



**WILLINGNESS TO PAY (WTP) OF HOUSEHOLD
TO SOLID WASTE MANAGEMENT SERVICES IN
JELI, KELANTAN**

by

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DECLARATION

I declare that this thesis entitled “Willingness to Pay (WTP) of Household to Solid Waste Management Services in Jeli, Kelantan” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Date: 8TH JANUARY 2020

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Willingness To Pay (WTP) of Household to Solid Waste Management Services in Jeli, Kelantan.

ABSTRACT

Solid waste management is a critical issue in developing country such as Malaysia where the growth of human population, increasing urbanization and rising standards of living due to technological innovations have contributed to an increase in the both quantity and variety of solid wastes. The increasing financial challenges for waste management have prompted researchers to pay close attention to the demand side of the problem. This study is undertaken in order to explore the practices and services in Jeli household, to investigate the perception of the respondents on solid waste management (SWM) and to determine the willingness to pay (WTP) on SWM among the respondents in Jeli, Kelantan by using Dichotomous Choice Contingent Valuation Method. A questionnaire was designed to draw a sample of 123 respondents for the study. The results from data analysis showed that the perception of the household on their practices and services provided is good. In addition, more than half of the respondent were willing to pay more to have an improvement in solid waste management services. Hence, the estimated mean household willingness to pay for solid waste management system in Jeli is about RM12.05/6 month per household. There are several suggestions being selected. Logistic regression model was used in this paper to obtain the association between the socio-demographic of the household with the WTP. The findings of logit study is that educational level, type of houses, occupation and household income are significantly influential in determining the households' willingness to pay for better solid waste management in Jeli.

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**Kesediaan untuk Membayar (WTP) oleh Isi Rumah terhadap Perkhidmatan
Pengurusan Sisa Pepejal di Jeli, Kelantan.**

ABSTRAK

Pengurusan sisa pepejal adalah isu kritikal di negara membangun seperti Malaysia di mana pertumbuhan populasi manusia, peningkatan perbandaran dan peningkatan taraf hidup disebabkan oleh inovasi teknologi telah menyumbang kepada peningkatan dalam kuantiti dan pelbagai sisa pepejal. Cabaran kewangan yang semakin meningkat untuk pengurusan sisa telah mendorong para penyelidik untuk memberi perhatian yang mendalam terhadap permintaan mengenai masalah tersebut. Kajian ini dijalankan untuk meneroka amalan dan perkhidmatan di rumah Jeli, untuk menyasiat persepsi responden mengenai pengurusan sisa pepejal, dan untuk menganggarkan kesanggupan untuk membayar (WTP) untuk SWM dalam kalangan responden di Jeli, Kelantan dengan menggunakan Kaedah Penilaian Kontinjen pilihan Dichotomous. Soal selidik telah dilakukan untuk mendapatkan sampel sebanyak 123 responden untuk kajian ini. Keputusan daripada kajian ini menunjukkan persepsi isi rumah terhadap amalan dan perkhidmatan mereka adalah baik. Di samping itu, lebih daripada separuh daripada responden sanggup membayar lebih untuk mendapatkan peningkatan dalam perkhidmatan pengurusan sisa pepejal. Oleh itu, anggaran kesediaan isi rumah untuk membayar sistem pengurusan sisa pepejal di Jeli adalah kira-kira RM12.05 / 6 bulan bagi setiap isi rumah. Terdapat beberapa cadangan yang dipilih. Model regresi logit digunakan dalam kajian ini untuk mengetahui hubungan antara sosio-demografi isi rumah dengan WTP. Kajian ini menemukan bahawa tahap pendidikan, jenis rumah, pekerjaan dan pendapatan isi rumah yang paling banyak mempengaruhi dalam menentukan kesediaan isi rumah untuk membayar pengurusan sisa pepejal yang lebih baik di Jeli.

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LISTS OF ABBREVIATIONS

| | |
|------|-----------------------------------|
| CVM | Contingent Valuation Method |
| DOSM | Department of Statistic Malaysia |
| ISWM | Integrated Solid Waste Management |
| MDJ | Majlis Daerah Jeli |
| MSWM | Municipal Solid Waste Management |
| SWM | Solid Waste Management |
| WTP | Willingness to Pay |

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Solid waste has come to be one of the major environmental problem other than carbon dioxide emissions, open burning, deforestation and water pollution (e.g. river pollution) in developing country such as Malaysia. Increased in population growth in an area is highly correlated with the increase in solid waste generation, thus becoming solid waste pollution. A failed management of solid waste will lead to major impact in human health and environment quality (Abas & Wee, 2016). However, it is significant to have the willingness to pay (WTP) of people in Kelantan, Malaysia for improvement in their solid waste management services.

The main guideline of Malaysia waste management concept is Solid Waste and Public Cleansing Management Act (Act 672) which has been introduced in 2007. Through this act, the management of solid waste in Malaysia has become more organized and systematic (Abas, 2018). Application of this Act 672 could be a stepping stone to an adequate solid waste management services especially in Jeli, Kelantan.

Municipalities are responsible in controlling and planning the municipal budget which a part of it will be spent on solid waste management (SWM) services. The most essential aspect of municipal solid waste management are collection and transportation of solid waste because it

requires most of the budget to be allocated in it and has the ultimate impact on the urban life (Maskey & Singh, 2017). This study evaluates the willingness to pay of the households in Jeli, Kelantan to improve their solid waste management services of waste collection and the determinant factors that have influence the management qualities.

Jeli is one of the district in Kelantan which is located between the boundaries of Gerik, Perak and Tanah Merah district. Jeli started to increase the population as there are development in educational institution such as Universiti Malaysia Kelantan, Politeknik Jeli and boarding schools that eventually makes the standard of living of the communities slowly changes. Generally, when population of an area increases, the wastes generates also increases (Julius *et al.*, 2017). This is because of the consumption of the community has increases. Therefore, solid waste management in Jeli has evolved through various strategies and methods of collection under waste management authority which is Majlis Daerah Jeli (MDJ). Urban cleaning and recreation is one of the main function of MDJ as well as managing tasks related to administration, secretariat and finance. Hence, MDJ are responsible towards making the city cleaner according to the Act 672 and, control and plan the budget wisely.

1.2 Problem Statement

As a developing country, population growth will increase, making the standards of living become increase and there were greater in consumption hence increase in waste generation (Agamuthu, 2009). A large proportion of developing country budgets were needed to be spent on solid waste management. Solid waste management services can be improved if there are good financial resources but this problem is increasing due to the inadequate governance, inappropriate planning by local authorities, undersupply of financial resource availability and ineffective management in solid waste especially in growing cities of developing (Anjum, 2013). An ideal structure for a good services must consider the usage of landfill which need to be reduced, the leachate problem, the cost for wages and facilities, and the taxes.

MDJ provides the services to manage solid waste from the domestic household in Jeli, however, due to low income resources in improving SWM services, the local council could not afford to provide a better facilities in collect and transport system, and manpower. Increase in waste generation and ineffective or in adequate solid waste management causes effects on health. Unorganized municipal solid waste (MSW) dumping systems because of increase in population lead to the stress on ecosystems as well as disturbs various nature cycles and human health (Soni, 2016). A study by Aina (2018) in Ondo State, Nigeria examined that the attitude of people and the inadequate facilities on the determinants of inadequate solid waste management services. It can be said that the research showed that economic factors led to inefficient of solid waste management. The government such as Majlis Daerah Jeli should allocate enough budget for provision of SWM services within municipality need to be reviewed from time to time to make certain if the monies are put to correct use and also to ensure the effectiveness of solid waste management system.

In order to determine communities contribution level in improving solid waste management system, a questionnaire would be distributed to the households about their willingness to pay (WTP) in improving solid waste management services in Jeli. Besides, the perception of the households towards current solid waste management services should be taken into account to analyze their level of satisfaction towards the service provided by MDJ and their opinions in making an improvement to the services should be considered.



1.3 Research Question

The research question for this study are:

1. How the respondents manage and practice their domestic solid waste?
2. What are the perception on current solid waste management practices and services?
3. What are the estimation of willingness to pay of respondents for solid waste management services?

1.4 Objectives

Objectives of this study are:

1. To explore the current solid waste management practices and services.
2. To investigate the perception on current solid waste management practices and services.
3. To determine willingness to pay (WTP) of respondents for solid waste management services.

1.5 Scope of Study

In this study, the research was conducted in five different areas in Jeli district which are Bandar Jeli, Kuala Balah, Gemang, Ayer Lanas and Batu Melintang. A number of 123 respondents are chosen to answer the survey which uses contingent valuation method (CVM) to develop their willingness to pay for an improved in solid waste management services using the quantitative research. The data from questionnaire that were distributed to the respondent and then analyzed using descriptive statistics to measure central tendency which include mean, median and mode, and logistic regression model to find out the monetary value that the communities in Jeli district were willing to pay to have an efficient and effective solid waste management services in Jeli, Kelantan. The questionnaires were evaluated on domestic solid waste management, practices and willingness to pay. At the end of this study, several recommendations were proposed to enhance the study.

