Multidisciplinary Informatics Journal
Vol. 2, No. 1, June 2019, Pg. 74 – 81

LOGISTIC REGRESSION ANALYSIS FOR AWARENESS AMONG STUDENTS TOWARDS ENVIRONMENTAL CARE IN UiTM, TAPAH CAMPUS

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Received: 10 April 2019 / Accepted: 15 May 2019 / Published online: 15 June 2019

ABSTRACT

Solid waste management is increasing and become one of the crucial environmental issues in Malaysia. However, individuals nowadays have lack aware in achieving sustainability in waste management that contributes for current and future generations. The information related to this environmental issue need to be shared among publics especially students in order to educate them and to create positives vibes towards environment. Therefore, this study sought to investigate the contribution factors such as gender, knowledge, perceptions, practice, and attitude towards awareness level among students. A set of data primarily collected using direct questionnaires among students from the Faculty of Computer and Mathematical Sciences. A total of 354 students comprising from various program were response and the data was analyzed using Logistic regression. The results found that four variables such as gender, knowledge, perceptions, and attitude were significantly influence the level of awareness among students towards environmental care.

Keywords: Awareness; Environmental Care; Logistic Regression Analysis; Solid Waste Management.

1. INTRODUCTION

The raising number of municipal solid waste management in Malaysia is one of the greatest environmental problems that need to be concerned and solved [1-3]. Globally, there are sources such as domestic, industrial and commercial that contributes on waste generation plus the increment of population as well [4]. Due to this reason, better strategies related to solid waste

management should be planned and practiced to maintain a sustainable environment for current and future generation. Therefore, environmental care is essential responsible for all people throughout the world. The information related to this environmental issue need to be conveyed among students in order to educate them and to create positives vibes towards environment [5]. A study by [6], stated that awareness level brings a meaning as concern and sensitivity towards the environment and its problems, whereby environmental education is the process of developing a world population that is aware and concerned about the total environment and its associated problems. The environmental education has been part of the curriculum of the public schools [3]. Some institution and agencies in Malaysia have given a serious attention to the environmental education. The action is a must as the environmental problems becomes to the chronic level from time to time. It is believed that when people well educate, their awareness level towards environmental care will be high. However, there will be factors that will affect the awareness level of the environmental problems. Therefore, this study intends to investigate the contribution of factors such as gender, knowledge, perceptions, practice, and attitude towards awareness level among students.

2. LITERATURE REVIEW

A finding from [5] found that students had high knowledge, awareness and attitudes about environment care but the practices was at the level of moderate. The finding was aligning with [7]. However, there is a difference for the gender towards environmental care where gender had significant influence towards environmental issues. It identified men were having high environmental knowledge compared with women but women were more emotionally engaged, show more concern about environmental destruction, believe less in technological solutions, and are more willing to change [8]. A study by [9] highlighted that although students had a high level of environmental awareness, this will not turn them in to active involvement and led them to environmental attitudes. The important key tools are education at school and also mass media. To aim for environmental attitudes and behaviors, environmental rights and responsibilities should be adopted at school and followed by applied training models. Curriculum of schools must be arranged at this stage. Besides, visual media should be employed to effectively support curriculum of schools. As mentioned by [10], attitude and awareness among the people are two most important factors for nature protection and concerned for environment. All individuals need to understand the consciousness that can affect the earth. Awareness can help find ways to keep things clean and green. The duty of the current generation is to leave the present environment as good as or better than today for future

generations. Hence, it is important that all members of society contribute to the best protection and preservation of the environment.

Some applications on logistic regression for solid waste management [11] conducted a research in Malaysia on contractor's awareness towards solid waste management using logistic regression analysis. The result showed that waste management plan, source reduction, recycle activity, waste sorting, harmfulness on human health and willing to pay for waste collection contributes significantly toward contractor's awareness. [12], use logistic regression analysis to examine the contributing factors on solid waste management in Cambodia among households. Education level and incomes have positive influences on knowledge and attitude towards waste management. However, practice of waste management received less influence from public. As a conclusion, practice need to burst more among public to increase household's awareness.

3. METHODOLOGY

3.1 Conceptual Framework

In this study, the design of the survey was conducted through a questionnaire survey using a quantitative approach to collect data and analyze the results of the study. This study was conducted to examine the level of awareness among students of UiTM Perak Branch, Tapah Campus towards environmental care. Awareness on environmental care is important to ensure a conducive and clean environment and attain green campus status. Thus, an established environment is for the sustainability of future generations. Figure 1 shows a study design consisting of independent variables and dependent variables.

