraju, M., Sathasivam, K. V., & Marimuthu, K. (2021). Waste to Wealth: Value Recovery from Bakery Wastes. *Sustainability*, 13(5), 2835. <https://doi.org/10.3390/su13052835>
- Guo, W., Xi, B., Huang, C., Li, J., Tang, Z., Li, W., Ma, C., & Wu, W. (2021). Solid waste management in China: Policy and driving factors in 2004–2019. *Resources, Conservation and Recycling*, 173, 105727. <https://doi.org/10.1016/j.resconrec.2021.105727>
- Hoang, N. H., & Fogarassy, C. (2020). Sustainability Evaluation of Municipal Solid Waste Management System for Hanoi (Vietnam)—Why to Choose the ‘Waste-to-Energy’ Concept. *Sustainability*, 12(3), 1085. <https://doi.org/10.3390/su12031085>
- Ismail, H., & Hanafiah, M. M. (2021). Waste-to-wealth in ASEAN countries: A case on e-waste generation from mobile phone. *IOP Conference Series: Earth and Environmental Science*, 880(1), 012038. <https://doi.org/10.1088/1755-1315/880/1/012038>
- Issock, P. B. I., Roberts-Lombard, M., & Mpinganjira, M. (2020). Normative influence on household waste separation: the moderating effect of policy implementation and sociodemographic variables. *Social Marketing Quarterly*, 26(2), 93–110.
- Lietz, P. (2010). Research into Questionnaire Design: A Summary of the Literature. *International Journal of Market Research*, 52(2), 249–272. <https://doi.org/10.2501/s147078530920120x>

- McAllister, J. (2015). Factors influencing solid-waste management in the developing world. Graduate Plan B and other Reports. 528. <https://digitalcommons.usu.edu/gradreports/528>
- Momoh, J. J., & Oladebeye, D. H. (2010). Assessment of awareness, attitude and willingness of people to participate in household solid waste recycling programme in Ado-ekiti, Nigeria. *Journal of Applied Sciences in Environmental Sanitation*, 5(1).
- Mumtaz, T., Yahaya, N. A., Abd-Aziz, S., Yee, P. L., Shirai, Y., & Hassan, M. A. (2010). Turning waste to wealth-biodegradable plastics polyhydroxyalkanoates from palm oil mill effluent—a Malaysian perspective. *Journal of Cleaner Production*, 18(14), 1393-1402.
- Ogu, V. I. (2000). Private sector participation and municipal waste management in Benin City, Nigeria. *Environment and Urbanization*, 12(2), 103-117
- Omrán, A., Mahmood, A., Aziz, H. A., & Robinson, G. M. (2009). Investigating Households Attitude Toward Recycling of Solid Waste in Malaysia: A Case Study. *International Journal of Environmental Research*, 3(2), 275–288. <https://doi.org/10.22059/ijer.2009.55>
- Reinau, D., Meier, C., Gerber, N., Hofbauer, G., & Surber, C. (2012). Sun protective behaviour of primary and secondary school students in North-Western Switzerland. *Swiss Medical Weekly*. <https://doi.org/10.4414/smw.2012.13520>
- Sharaai, A. H., & Yap, L. H. (2022). Relationship Between Level of Awareness and Willingness to Participate in Recycling. In *Proceedings of the World Conference on Waste Management (Vol. 3, No. 1, pp. 43-57)*
- Suandi, I. S., Zainuddin, M. F., Manaf, L. A., & Mohd, S. M. (2023). Community Knowledge and Perception Towards Illegal Waste Disposal: A Case Study Of Sungai Besar Coastline Mangroves Forest in Selangor, Malaysia. *Planning Malaysia*, 21.
- Syahid, A., Shaari, A. A. H., Noh, N. A., & Sulaiman, S. (2023). Capacity Building Planning for Fisherman Community's Empowerment. *Planning Malaysia*, 21
- Utiti, C., Rosland, A., Saari, M. Y., & Abd Rahman, M. D. (2021). From waste to wealth: Identifying the economic impact of the recycling sector in Malaysia. *Malaysian Journal of Economic Studies*, 58(1), 125-143
- Wang, H., Liu, X., Wang, N., Zhang, K., Wang, F., Zhang, S., Wang, R., Zheng, P., & Matsushita, M. (2020). Key factors influencing public awareness of household solid waste recycling in urban areas of China: A case study. *Resources, Conservation and Recycling*, 158, 104813. <https://doi.org/10.1016/j.resconrec.2020.104813>
- Yusoh, M. P., Dering, N. F., Mapjabil, J., Abdul Latip, N., Kumalah, M. J., Mohd. Noor, H., & Hanafi, N. (2022). ASSESSMENT OF PAYMENT RATES AND WILLINGNESS TO PAY AT TOURIST DESTINATION - A COMPARISON BETWEEN KUNDASANG AND KOTA BELUD, SABAH, MALAYSIA. *PLANNING MALAYSIA*, 20(23). <https://doi.org/10.21837/pm.v20i23.1148>

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