1.6 Significance of Study

The significant of this study were to explore solid waste management and practices from the respondent's household and to determine their ways of managing waste before being disposed of. The level of awareness from the semi-rural area about proper methods to manage their solid waste that were produced mostly from the residential area. Next, from this study, the resident's perception about the willing to monetarily attach in improving solid waste management was one of the necessary in this study.

CHAPTER 2

LITERATURE REVIEW

2.1 Solid Waste

According to Act 672, solid waste can be considered as any scrap material, other unwanted substance or rejected products arising from the application of any process that is needed to be disposed of. Solid waste can be classified as many types which includes, municipal solid waste which come from residential area or residue from sanitation and demolition debris, clinical waste from laboratory and hazardous waste. Generally, waste can be categorized into recyclable waste, organic waste, soiled waste such as hospital waste and lastly, toxic waste. Solid waste can come any places includes the industrial, institutional, residential, agricultural and commercial activities in a given area (Leblanc, 2018).

2.1.1 Solid Waste Management

According to Act 672, solid waste management services includes the separation, storage, collection, transportation, transfer, processing, recycling, treatment and disposal of controlled solid waste. Collection systems of solid waste depends on the areas of waste collected, for example, door to door collection or community bin collection which requires manual and multiple handling of waste to dump into transportation vehicles. Then, it were sent by using vehicles to a facility that

combines waste from multiple area of collection that came from the collection center into larger, high volume transfer vehicles for more economical shipment to distant disposal sites called transfer station. From transfer station, the wastes were sent to disposal sites where waste materials were buried (Mishra, 2014). According to Lau (2004), the collection rates vary from state to state because of difference in efficiency in collection and transfer.

Apart from implementing Act 672, integrated solid waste management (ISWM) is a new established policy in SWM for developing countries. ISWM practices reduce, reuse and recycle together with landfilling and incineration as waste disposal method as an effort to waste reduction and cost-effectiveness (Rahim *et al.*, 2012). In Malaysia, urban streets were cleaned by the municipalities using the Local Government Act 1076 and the Street, Drainage and Building Act 1974 until the late 1960s which then passed for sanitary disposal and public cleansing services (Kadiresu, 2012).

2.2 Theoretical Framework

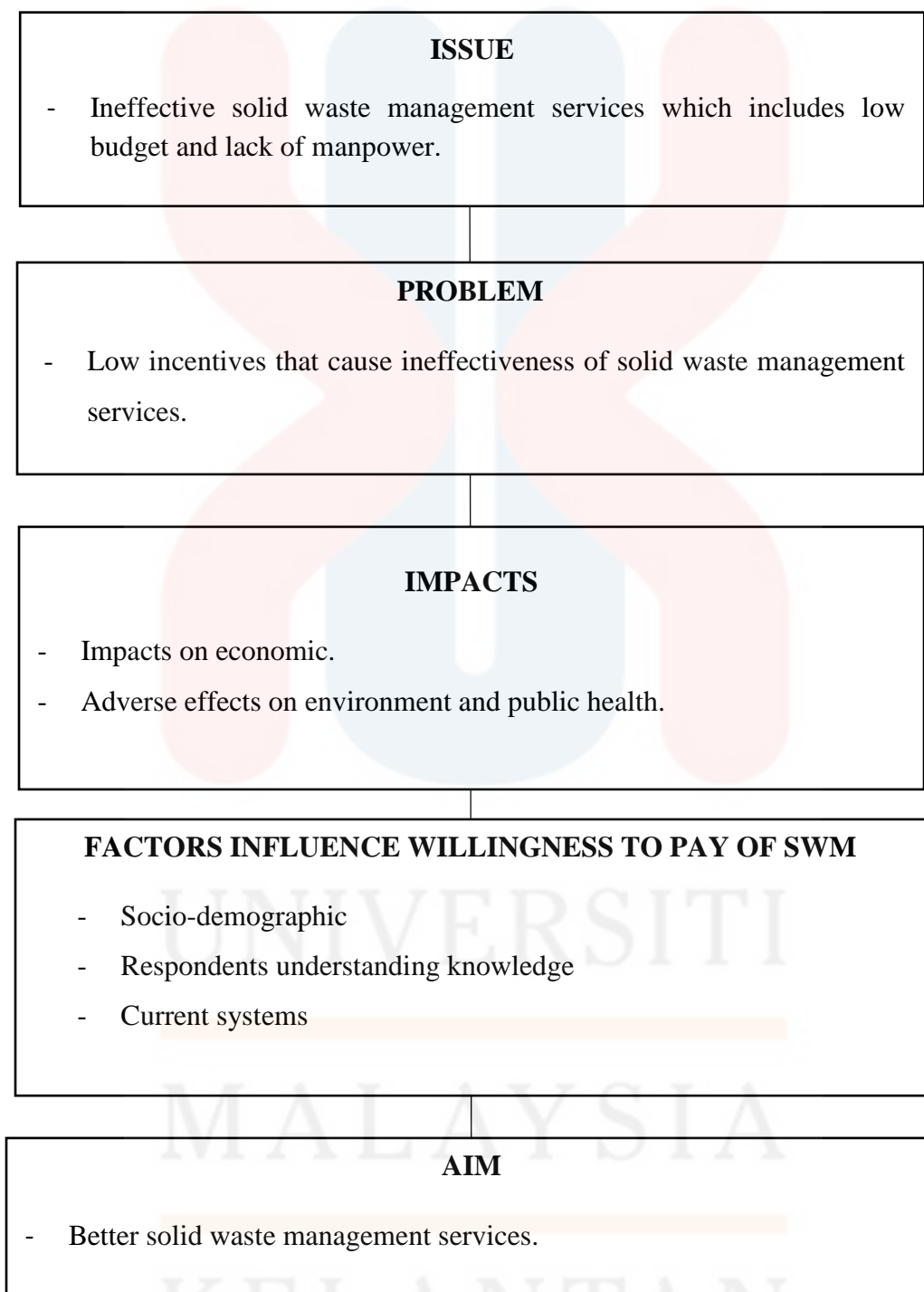


Figure 2.1 Theoretical framework for this study

2.3 Issue on Solid Waste Management Services

According to the journal from Afroz *et al.* (2013), Anjum (2013), Ojok *et al.* (2013) and Trang *et al.* (2017), it was agreed that rapid growth population, urbanization, economic development, and industrialization have resulted in massive volume of solid waste generation in residential areas throughout the world but the main focus are especially in the developing countries where there are rapidly growing cities with more industrial sectors and housing areas. Therefore, increases the economic demands in solid waste management services that require the government to provide a large proportion of budgets in order to develop a sustainable solid waste management services.

Waste collection in the rural requires higher cost due to the low density of the rural households than the urban settings (Selvam & Wong, 2016). For example, collection, transportation and treatment of 1 tonne of MSW in the urban and rural areas of Hangzhou, China costs about 175 and 293 US\$/ton, respectively (He, 2012). Such situation reduces the efficiency of collection, transport and treatment in the rural areas resulting in higher pollution subsequently causing environmental as well as public health issues.

2.4 Impacts of Ineffective Solid Waste Management Services

2.4.1 Impacts on Economic

Expanding economic activities and growing population are generating excessive solid waste especially in developing country. A research successfully done by Ab Rahim *et al.* (2012) reported that the estimated solid waste generation was about 320 tonnes per day in 2010 and increased of 119% from 146 tonnes per day in 2006 which automatically makes the local authorities invest in higher cost in order to provide management of solid waste management services in sustainable way. Besides, excessive solid waste generation and unsystematic use of dumpsite shortens its life span which eventually financial issue becomes the barrier of improvement intended in solid waste management (Isa *et al.*, 2005)

2.4.2 Impacts on Environment and Public Health

Developing countries mostly faces similar aspects of ineffectiveness of solid waste management which includes placement of solid waste on the ground, leachate and emission dust and gases which will cause drawbacks to the environment, health and dumpsite's lifespan (Rahim *et al.*, 2012). These flaws to provide good services of solid waste management are the catalysts to environmental hazards thus leading to poor environmental and health effects. Environmental degradation will occur because of inadequate waste management in the disposal of solid waste (Vivek *et al.*, 2013). Also, waste management has become major cause of pollution and diseases will outbreaks to many parts of the world.

According to (Farooq *et al.*, 2017), solid waste is a large source of methane which known as a powerful greenhouse gases that is impactful to the environment in the short-term. Excessive amount of uncollected solid waste will eventually contributes to air pollution, flooding and public health impacts such as diarrhea, dengue fever, Malaria and Leptospirosis. This vector borne diseases comes from insanitary waste disposal hence promotes breeding of pests. Besides, ground and surface water will be contaminated due to indiscriminate waste disposal at the dumpsite.

2.5 Factors Influence Willingness to Pay for Solid Waste Management Services

2.5.1 Socio-Demographic

A study by Ojok *et al.* (2013) shows that a systematic technique was used in the selected household area while considering the total projected population and housing in Kampala. From the research made at Thu Dau Mot City, showed that the socio-economic and demographic influences the significant of the probability of answering “YES” of respondents to the bid price asked (Trang *et al.*, 2017).