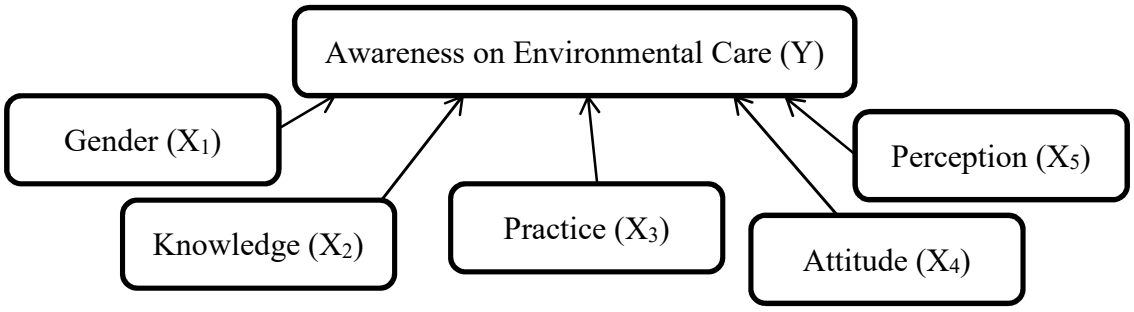

Fig. 1. Variables of Awareness on Environment Care

3.2 Design of Experiment

The questionnaire was distributed to a total of 354 students comprising students from the Faculty of Computer and Mathematical Sciences (FSKM). These students comprise from various programs of study, namely Diploma in Computer Science (CS110), Diploma in

Statistics (CS111), Diploma in Actuaries (CS112), Diploma in Mathematical Science (CS143) and Bachelor of Computer Science (CS230). Questionnaires were distributed randomly and the findings were recorded using the IBM SPSS 25 software. Table 1 provides an overview of the explanatory variables used in the logistic regression model of the study. Most of the variables are derived from the survey, in which it is considered relevant from theoretical point of view and included as explanatory variables [1,7]. The hypotheses of study are: H_0 = Gender, Knowledge, Practice, Attitudes and Perceptions are not contributing factors that influence the level of awareness on environmental care. H_1 = Gender, Knowledge, Practice, Attitudes and Perceptions are factors that influence the level of awareness on environmental care.

Table 1. Description of the independent variables in logistic regression model

Variable	Level of variable	Scale of measurement
Dependent variable		
Awareness on Environmental Care	1=Yes, 2=No	Nominal
Independent variable		
Program	1=CS110, 2=CS111, 3=CS112, 4=CS143, 5=CS230	Nominal
Gender	1= Male, 2=Female	Nominal
Knowledge	1=Strongly Agree, 2=Agree, Neutral, 3=Disagree, 4=Strongly disagree	Interval
Practice	1=Strongly Agree, 2=Agree, Neutral, 3=Disagree, 4=Strongly disagree	Interval
Attitude	1=Strongly Agree, 2=Agree, Neutral, 3=Disagree, 4=Strongly disagree	Interval
Perception	1=Strongly Agree, 2=Agree, Neutral, 3=Disagree, 4=Strongly disagree	Interval

3.3. Logistic Regression Model

This study has been designed with logistic regression analysis model. The relationship between dependent and independent variables is examined by correlation coefficient (R) values in two variable cases and for multivariate case, t value, coefficient of determination (R^2), adjusted R^2 and F-value is estimated. The likelihood ratio index has been measured as an indicator of goodness of fit for the model in order to determine the factors that contribute to the awareness

of environmental care in UiTM Campus Tapah. The developed model assesses the relationship between variables; which are gender, knowledge, practice, attitude and perception. The dependent variable is designed as a dichotomous dummy based on the hypothesis of students' awareness towards environmental care.

