

Statistical t Analysis for the Solution of Prediction Trash Management in Dusun Tanjung Sari Kec. Ngaglik Kab Sleman, Yogyakarta

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Abstract. Trash management is one of the society participation to have a good hygiene for each area or nationally. Trash is known as the remainder of regular consumption that should be disposed to do waste processing which will be beneficial and improve the hygiene. The way to do is by sorting plastic which is processed into goods in accordance with the waste. In this study, we will know what are the factors that affect the desire of citizens to process the waste. The factors would have the identity and the state of being of each resident, having known of these factors will be the education about waste management, so it can be compared how the results of the extension by using preliminary data prior to the extension and the final data after extension. The analysis uses multiple logistic regression is the identify factors that influence people's to desire the waste while the comparison results using t analysis. Data is derived from statistical instrument in the form of a questionnaire.

1. Introduction

The number of environmental researchers began thinking about the long-term evolution of technology, economic systems, and the environment in the 1980s and 1990s. They proposed a transformation in the management of products, materials, and wastes by looking for a manifestation of sustainable development. Ayres defined the technological evolution of industrial society toward the increasingly efficient use of materials and products [1]. Graedel and Allen using an industrial ecosystem concept in which wastes from one sector would be used as inputs in another sector, as a developed of recycling materials [2]. Braungart argued that all products should be biodegradable or recycled, with shopping and “deshopping” managed [3]. Making these ideas real remains a challenge. Collecting, sorting, and managing the huge array from the consumer products are difficult [4-6].

Padukuhan Tanjungsari, Sleman, Yogyakarta is an area of considerable potential in the management of plastic and paper wastes. There is no optimal utilization of garbage. For these problem, trash management with statistical t analysis proposed to be a solution. Trash management is about colleting, sorting and managing the plastics and papers waste [7-9]. Plastic and paper waste could be recycled or made into other useful items such as the manufacture of bags, and other equipments according to our own creativity.



In this paper, The discussion of this study proposes the analysis using multiple logistic regression is the identify factors that influence people's to desire the waste while the comparison results using t analysis.

2. Methods

The method for this research used multiple logistic regression and t-test [10] to have different mean between two dependent populations. Multiple logistic regression is a popular and widely used for analysis as the linear regression without the dichotomous outcome (e.g., success/failure or yes/no or died/lived). The outcome of the data 1 is dichotomous (yes or no). Model for this method is

$$\log \frac{\pi_i}{1 - \pi_i} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_p x_{pi}$$

where x_i is covariates or independent variables.

t-test for different mean between two dependent population uses t distribution where the data has amount samples. The mean hipotesis of t-test is nothing difference between 2 data that have same population. The formula is

$$t = \frac{\bar{X}_D - \mu_0}{\frac{s_D}{\sqrt{n}}}.$$

where m_i is zero if two sample don't have difference

3. Results and Discussion

3.1. Analysis of first survey

The first survey is the motivation and the score of trash management. It has been done in Padukuhan Tanjung Sari Kec. Ngaglik Kab Sleman, Yogyakarta. Motivation to trash management could be defined in two options. They are yes and no. The defined yes if the person has high motivation to collecting, sorting, and managing the trash product. The defined no if the person does not have motivation to collecting, sorting, and managing the trash product. The motivation is independent variable and the parameter of motivation is dependent variable. The parameter of motivation is about identity (age and education), self-opinion, and economics. Logistic regression analysis used to know about the main factor that influence the motivations with the outcome of two defined options (yes or no) by multiple.

The logistic regression analysis is used by R software. From this analysis, it will show the main factor which influence the dependent variable. Alpha that use for this analysis is 0.05 with confident interval 0.95. The output for this analysis is in table 1

Table 1. P value of independent variable

| Variable | P value |
|--------------|---------|
| Age | 0.5627 |
| Education | 0.0279 |
| Self-opinion | 0.39 |
| Economic | 0.5095 |
| Intercept | 0.1358 |

H_0 for this analysis variable is not significant and H_1 variable is significant. H_0 is rejected if P value less than alpha. P value of education is less than 0.05 so the most significant variable in this analysis is only education. Using entering data from this analysis, each dependent variables taken out depend of P value. The variables that taken out are age, self-opinion, and economic. Final output is in table 2.

Table 2. P value of Education and intercept of influence motivation trash management

| Variable | P value |
|-----------|---------|
| Education | 0.0208 |
| Intercept | 0.0489 |

Education is the main factor that influence the motivation for trash management. From this research, It could be concluded that socialization for trash management would be focus in education problem.

3.2. Analysis of the second survey

The second survey in this research is similar with the first survey about management trash that has been done in Dusun Tanjung Sari Kec. Ngaglik Kab Sleman. Score for this part depend on the people who has or no motivation. if score is decline, It define the people in this village have well trash management and if score is increase, it define the people in this village do not have well trash management.

Analysis statistical t is used to know about the differences between two surveys. It is t-analysis for two dependent population. Alpha that use for this analysis is 0.05 with confident interval 0.95. H_0 define if there is no different between two populations and H_1 define if there is different between two populations from the surveys. H_0 is rejected when it less than alpha. P value of this analysis is 0.7131. From this results, It shows that H_0 is not rejected because P_value is higher than alpha. So it can be concluded from the two surveys that socialization of trash management do not have significant influence for the people.

4. Conclusion

Analysis statistical t is used to know about the differences between two surveys. It is t-analysis for two dependent population. Alpha that use for this analysis is 0.05 with confident interval 0.95. H_0 define if there is no different between two populations and H_1 define if there is different between two populations from the surveys. H_0 is rejected when it less than alpha. P value of this analysis is 0.7131. From this results, It shows that H_0 is not rejected because P_value is higher than alpha. So it can be concluded from the two surveys that socialization of trash management do not have significant influence for the people.

References

- [1] Ayres RU 1989 Industrial metabolism. In *Technology and environment*, edited by J. H. Ausubel and H. E. Sladovich. Washington DC: National Academy Press
- [2] Braungart M 1994 Product lifecycle management to replace waste management. In *Industrial ecology and global change*, edited by R. Socolow, C. Andrews, F. Berkhout, and V. Thomas. Cambridge, UK: Cambridge University Press
- [3] Graedel TE and Allenby BR 1995 *Industrial ecology* Englewood Cliffs, NJ: Prentice Hall
- [4] Gershenfeld N 1999 *When things start to think*. New York: Holt
- [5] ISWA (International Solid Waste Association) 1999 *Solid waste on-board weighing systems*. Copenhagen: International Solid Waste Association.
- [6] Klausner MW, Grimm, and C. Hendrickson 1998 Reuse of electric motors in consumer products: Design and analysis of an electronic data log. *Journal of Industrial Ecology* 2(2): 89
- [7] Wagner SH, Gleskova JC, Sturm, and Suo 2000 Novel processing technology for Macroelectronics. In *Technology and applications of hydrogenated amorphous silicon*, edited by R. A. Street. Berlin: Springer.
- [8] Lee Y 1999 *MicroID 13.56 MHz RFID system design guide, AN707 MCRF 355/360 Applications*. Chandler AZ: Microchip Technology
- [9] Menell P 1990 Beyond the throwaway society: An incentive approach to regulating municipal

solid waste. *Ecology Law Quarterly* 17: 655

- [10] Walpole RE 1995 *Introduction to Statistics 3rd edition* Addison Wasley New York