2.5.2 Respondents Understanding Knowledge

Past researchers investigated one variable that the respondents aware about solid waste management services and how they acquired information about it. Banga (2013) reported in her work that participation from the communities in solid waste management handling method depends on the gender, level of awareness, educational level, and households' income. Next, a study in Ghana has come to a conclusion that most of household who were aware of solid waste

management strategies did not put them into practice because the awareness on the importance of SWM were low in that particular area. Besides, the data obtained stated that the people's attitude towards social commitment to participate in solid waste management has become slightly decrease.

According to a research by Addaney and Anarfiwaah (2015), it can be concluded that some public awareness being created with little supervision provided resulting to the rising indiscriminate disposal and littering in the municipalities. Therefore, the respondents' understanding knowledge on solid waste management influence their willingness to pay for solid waste management services.

2.5.3 Current System

In Malaysia, road were cleaned by the local district health and wellbeing office by following the policy of Local Government Act 1976 and the Street, Drainage and Building Act 1974 until the late 1960s. Later, the cleaning process was done by public cleansing services and sanitary disposal. Malaysian laws were marked as really general and far from adequacy because of absence in resources and faced municipal budget limitation to increase SWM quality services. According to Hassan *et al.* (2000) waste collection budgets was ranging from 20% to 70%, according to the dimensions of the municipality.

Until today, there were wastes dumped in open fields and rivers and a research of solid waste disposal handling in Kuala Lumpur disclosed that 31.9% of waste were disposed by households using method of open burning, whereas there were 6.5% of wastes dumped into the river system (Murad & Siwar 2007). Therefore, environmental safety should be a concerned in Malaysia as Malaysia was levelled as secondary in environmental safety concern, and most of the

municipalities had to find new disposal sites or landfill because the existing disposal sites were nearly depleted (Hassan *et al.*, 2000).

Furthermore, MSWM in Malaysia is managed responsibly by the public sector even though private contractors which was held under the privatization program has been contracted out part of the solid waste management services by the government (Lau, 2004). Despite the involvement of private contractors, SWM services contributed to a high proportion of the municipal revenues as waste management and planning which are under municipal responsibility. From the budgets, 50% on average of the municipal operating budget were allocated on municipal solid waste management (MSWM) and collection of waste have spent about 70% of the budgets. The three sources of generate funding for the municipal budgets were from service charges, municipal taxes, and also subsidies from municipal revenues that was received from the government initiatives (UNEP, 2002). Municipalities depend deeply on municipal taxes or monies to provide better quality of SWM services to the households. This is because the taxes charged for collection and transfer system was not covering the costs for the operations. Besides, there were no uniformed procedures for monies needed to be paid and the debates about this issue are still ongoing.

2.5.4 Review of Previous Studies

In recent years, contingent valuation method (CVM) is commonly used in developing countries to elicit the preferences of individuals for basic infrastructural projects (Merrett, 2002). Thus, CVM has developed to be a particularly trendy instrument to measure the benefit of value changes in the supply of non-market goods and services and it is also widely accepted around the world. This method has previously been used for environmental goods in many countries around the world, especially in Malaysia and in other developing countries. The studies recorded here used CVM with the dichotomous choice approach. Table 2.1 represents a summary of the studies that have been carried out for solid waste management in Malaysia and in other selected developing countries.

Table 2.1 Summary of Previous Studies Using CVM

| Year | Researcher | Valued areas | Willingness to Pay (Valuation result) |
|-------------|---------------------|---------------------------------|---|
| 2012 | Ojok <i>et al.</i> | Kampala, Uganda | Mean: UGX 5,382 (USD 2.91) |
| 2012 | Rahim <i>et al.</i> | Kota Bharu, Kelantan | Mean: RM13.91 per month |
| 2013 | Anjum | Islamabad, Pakistan | Mean: Rs 289.15 |
| 2013 | Balasubramaniam | Madurai, India | Mean: INR Rs 24 (USD 0.34) |
| 2016 | Song <i>et al.</i> | Macau | Mean: 38.5 MOP / month per household |
| 2017 | Trang <i>et al.</i> | Thu Dau Mot City, Binh Duong | Mean: 24 thousand VND / month per household |
| 2018 | Ndau and Tilley | Blantyre, Malawi | Mean: MWK 1,139 |

2.6 Better Solid Waste Management Services

From the research made by (Afroz & Masud, 2011) which studied on contingent valuation method (CVM) used to estimate the willingness to pay (WTP) of the households in order to improve the SWM system in Kuala Lumpur had come to a conclusion that from a set of scenarios were chosen by policy makers includes different elements and willingness to pay estimated for each attribute in designing an improvement for solid waste management while taking into consideration that socioeconomic factors and quality of SWM services include waste collection services will eventually influence the willingness to pay of household towards efficient solid waste management.

CHAPTER 3

MATERIALS AND METHODS

3.1 Study Area

This project was to study the respondents from Jeli district. Jeli is the third biggest district in Kelantan where Batu Melintang, Jeli and Kuala Balah are the ‘mukim’ in Jeli district. Jeli land with an area of 128,020.56 hectares or 1,280.21 sq. km had a population of approximately 42,872 people according to Jeli Land and District Office (2019).

In this study, at least 123 respondents from Jeli, Kuala Balah and Batu Melintang were distributed by the questionnaire to determine the willingness to pay of the households towards improved SWM services in Jeli, Kelantan and the factors influencing the WTP.

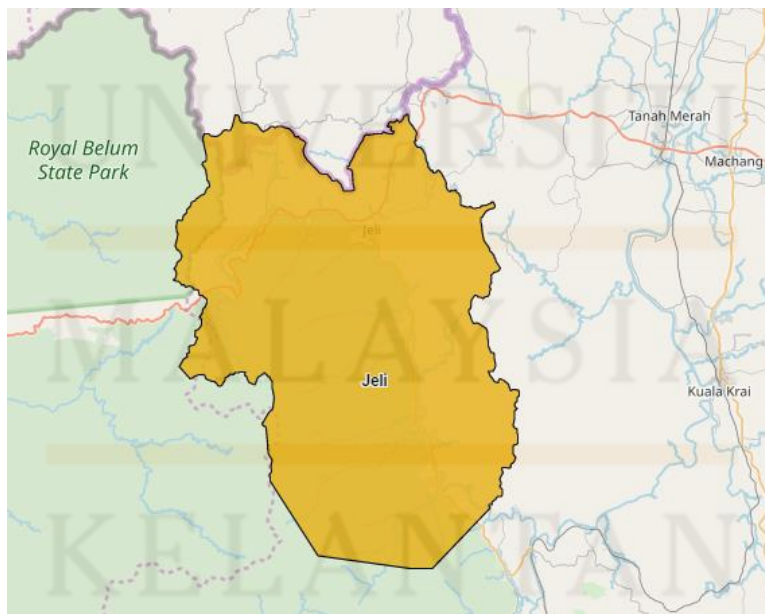


Figure 3.1 Jeli district (Source: Jeli Land and District Office, 2019)

3.2 Data Collection

3.2.1 Primary Data

The method used to identify the awareness of willingness to pay for the solid waste management services of the household in Jeli, Kelantan was the quantitative primary data. Quantitative primary data requires the data can be collected through questionnaires, polls or surveys using computational techniques like Statistical Package for the Social Sciences (SPSS) which emphasizes the objective measurements and the mathematical, statistical, or numerical analysis of the data collected (Babbie, 2010). In this study, questionnaires was chosen to emphasize the objectives measured in statistical analysis of the data collected.

3.2.1.1 Questionnaire Design

A structured questionnaire was designed to collect primary data from the households in Jeli where the questionnaire consist of three sections (**Appendix B**). After the questionnaire was designed, the validation and reliability test of the questionnaire was done to assure dependable measurement of the variables under investigation. There are three types of validity test which are content validity, construct validity and criterion-related validity. Meanwhile, reliability test consist of three types includes split-half reliability, test-retest reliability and internal consistency reliability test. Hence, in this study, content validity and internal consistency reliability test was applied. The expert who have checked the questionnaire were Dr. Muhamad Azahar and Mr. Hizami Hassin. The data validation was realized with an internal consistency examination through the Cronbach's alpha statistic. For reliability test, internal consistency reliability test was done to express the

number of coefficient known as alpha Cronbach's coefficient. The result of Cronbach's alpha test for the questionnaire designed was 0.698 (**Appendix C**). According to Starovoytova (2018), most-authors recommend that a-value of 0.6 to 0.85 as an acceptable value for Cronbach's-alpha. Values substantially lower indicate an unreliable scale (either the question is too-short, or the-answers have nothing in common).

The first section of the questionnaire includes information on the household socio-demographic which include socioeconomic characteristics. The second part was about Solid Waste Management (SWM) which includes the household general waste handling activities, knowledge about the current SWM services provides by MDJ, the awareness of households towards the impact of waste on the environment and the perceptions on current solid waste management service that existed in Jeli. For the last section, contingent valuation method (CVM) was designed as a technique to estimate the willingness to pay a fee by the households for improved solid waste management services.