The model is as,

$$Log\frac{Pi}{1-Pi} = Zi = \beta 0 + \beta iXi + \varepsilon$$

Where,

P_i = 1 if student's awareness on environmental care is adequately aware
P_i = 0 for otherwise
X_i = independent variables
$ß_0$ = constant term
$ß_i$ = coefficient of independent variables
Ɛ = the error term
i = 1, 2, 3, …, n

Since the logistic regression test is a non-parametric test involving non-parametric data, then the study data is not normally distributed, ie the researcher does not have to check whether the study data is normally distributed before making the analysis. Therefore, here are some of the requirements of logistic regression: (a) dependent variable is dichotomous data - which the measurement scales for dependent variables should be dichotomous ie data has only two categories; (b) sample size of study - the minimum number of respondents for each study variable is 10 [13]. This study involves five independent variables and one dependent variable, thus the minimum sample size for this study is 6 x 10 which is only 60. For this study, the recorded data is 354 data, therefore this requirement has been met; (c) multicollinearity - standard error values show multicollinearity values between independent variables is said to be no problem if the standard error value is within 2.0 to -2.0. The chi-square and Hosmer-Lemeshow tests were analyzed to assess the significance level and goodness of fit of the model [13]. Wald test measurement is conducted in order to confirm or not the substantial evidence against a null hypothesis [14].

4. RESULTS AND DISCUSSION

4.1 Descriptive Analysis on Respondents

The survey was distributed among 354 FSKM students [1, 7], which consist of five programs from part 1 till part 6. The highest number of respondents is 113 from program CS143. 91 of the respondents are from CS110 followed by CS112 (53), CS111 (46) and CS230 (51). Their age is between 18 to 25 years old and 112 are males and 242 are female as in Table 2. Overall,

89.27% of the respondents are aware with the environmental care and only 10.73% of the total respondents are not aware with the environmental care in UiTM Tapah Campus.

Table 2. Cross tabulation on data collection

Gender	Awareness		
	Yes	**No**	**Total**
Male	89	23	112
Female	227	145	242
Total	316	38	354

4.2 Results of logistic regression

This study applied Logistic regression method using backward stepwise regression. The model Chi Square (χ^2) results derived are[χ^2 (df = 5, N = 354) = 28.873, p <0.05] and [χ^2 (df = 4, N = 354) = 27.048, p <0.05] for the logic model in step 1 and step 2 respectively after the independent variable included in the model to be analyzed. It shows that overall, there are four independent variables were significantly effect in a change in the dependent variable.

Table 3. Variables in the equation

Variables	Coefficient ,B	Standard error	Wald	df	p-value	Exp(B)
Constant	2.866	0.368	60.759	1	0.000	17.575
Gender	-1.350	0.364	13.757	1	0.000	0.259
Perception	0.871	0.388	5.055	1	0.025	2.390
Attitude	-0.828	0.379	4.765	1	0.029	0.437
Knowledge	-2.408	1.042	5.343	1	0.021	0.090

Based on Table 2, the standard error values indicate multicollinearity values between independent variables, which are less reliable because they are similar to each other if the value is outside +2 and -2. The standard error value between 0.36 and 1.05 for the predictor variables in this study lies within that environment. This indicates that the variables do not have multi-collinearity problems. This study obtained, the information for the significant second predictor variables is shown after being included gender, perception, attitude and knowledge. Wald value [χ^2 (df = 1, N = 354) = 13.757 (gender); 5.055 (perception); Significantly, 4.765 (attitude) and 5.343 (knowledge) show that these four independent variables can increase the level of student

awareness on sustainable environmental care. The odd ratio value, Exp (B) = 0.259 (gender); 2.390 (perception); 0.437 (attitude) and 0.090 (knowledge). This shows that 74.1% (gender); 56.3% (attitude) and 91% (knowledge) have influence the level of environmental awareness. Since the odd ratio of all variables is less than 1 then these independent variables only give a small change of effect on dependent variables. While the perception showed an increase of 2,390 times on the level of awareness on the importance of sustainable environmental care. Therefore, the logistic regression equation for this study is

$$\text{Log}\frac{Pi}{1-\ Pi} = 2.866 - 1.350X_1 + 0.871X_5 - 0.828X_3 - 2.408X_4$$

5. CONCLUSION

Every individual has responsible towards environmental care in order to ensure economic, social and environment aspects can be protected. Their involvement and cooperation contribute in achieving sustainability in waste management involved with suitable method and technology applied. Thus, it is great significance to improve the level of awareness towards importance of environmental care especially among university students. This study found that there are four key factors that contribute towards level of awareness which are gender, perception, attitude and knowledge. These factors influence the awareness regarding waste management which is necessary to be effective for proper waste management and to minimize waste generation as well as environmental degradation in Malaysia.

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