Moreover, Likert scale was developed to measure attitudes or opinions of the respondent by choosing the answer in a scale such scale 1-5 either, 1 is the strongly disagree, 2 is disagree, 3 indicates moderately agree, 4 is agree or 5 as strongly agree. This enables Objectives 2 which is the perception on current solid waste management services to be achieved and their awareness on the current situation with solid waste issues and willingness to pay for improved solid waste management services to be analyzed using regression analysis.

3.2.1.2 Sampling Strategy

The method for sampling method used in this study is stratified random sampling. About 123 questionnaire were distributed at different area which are Batu Melintang, Kuala Balah, Bandar Jeli, Gemang and Ayer Lanas considering the type of houses in each area that are terrace, bungalow and wooden houses. So, as to take a number of respondents as a sample that can be the best representative for the whole population, the number of respondents were determined based on the table of sample size in **Appendix A** as proposed by Krejcie & Morgan (1970). For this study, from the total of 42,872 populations in Jeli, 380 respondent should be taken according to Appendix A, however, due to time constraint, transportation constraint and lack of budget only 123 respondents was able to be achieved.

3.2.2 Secondary Data

Secondary data is taken from the past research that were collected and already available from other sources such as reference books, journals, newspaper articles and web search that have relations to willingness to pay of solid waste management. In addition, secondary data helped to make primary data collection more accurate since secondary data fill in the gaps and deficiencies and helped in adding information that were needed to be collected. For this study, the secondary data could be obtained from past research from Malaysia and other countries that measures the willingness to pay of households' solid waste management services using the CVM techniques. Hence, from the data obtained, the most influencing factors in household WTP could be found out and compared with the primary data. Therefore, it helped to strengthen all the statements regarding this study as it is proven by the other researchers.

3.3 Data Analysis

3.3.1 Descriptive Statistic

Descriptive statistic was used in summarizing the survey data to measures the central tendency which include mode, mean, median as well as dispersion measures such as standard deviation and range which described the value or responses closeness to central tendencies. Percentages were displayed as the distribution that summarizes the frequency of individual values or ranges of values for a variable. In this cases, the sociodemographic results were presented in percentage. Besides, the mean of the data were used in order to determine the variability for asset of data. The data was analyzed to estimate the center of a distribution values. Mean values computed to analyze the perception of respondents and the average amount of bid price the respondents willing to pay.

3.3.2 Logistic Regression Model

Logistic regression model is a statistical process that has been used to identify the determining factors of households' willingness to pay for improved solid waste management services from the data collected after distributing the survey to 123 respondents. The data were analyzed to determine the responses of some variable to the corresponding the socio-economic attributes of the respondents in order to see WTP for SWM (Anjum, 2013). The logistic regression model was used because of its asymptotic characteristics and its comparative mathematical simplicity.

Conceptually, a bidding format was used to produce willingness to pay (Randall et al., 1974). The single-bounded dichotomous choice contingent valuation (DCCV) model was used to analyze the data. For the DCCV model, two possible results can be observed that are either the respondent is not willing to pay for the bid level of the assurance tax offered or the respondent is willing to pay for the bid price level of the solid waste allocation budget to have better solid waste management services. The bid price is the dependent variable, where 1 = 'yes' and 2 = 'no'. Hence, the estimated WTP measures were calculated using the logit regression model for the mean price and income level. In this study, the SPSS 20.0 program was used in order to compute the binary logit regression of the visitors' willingness to pay.

Comparative mathematical simplicity is mathematical development which are often valued for providing streamlined solutions to problems, shorter proofs, or easier calculations. Next, asymptotic characteristic increases and decreases until a certain fixed value approached such as asymptote at the point it levels off. Logit model has a cumulative probability function with the ability to deal with a dependent variable which allows for estimating the probability that an event will occur or not through prediction of a binary dependent outcome from a set of independent variables (Aggrey & Douglason, 2010). Moreover, the logistic regression model provides information only about respondents' decision to pay or to not pay for the improved SWM service. The logistic regression model or logit model to identify household's WTP for improved waste collection service can be stated as:

$$Y = \frac{1}{1+exp^{-z}} \quad (1)$$

Where;

Y = Response of respondents to WTP such as sex, age, education, family size, monthly size, monthly income, present cleaning status and maximum amount of willing to pay for respondents to the willingness to pay question which was either Yes = 1 or No = 0)

Z = Summation of explanatory variables multiplied by their coefficient, for example.,

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_8 X_8 + \varepsilon_i \quad (2)$$

Where;

β_0 = the intercept which is constant

$\beta_1 \dots \beta_8$ = Coefficient of explanatory variables

$X_1 \dots X_8$ = a set of independent variable

ε_i = Error term

The probability of households' willingness to pay for improved solid waste management services cannot use the parameters from the logit model as to interpret effects of the explanatory variable for each variables because the model is non-linear. So, as to find the relative magnitude of effects of each explanatory variable, marginal effects was calculated. The effects of the j th explanatory variable can be summarized as below:

$$\frac{1}{n} \sum_{i=1}^n \frac{\partial P [Y_i=1]}{\partial X_{ji}} = \beta_j \frac{1}{n} \sum_{i=1}^n f(X_j^1 \beta), j = 2, \dots, k. \quad (3)$$

i.e., the mean marginal effects over the sample of n individuals.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

In this chapter, the results are presented. The descriptive analysis discusses the results of the demographic profile, the current services and the perceptions of the household on solid waste management of their current practices and services provided at Jeli district. This chapter also covers the willingness to pay analysis of the household towards SWM.

4.1.1 Demographic Result and Socio-Economic

Jeli is a district in Kelantan formerly a rural area without low facilities provided for the people to easily access. However, it is slowly developed as there is university, district council and other new facilities will be built in Jeli for the people's access. Nowadays, people starts to migrate to Jeli for work purpose. Hence, DOSM state that population in Kelantan has increase over the year making different type of household income are available in Jeli as many type of working sector has opened. For this study, about 123 respondents of the people in Jeli have participated in this survey and the demographic and socioeconomic characteristics of the respondents are showed in Table 4.1.

The questionnaire were distributed to the head of the family in order to get the most reliable data. From 123 respondents, the majority of respondents were male (63.4%) whereas another 36.6% were female. According to the age group, the highest percentage of respondents is between 51-60 years old with 26.8% followed by above 60 years of age (24.4%), 41-50 age group (23.6%), 31-40 years old (17.1%) and 21-30 years old (8.1%). This implies that respondents are in their active age and therefore can work to earn, more income which can affect their decision to pay for improved waste services. Next, all of the respondents were Malay as other races population are minority in Jeli.

The education level of the collected respondent's data mostly was SPM which accounted for 36.6%, followed by UPSR (17.1%), Diploma/Degree (16.3%), PMR (11.4%), 10.6% were unschooled and STPM/STAM/Sijil with 8.1%. According to the study made by Trang (2017), the education levels is not high enough may be the reasons explaining why the majority of respondents are not aware of the importance of taking care the environment. As for the employment status, the largest number were self-employed with 37.4%. The second largest number (30.9%) was unemployed which is mostly filled by women as the head of the family. Then it is followed by 22.0% works in public sector, private sector (8.1%) and retired (1.6%). The household income level was classified into four classes which are; below RM500 (17.1%), RM501-RM2500 (61.8%), RM2501-RM4500 (7.3%) and above RM4500 (13.8%). Most of the respondents are belong to the RM501-RM2500 group depending to their employment status. It is quite high in number for below RM500 classes because the poor household depends their lives on the welfare money. Generally, respondents who have higher incomes are willing to pay more for the solid waste management.

The distribution of household size indicates that 1-3 (29.3%), 4-6 (47.2%), 7-9 (22/8%), and more than 10 people (0.8%). This study also figured out the types of houses of wooden house

(39.0%), terrace house (18.7%), and bungalow (42.3%). The respondents owns their house accounted for 87.8% whereas 12.2% rented their house.

Table 4.1 Demographic and socioeconomic characteristics

| Variable | N (%) |
|-------------------------------|-------------|
| Gender | |
| • Male | 78 (63.4) |
| • Female | 45 (36.6) |
| Age | |
| • 21-30 | 10 (8.1) |
| • 31-40 | 21 (17.1) |
| • 41-50 | 29 (23.6) |
| • 51-60 | 33 (26.8) |
| • >60 | 30 (24.4) |
| Race | |
| • Malay | 123 (100.0) |
| Education Level | |
| • UPSR | 21 (17.1) |
| • PMR | 14 (11.4) |
| • SPM | 45 (36.6) |
| • STPM/STAM/SIJIL | 10 (8.1) |
| • DIPLOMA/DEGREE | 20 (16.3) |
| • Unschooled | 13 (10.6) |
| Occupation | |
| • Public Sector | 27 (22.0) |
| • Private sector | 10 (8.1) |
| • Self-employed | 46 (37.4) |
| • Unemployed | 38 (30.9) |
| • Retired | 2 (1.6) |
| Household Income Level | |
| • <RM500 | 21 (17.1) |
| • RM501-RM2500 | 76 (61.8) |
| • RM2501-RM4500 | 9 (7.3) |
| • >RM4500 | 17 (13.8) |
| Number of Household | |
| • 1-3 | 36 (29.3) |
| • 4-6 | 58 (47.2) |
| • 7-9 | 28 (22.8) |
| • >10 | 1 (0.8) |

Table 4.1 (Continued)

| | |
|----------------|------------|
| Type of House | |
| • Wooden House | 48 (39.0) |
| • Terrace | 23 (18.7) |
| • Bungalow | 52 (42.3) |
| House status | |
| • Owner | 108 (87.8) |
| • Rent | 15 (12.2) |

The gender of respondents that answered the questionnaire mostly were male which indicates that they are the head of the family and the one who pays for taxes and bills. Besides, female respondent were mostly single mother or lives alone unmarried. From the age range with the 41 years and above implies that the respondents are in their active age and therefore can work to gain more income which can affect their decision to pay to have a better waste management services in future. Most of the citizen in Kelantan are Malay with very small amount of other ethnicity according to City Population web site (2017) which explained whole respondents were Malay. Lower number of household indirectly influences the willingness to pay because they had less commitment compared to higher household sizes. Different type of houses may affect the WTP values of the respondents depending to their household income.

4.1.2 Practices of Solid Waste Management

The results of the respondent current practices of solid waste management are presented in Table 4.2. The majority (86.2%) of respondents use the facilities provided by the authority by disposing their solid domestic waste into MDJ garbage bin which is located near their housing area entrance. However, about 13.8% burn their waste near their houses. In terms of frequency of throwing their trash into the main bin for a week, the results indicate that 43.1% of the respondents throw their trash more than three times a week, followed by three times a week (31.7%), 16.3% throws 2 times a week and 8.9% once a week. This is because the respondent's frequency of throwing trash to main bin influenced by the number of household and the amount of trash were produced for a week.

Next, more than half of the respondents (54.5%) chose 'No' for the questions which asked if they sort their garbage into categories such as paper, glass and food waste while the other 45.5% chose 'Yes' as they sort their garbage accordingly. Some of the respondents said that they did not sort their garbage into category because they realised that the landfill did not managed sustainably by the authority.

There were 54.5% of the respondents claimed that MDJ did not collect garbage in their area whereas 45.5% that MDJ has done their part in collecting the garbage in their housing areas. The frequency of the authorities collect garbage every week were questioned, 44.7% were not knowing the frequency of the garbage collected per week while 30.9% chose more than three times a week, followed by 12.2% for three times a week, 8.9% chose twice a week and the rest 3.3 % chose once a week.

Table 4.2 Respondent current practices of SWM

| Section | N (%) |
|---|------------|
| How do you manage the waste in your home? | |
| • MDJ's Garbage Bin | 106 (86.2) |
| • Burn the waste | 17 (13.8) |
| How often do you throw trash into the main bin in your home area during the week? | |
| • 1 | 11 (8.9) |
| • 2 | 20 (16.3) |
| • 3 | 39 (31.7) |
| • >3 | 53 (43.1) |
| Do you sort your trash by category? E.g.: food waste, glass, paper etc. | |
| • Yes | 56 (45.5) |
| • No | 67 (54.5) |
| Is the Jeli District Council (MDJ) collecting garbage in your home area? | |
| • Yes | 67 (54.5) |
| • No | 56 (45.5) |
| If you use district council services, how many times wastes in your area are collected in a week? | |
| • 1 | 4 (3.3) |
| • 2 | 11 (8.9) |
| • 3 | 15 (12.2) |
| • >3 | 38 (30.9) |
| • Do not know | 55 (44.7) |

The study reveals that most of the respondents use the facilities provided by the authority for their waste disposal whereas some of them burned their waste as an easier alternatives for them because they thought that the disposal bin were located far from their houses. Most of the people that burned their waste was aware of the effect to the environment health which will add to the toxic gaseous emissions in the atmosphere, polluting the air and destroying the ozone layer and its protective properties, thus increasing the risk of health hazards, however, they are used to that method (Yoda et al., 2014). In addition, the respondents are not aware of the services quality provided by the MDJ because about 44.7% of them did not know the frequency of their wastes being collected by the authority. This is because of the disposal bin located at the entrance of their

housing area which is difficult to access for some of the respondent to notice the frequency of the waste collection.

4.1.3 Perception on Current Practices

Table 4.3 indicates the perception of the respondents towards their current practices on solid waste management. The majority of the respondents agree that they satisfied with the way they dispose garbage with a percentage of 55.3%, while 23.6% noted that they are moderately agree, 19.5% stated that they are strongly agreed and the rest 1.6% chose disagree.

Among 123 respondents, 40.7% of them agreed that their solid waste management in their household can be improved. About 34.1% strongly agreed to change their management into sustainable way of disposing garbage, followed by 20.3 percent stated that they moderately agreed and 4.1 percent chose disagree. However, 0.8 percent stated that they are strongly disagree as they had comfortable with their method to dispose the garbage.

More than half (51.2%) of the respondent agreed that their method of managing solid waste are good for the environment. Meanwhile, there are 22.8% chooses moderately agreed, 22.0% answered strongly agreed, 3.3% of the respondent were disagree and 0.8% strongly disagree.

For the question to see their level of awareness on the importance of SWM to the environment, the data survey recorded majority of 55.3% strongly agrees, 29.3% agree, 13.8 moderately agree, 1.6 disagree and no household strongly disagreed.

There were 49.6% from the total respondents strongly agrees that it is importance to sort waste into categories for the sake of protecting the environment, followed by 35.8% agrees, 13.0% moderately agrees, 1.6% disagree and no one chose strongly disagree.

Table 4.3 Respondents Perception on Current practices

| Variables | Mean (Std. Dev) | 1 | 2 | 3 | 4 | 5 |
|--|-----------------------|---------------------------------|---------------------|--------------------------------|------------------|------------------------------|
| | | (strongly disagree) N (%) | (disagree) N (%) | (moderately agree) N (%) | (agree) N (%) | (strongly agree) N (%) |
| Are you satisfied with the way you dispose of solid waste? | 3.93 (0.703) | 0 (0) | 2 (1.6) | 29 (23.6) | 68 (55.3) | 24 (19.5) |
| Is solid waste management in your home can be improved? | 4.03 (0.886) | 1 (0.8) | 5 (4.1) | 25 (20.3) | 50 (40.7) | 42 (34.1) |
| Is your waste management good for the environment? | 3.90 (0.804) | 1 (0.8) | 4 (3.3) | 28 (22.8) | 63 (51.2) | 27 (22.0) |
| Are you aware of the importance of solid waste management to the environment? | 4.38 (0.784) | 0 (0) | 2 (1.6) | 17 (13.8) | 36 (29.3) | 68 (55.3) |
| Do you know the importance of sorting waste into categories that are good for the environment? | 4.33 (0.765) | 0 (0) | 2 (1.6) | 16 (13.0) | 44 (35.8) | 61 (49.6) |

Generally, the perception of the 123 respondents on their current solid waste management were good because most of them satisfied with their current practices. Environmental awareness is likely to increase the demand for environmental goods and services. Therefore, this study showed the respondents who are aware of the importance of taking care the environment by making sure that the waste management is improve are expected to pay for waste management services as found by other similar studies (Padi et al., 2015; Roy & Deb, 2013; Anjum, 2013).

4.1.4 Perception on Current Service Provided

Table 4.4 shows the perception of the respondents towards the current services provided on solid waste management. The majority of the respondents agree that they satisfied with the way they dispose garbage with a percentage of 35.0%, while 33.3% choses that they are moderately agree, 13.8% stated that they are strongly agreed and the rest 14.6% chose disagree, 3.3% strongly disagree.

Based on the data gathered, there were 32.5% stated moderately agreed to the question asking whether the services provided timely and effective in their residential area, 26.8% choses agreed, 17.9% disagreed, 15.4% strongly agreed and 7.3% strongly disagree.

In addition, for question that asked whether the collection from Majlis Daerah Jeli is sufficient to manage their solid waste, there were 30.9% answered agreed and moderately agreed while 21.1% disagree with the questions, 10.6% strongly agreed as they think that the service provided was sufficient to manage their domestic waste. However, only 6.5% strongly disagreed as they preferred their own method of disposing solid waste.

Lastly, since the trash bin is only provided at the entrance of their residential area, a question of if the trash bin is reachable was asked. Most of the respondent (30.1%) strongly agreed and 27.6% agreed that they have no issues with the distance of trash bin provided. However, 16.3% strongly disagreed, there are 13.8% choses moderately agreed while 12.2% disagree because the distance of garbage bin has become the contributor for their answered. This question were affected by the random distribution of the survey to the people who lives near the main entrance and those who lives far from main entrance that needs extra effort to dispose their solid waste. Hence, some of the people that feels a burden to dispose the waste in the garbage bin provided, they tend to burn their waste instead.

Table 4.4 Perception of Respondents on Current Services Provided

| Variables | Mean (Std. Dev) | 1 | 2 | 3 | 4 | 5 |
|---|-----------------------|---------------------------------|---------------------|--------------------------------|------------------|------------------------------|
| | | (strongly disagree) N (%) | (disagree) N (%) | (moderately agree) N (%) | (agree) N (%) | (strongly agree) N (%) |
| Are you satisfied with the solid waste management service in your home? | 3.41 (1.008) | 4 (3.3) | 18 (14.6) | 41 (33.3) | 43 (35.0) | 17 (13.8) |
| Is the service provided timely and effective in your residential area? | 3.25 (1.142) | 9 (7.3) | 22 (17.9) | 40 (32.5) | 33 (26.8) | 19 (15.4) |
| Is the collection from the MDJ sufficient to manage your solid waste? | 3.18 (1.087) | 8 (6.5) | 26 (21.1) | 38 (30.9) | 38 (30.9) | 13 (10.6) |
| Is the trash bin easily reached? | 3.43 (1.443) | 20 (16.3) | 15 (12.2) | 17 (13.8) | 34 (27.6) | 37 (30.1) |

The services provided by MDJ was moderately satisfying the respondents because of the facilities was inadequate which determine the ineffective of solid waste management in Jeli. This study is in line with the findings of UNEP, (2007) who reported that there are several factors that have facilitated increase in the volume of solid waste generated. The factors that have led to increase in solid waste generation is rapid urbanization and urbanization comes with expansion of towns which manifests through the growth of social and economic infrastructure/services and industrialization. Besides, the other factor that increases the volume of solid waste generated in Jeli was during the festive seasons where the household size increase and the frequency of the waste collected is inefficient as the authority did not collect the waste during those days.

4.2 Willingness to Pay for Solid Waste Management Services

This section presented the WTP as stated by the respondents. The analysis used the dichotomous choice CVM, whereby each respondent is asked whether they would be willing to pay a particular price to improve solid waste management services by letting them answer the question with ‘yes’ or ‘no’ to the bid price. Bidding prices between RM8 to RM16 were assigned during the distribution of the survey at Jeli, Kelantan. The distribution frequency of the respondent’s willingness to pay for each bid amount is shown in Table 4.5.

A sample of 123 questionnaires were used in the survey and all the sample were accepted and used for the analysis to determine the willingness to pay. In addition, there were 76 (61.8 %) of the 123 respondents that indicated their willingness to pay for the given bid, and 47 respondents (38.2 %) did not indicate their willingness to pay.

The results presented in this study including a bid price with a lower bidding price, imply large numbers of respondents are willing to pay for the better solid waste management in Jeli area. This result is consistent with the theoretical expectation “as the given bid is decreased, the number of respondents willing to pay increases and vice versa”, which means there is a negative relationship between the WTP and the amount of solid waste budget from the assessment tax.

Practically, on the first bid level value of RM8 given to the respondents, about 22.4 percent of respondents were willing to pay and only 17.0 percent of them would avoid paying. When the given bid level increased to RM16, more of respondents were willing to pay (23.7 %) while only a small percentage of respondent (12.8 %) were not willing to pay for the given bid level. In addition, when the given bid increased to RM10, there were 18.4% willing to pay while 23.4% were not willing to pay for the given bid level. For RM12 bid given, the percentage of respondents willing to pay for SWM was 17.1% and 25.5% were not willing to pay. Next, bid level value of

RM14 given to the respondents, 21.3% of them would avoid paying while 18.4% of respondents were willing to pay. From the results, it showed that from the bid value of RM10 to RM14, the percentage of the respondents that were not willing to pay is higher than willing to pay. Previous study (Ndau et al., 2018;) stated that the characteristic of respond by the household on willingness to pay should be decreasing as the bid value increases. However, it is a different cases in this study whereby the lowest bid value (RM8) has lower percentage than the highest bid value (RM16) because of randomly distributed.

Table 4.5 Percentage of Respond Bidding Price

| Prices (RM) | Yes | No | Total |
|-------------|----------------------|----------------------|----------------------|
| | N (%) | N (%) | N (%) |
| 8 | 17 (22.4) | 8 (17.0) | 25 (20.3) |
| 10 | 14 (18.4) | 11 (23.4) | 25 (20.3) |
| 12 | 13 (17.1) | 12 (25.5) | 25 (20.3) |
| 14 | 14 (18.4) | 10 (21.3) | 24 (19.5) |
| 16 | 18 (23.7) | 6 (12.8) | 24 (19.5) |
| Total | 76 (61.8) | 47 (38.2) | 123 (100) |

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4.2.1 Factors That Influences the Willingness to Pay for Solid Waste Management

Services

A regression model was developed to explore the influence factors on willingness to pay questions. The respondents selected their willingness to pay for solid waste management in two alternatives which are 1 for willing to pay whereas 2 for not willing to pay, thereby making the dependent variable of the discrete regression model. This study applied binary logit regression to evaluate the probability of the willingness to pay of the household on solid waste management in Jeli. The binary logit regression was performed using SPSS 20.0 and the results given in Table 4.6. This analysis was used to test if there was significant difference in the variables of the sociodemographic factors, and to provide further information about the independent variables which influenced the WTP.

Table 4.6 Logistic Regression Model

| Variable | B | Sig. | Exp(B) |
|---------------------------------------|----------|-------------|---------------|
| Gender | 0.633 | 0.207 | 1.884 |
| Age | 0.260 | 0.215 | 1.297 |
| Education Level | 0.370 | 0.041* | 1.447 |
| Occupation | 0.772 | 0.003* | 2.164 |
| Household Income Level | 1.024 | 0.006* | 0.359 |
| Number of Household | 0.434 | 0.202 | 1.543 |
| Type of House | 0.672 | 0.010* | 0.511 |
| Home status | 0.987 | 0.156 | 2.683 |
| Bid | 0.088 | 0.279 | 1.092 |
| Constant | -4.785 | 0.055* | 0.008 |
| Pseudo R² | 0.409 | | |
| Log likelihood | -124.919 | | |
| Percentage of right prediction | 71.5% | | |

Note: * Significant at 5% level

Based on the results summarized in Table 4.6 above, the variables of education level, occupation, household income level and type of house show statistical significance estimated based on dichotomous choice Contingent Valuation Method (CVM) with respect to the household's willingness to pay for SWM. Meanwhile, gender, age, number of household, home status and bid price had no significant effect on the amount of willingness to pay with 0.633, 0.260, 0.434, 0.987 and 0.088 values of coefficient respectively. The education level coefficient shows a positive value (0.370). For the household income level context, income is stated in the analysis at the 5 percent of level confidence with a value of 1.024. Next, the occupation coefficient illustrates a positive value of 0.772. The coefficient for type of house is at a value of 0.672.

All the parameters that are statistically significant which indicates the significant value at 5 percent level. The goodness of fit test for the regression is given by Pseudo- R^2 with 0.409 or 41 percent which means at least one of the variables is different from zero, as 41 percent of the variations in willingness to pay for solid waste management in Jeli, Kelantan can be explained by the independent variables in the model. The log likelihood for this study is -124.919 whereby higher likelihood means that the model has a better relative chance of producing the data. In addition, the percentage of correct prediction is 71.5 percent which shows that this model was 71.5 percent well predicted.

Odd ratio predicting the decision for WTP on solid waste management services from all these variables were displayed in the right-most column labelled "Exp(B)". The odd ratio for gender (1.884), age (1.297), education level (1.447), occupation (2.164), number of household (1.543) and home status (2.683) could be seen as more than 1 means that there were higher odds of these factors will be willing to pay for improved SWM services whereas household income level (0.359) and type of house (0.511) have less than 1 for odd ratio which means it is associated with lower

odds. Meanwhile, bid price showed odd ratio with value of 1.092 means that exposure of this factor does not affect the odds of decision to pay for SWM. However, education level, occupation, household income level and type of house showed a statistically significant result in determining the households' WTP an additional amount for better solid waste management services. According to Julius *et al.* (2017) and Naanwaab *et al.* (2014), the household in a higher income has higher odd ratios of WTP compared to lower income. This signifies the importance of income in influencing the desire for household to manage and conserve the environmental quality.

According to the logit regression result, education level is a significant variable in this analysis with a value of significance level at 0.041. This means that those respondent with a high level of education are willing to pay a higher amount than those with a lower education level. This is because the coefficient for education level was positive which support the hypothesis that the probability of the respondents' willing to pay increases with education level. The higher the education attained, the higher the probability of the respondents' willingness to pay for improved waste disposal services.

Another significant variable in this study is occupation with a value of significance level at 0.003. Occupation is positively related to willingness to pay of household to improve waste management services. It means that respondents with a better job which satisfy their household income will increase the tendencies to agree and pay for improved SWM.

Household income level was analysed as significant variable which has 0.006 as a value of significance. However, the coefficient value was positive which indicates that the level of incomes does support the hypothesis that the probability of the respondents saying 'yes' to the willingness to pay question increases with income level. Previous studies have shown the positive relationship between income and the level of willingness to pay that is the respondents with a lower income

show a lower WTP (Asgary *et al.*, 2004; Dong *et al.*, 2004; Trang *et al.*, 2017). However, a study by Asenso-Okyere *et al.*, (1997) and Balasubramanian, 2013 reported a negative relationship between income and level of willingness to pay due to less of satisfaction provide in term of facilities at the research area. Meanwhile, the type of house coefficient shows a positive value (0.672) and significance at the 5% level of confidence which was 0.010. Hence, according to Rusli *et al.* (2008) a higher educational level is related with better employment and higher income, thus it will increase the probability of respondents to willingly pay for better solid waste management services.



4.2.2 Mean Value of Willingness to Pay for Solid Waste Management Services

The result of the WTP based on income level and education level is presented in Table 4.7, Table 4.8, Table 4.9 and Table 4.10 respectively. The result of the logistic regression analysis shows that the mean WTP of the household WTP for better solid waste management services is RM 12.05 per 6 month for all household.

From the result in Table 4.7, it indicates that the WTP based on the income level of the respondents with less than RM 500 is RM 6.52, income between RM 501 – RM 2500 is RM 10.20 while an income between RM 2501 – RM 4500 is RM 18.00. Meanwhile, for an income level of more than RM 4500 are willing to pay RM 24.00.

Table 4.7 WTP Based on Income Level

| Household Income | Mean (RM) | Std. Deviation |
|-------------------------|------------------|-----------------------|
| <RM500 | 6.52 | 1.250 |
| RM501-RM2500 | 10.20 | 4.885 |
| RM2501-RM4500 | 18.00 | 12.610 |
| >RM4500 | 24.00 | 17.176 |
| All sample | 12.05 | 9.693 |

In the context of the WTP based on the education level (Table 4.8), the respondents with a non-university education such as UPSR were willing to pay RM 8.33, followed with PMR (RM10.00), SPM (RM12.24), STPM/STAM/Sijil with RM11.70 and unschooled for RM6.69. Meanwhile for respondents with a university education level (Diploma/Degree and above) they were willing to pay RM 20.60 for improvement in waste management. The result was significant to prove that the respondents with a high income and education level were statistically willing to pay more on SWM services rather than the lower income and education level of respondents.

Table 4.8 WTP Based on Education level

| Education level | Mean (RM) | Std. Deviation |
|------------------------|------------------|-----------------------|
| UPSR | 8.33 | 3.786 |
| PMR | 10.00 | 4.506 |
| SPM | 12.24 | 9.635 |
| STPM/STAM/SIJIL | 11.70 | 4.945 |
| DIPLOMA/DEGREE | 20.60 | 15.150 |
| Unschoolled | 6.69 | 2.213 |
| All sample | 12.05 | 9.693 |

From the analysis of data (Table 4.9), type of house which are significance influence the factors of the household to pay and agree for a better waste management system. The respondents with wooden house has a mean value to pay for RM9.94, terrace is RM16.57 while bungalow is RM12.00. The results show that the bungalow houses willing to pay lower than terrace because of they had satisfied with the services provided by the authority.

Table 4.9 WTP Based on Type of house

| Type of house | Mean (RM) | Std. Deviation |
|----------------------|------------------|-----------------------|
| Wooden House | 9.94 | 7.262 |
| Terrace | 16.57 | 14.035 |
| Bungalow | 12.00 | 8.818 |
| All sample | 12.05 | 9.693 |

In addition, Table 4.10 indicates the willingness to pay of household based on occupation. Occupation of the respondents can be divided into employed and unemployed. Employed respondents which includes public sector that were willing to pay RM17.15, private sectors were RM11.90 while self-employed were willing to pay RM10.89 for a better solid waste management in their housing area. Besides, unemployed respondents willing to pay RM9.03 which also includes retired respondent with the highest amount of willing to pay (RM28.00).

Table 4.10 WTP Based on Occupation

| Occupation | Mean (RM) | Std. Deviation |
|-------------------|------------------|-----------------------|
| Public Sector | 17.15 | 12.669 |
| Private sector | 11.90 | 4.228 |
| Self-employed | 10.89 | 8.910 |
| Unemployed | 9.03 | 5.112 |
| Retired | 28.00 | 31.113 |
| All sample | 12.05 | 9.693 |

From the study, the regression estimated that the most influential variables to WTP of solid waste management services in Jeli are household income, education level, type of house and occupation with an average WTP value of RM12.05 per six month per household. If such charges are properly collected by the MDJ would able to properly handle the situation whereby the lack of staff and lack of revenue can be solved. Thus, this process would be cost recovery and revenue generating for the government.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Increasing population growth in an area has increase the public attention on the environmental impacts of solid waste management in Jeli, due to the continually increasing amount of solid waste being generated and the limited space and capacity of waste treatment facilities. In this study, we discussed respondents' current practices and services, perception and willingness to pay for solid waste management services through a questionnaire survey which was distributed in Jeli, Kelantan.

Overall, the survey was relatively successful in eliciting the residents' current practices and services, perception and their WTP values for solid waste management. Jeli residents had relatively good environmental awareness. All respondents started to have concerned about the environmental issues but they have no actions taken to make changes as some of them are still poor living where it will cause burden to them. In regard to Jeli environment, most respondents thought that the current services provided by MDJ should be improvise.

Most respondent thought that the government should make more effective measures to improve the management of solid waste. The survey data reveal a positive attitude towards using facilities provided by MDJ. In our study, most respondents (61.8%) provided positive answers to the questions about WTP. Using the logistic regression method, these survey results showed that

the probability of the respondents' saying 'yes' to the WTP question increases with education level, occupation, household income level and type of house. The mean WTP was RM12.05 per household for every 6 month per household.

The socio-demographic pattern, practices, services and perception of the people should be taken into consideration before performing any method to improve waste management. Therefore, the results of this study can be useful for understanding the issues, respondents' perception and awareness, and willingness to pay for solid waste disposal, for the government which can be used to enhance of solid waste management in Jeli.

5.2 Recommendations

5.2.1 Increase Accessibility and Amount Garbage Bin

Based on the result of the perception on SWM services, Majlis Daerah Jeli needs to improve their services to the people in Jeli by increasing the accessibility of the garbage bin in order to make all the people able to use the facilities provided instead of burning their waste which may harm the environment. Besides, the authority should increase the amount of garbage bin to suit the number of people living in an area and the amount of waste generated.

5.2.2 Standardize Tax Collection

Based on the result of the analysis of willingness to pay, Majlis Daerah Jeli needs to standardize tax collection to improve their solid waste management services. This is because some of the respondent's reasons of not paying is that no tax implements by the MDJ on their household. Hence, to construct a new standardize tax collection method, MDJ should take note and consider about the household socio-demographic as it will contribute to households willingness to pay for an improved services.

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APPENDIX A

Table 1.1 Determining Sample Size from a Given Population

| N | S | N | S | N | S |
|-----|-----|------|-----|---------|-----|
| 10 | 10 | 220 | 140 | 1200 | 291 |
| 15 | 14 | 230 | 144 | 1300 | 297 |
| 20 | 19 | 240 | 148 | 1400 | 302 |
| 25 | 24 | 250 | 152 | 1500 | 306 |
| 30 | 28 | 260 | 155 | 1600 | 310 |
| 35 | 32 | 270 | 159 | 1700 | 313 |
| 40 | 36 | 280 | 162 | 1800 | 317 |
| 45 | 40 | 290 | 165 | 1900 | 320 |
| 50 | 44 | 300 | 169 | 2000 | 322 |
| 55 | 48 | 320 | 175 | 2200 | 327 |
| 60 | 52 | 340 | 181 | 2400 | 331 |
| 65 | 56 | 360 | 186 | 2600 | 335 |
| 70 | 59 | 380 | 191 | 2800 | 338 |
| 75 | 63 | 400 | 196 | 3000 | 341 |
| 80 | 66 | 420 | 201 | 3500 | 346 |
| 85 | 70 | 440 | 205 | 4000 | 351 |
| 90 | 73 | 460 | 210 | 4500 | 354 |
| 95 | 76 | 480 | 214 | 5000 | 357 |
| 100 | 80 | 500 | 217 | 6000 | 361 |
| 110 | 86 | 550 | 226 | 7000 | 364 |
| 120 | 92 | 600 | 234 | 8000 | 367 |
| 130 | 97 | 650 | 242 | 9000 | 368 |
| 140 | 103 | 700 | 248 | 10000 | 370 |
| 150 | 108 | 750 | 254 | 15000 | 375 |
| 160 | 113 | 800 | 260 | 20000 | 377 |
| 170 | 118 | 850 | 265 | 30000 | 379 |
| 180 | 123 | 900 | 269 | 40000 | 380 |
| 190 | 127 | 950 | 274 | 50000 | 381 |
| 200 | 132 | 1000 | 278 | 75000 | 382 |
| 210 | 136 | 1100 | 285 | 1000000 | 384 |

Note.—N is population size. S is sample size.

(Source: Krejcie & Morgan, 1970)

APPENDIX B

Sample of a questionnaire



UNIVERSITI
MALAYSIA
KELANTAN

FAKULTI SAINS BUMI

IJAZAH SARJANA MUDA SAINS GUNAAN (SAINS KELESTARIAN) DENGAN KEPUJIAN

No:

- Saya merupakan pelajar tahun akhir di Universiti Malaysia Kelantan dan kini saya sedang menjalankan kajian bagi penambah baik pengurusan sisa pepejal di daerah Jeli.
- Segala maklum balas yang diberikan oleh pihak tuan/puan adalah **SULIT** dan hanya digunakan untuk tujuan kajian ini.
- Pihak Tuan/Puan boleh menolak dari menyertai kajian ini sekiranya boleh mengancam keselamatan Tuan/Puan.

Bahagian A- Demografi

Nota: Sila tandakan [/] pada ruang yang disediakan.

1. Jantina
- Lelaki
- Perempuan

2. Umur (KIR):
- 21-30
- 31-40
- 41-50
- 51-60
- >60

3. Bangsa:
- Melayu
- India
- Cina
- Lain-lain:

4. Tahap pendidikan:
- UPSR
- PMR
- SPM
- STPM/STAM/Sijil
- Diploma/Ijazah
- Tidak bersekolah

5. Pekerjaan:
- Sektor kerajaan
- Sektor swasta
- Kerja sendiri
- Tidak bekerja
- Lain lain:

6. Pendapatan isi rumah:
- <RM500
- RM501-RM1000
- RM1001-RM1500
- RM1501-RM2000
- RM2001-RM2500
- RM2501-RM3000
- RM3001-RM3500
- RM3501-RM4000
- RM4001-RM4500
- >RM4500

7. Bilangan isi rumah:

8. Jenis rumah kediaman:
- Kampung (Kayu)
- Teres
- Banglo

9. Status rumah:
- Rumah sendiri
- Rumah sewa

Bahagian B- Pengurusan Sisa Pepejal

Nota: Sila tandakan [/] pada ruang yang disediakan.

1. Bagaimanakah anda menguruskan sampah di rumah anda?

| | |
|--|--------------------------|
| Buang ke tong sampah besar yang disediakan MDJ | <input type="checkbox"/> |
| Gali lubang di sekitar kawasan rumah dan bakar | <input type="checkbox"/> |
| Buang di ruang terbuka seperti jalan | <input type="checkbox"/> |
| Buang ke dalam sungai | <input type="checkbox"/> |
| Lain- lain: _____ | |

2. Berapa kerapkah anda membuang sampah ke tong sampah utama di kawasan rumah anda dalam seminggu?

| | |
|--------------------------|--------------------------|
| 1 kali | <input type="checkbox"/> |
| 2 kali | <input type="checkbox"/> |
| 3 kali | <input type="checkbox"/> |
| >3 kali(nyatakan): _____ | |

3. Adakah anda mengasingkan sampah anda mengikut kategori? Eg: sisa makanan, kaca, kertas dll.

| | |
|-------|--------------------------|
| Ya | <input type="checkbox"/> |
| Tidak | <input type="checkbox"/> |

4. Adakah pihak Majlis Daerah Jeli (MDJ) mengutip sampah di kawasan rumah anda?

| | |
|-------|--------------------------|
| Ya | <input type="checkbox"/> |
| Tidak | <input type="checkbox"/> |

5. Jika anda menggunakan khidmat pihak majlis daerah, berapa kalikah sampah di kawasan anda dikutip dalam seminggu?

| | |
|---------------------------|--------------------------|
| 1 kali | <input type="checkbox"/> |
| 2 kali | <input type="checkbox"/> |
| 3 kali | <input type="checkbox"/> |
| >3 kali (Nyatakan): _____ | |

Bahagian C – Persepsi terhadap pengurusan sisa pepejal

Untuk setiap pernyataan, sila nyatakan jika anda setuju atau tidak setuju berdasarkan skala 1 hingga 5 berikut:

1 = Sangat Tidak Setuju, 2 = Tidak Setuju, 3 = Sederhana Setuju, 4 = Setuju, 5 = Sangat Setuju

| | | | | | |
|--|---|---|---|---|---|
| Adakah anda berpuas hati dengan cara anda membuang sampah? | 1 | 2 | 3 | 4 | 5 |
| Adakah pengurusan sisa pepejal dirumah anda boleh ditambah baik? | 1 | 2 | 3 | 4 | 5 |
| Adakah pengurusan sampah anda bagus untuk alam sekitar? | 1 | 2 | 3 | 4 | 5 |
| Adakah anda sedar akan kepentingan pengurusan sisa pepejal terhadap alam sekitar? | 1 | 2 | 3 | 4 | 5 |
| Adakah anda tahu kepentingan mengasingkan sampah mengikut kategori bagus untuk alam sekitar? | 1 | 2 | 3 | 4 | 5 |
| Adakah anda berpuas hati dengan servis pengurusan sisa pepejal di kawasan perumahan anda? | 1 | 2 | 3 | 4 | 5 |
| Adakah servis yang diberikan menepati masa dan efektif di kawasan perumahan anda? | 1 | 2 | 3 | 4 | 5 |
| Adakah kutipan daripada pihak MDJ memadai untuk menguruskan sisa pepejal anda? | 1 | 2 | 3 | 4 | 5 |
| Adakah jarak tong sampah boleh dicapai dengan mudah? | 1 | 2 | 3 | 4 | 5 |

Bahagian D - Kesediaan untuk membayar

**SENARIO MENGENAI
PENGURUSAN SISA PEPEJAL DI
JELI.**

Jumlah sisa pepejal semakin bertambah dari hari ke hari sehingga menyebabkan kekurangan tapak pelupusan sampah telah isu yang membingungkan pihak berwajib. Hal ini kerana pengurusan sisa pepejal yang kurang efektif akan memberi kesan terhadap alam sekitar serta kesihatan diri manusia. Oleh itu, untuk menyediakan perkhidmatan pengumpulan sisa secara tetap oleh Majlis Daerah Jeli, sumber tenaga manusia dan bilangan kenderaan perlu ditingkatkan yang mana akan menanggung kos yang tinggi. Pihak pengurusan boleh membiayai perkhidmatan yang lebih baik dengan mengenakan bayaran tambahan dalam kutipan sampah. Bayaran tambahan tersebut akan digunakan dengan efisien untuk penambahbaikan pengurusan sisa pepejal di Jeli.

D1. Berdasarkan senario diatas, jika pihak majlis mahu meningkatkan mutu perkhidmatan pengumpulan sisa pepejal, adakah anda sanggup membayar lebih untuk perkhidmatan yang efektif setelah memandangkan pendapatan dan perbelanjaan isi rumah anda?

- YA** (Sila ke soalan **D2**)
TIDAK (Sila ke soalan **D6**)

D2. Berdasarkan senario diatas dan mempertimbangkan pendapatan dan perbelanjaan semasa, adakah anda sanggup membayar (RM8 / RM10 / RM12 / RM14 / RM16) untuk pengurusan sisa pepejal? (Harga asas

untuk pengurusan sisa pepejal ialah RM6/separuh tahun)

- YA** (Sila ke soalan **D3**)
TIDAK (Sila ke soalan **D4**)

D3. Jika anda menjawab **YA** pada soalan **D2**, adakah anda sanggup membayar (RM10 / RM12 / RM14 / RM16 / RM18) untuk pengurusan sisa pepejal? (Harga asas untuk pengurusan sisa pepejal ialah RM6/separuh tahun)

- YA** (Sila ke soalan **D5**)
TIDAK (Sila ke soalan **D4**)

D4. Jika anda menjawab **TIDAK** pada soalan **D2** dan **D3**, adakah anda sanggup membayar (RM7 / RM8 / RM10/ RM12 / RM14 / RM16) untuk pengurusan sisa pepejal? (Harga asas untuk pengurusan sisa pepejal ialah RM6/separuh tahun)

- YA**
TIDAK (Sila ke soalan **D5**)

D5. Dengan mempertimbangkan pendapatan dan perbelanjaan semasa, berapakah jumlah **MAKSIMUM** yang anda sanggup bayar untuk pengurusan sisa pepejal?

RM

D6. Apakah alasan anda untuk tidak membayar?

Tidak mampu
Rasa tidak penting
Tanggungjawab badan kerajaan
Lain-lain:

D7. Adakah anda mempunyai sebarang komen atau cadangan untuk pengurusan sisa pepejal?

**SOALAN TAMAT
TERIMA KASIH**

APPENDIX C

Reliability Test

Reliability Statistics

| Cronbach's Alpha | N of Items |
|------------------|------------|
| 0.698 | 9 |

Item Statistics

| | Mean | Std. Deviation | N |
|--|------|----------------|----|
| Are you satisfied with the way you dispose of solid waste? | 3.90 | 0.923 | 30 |
| Is solid waste management in your home can be improved? | 3.57 | 0.817 | 30 |
| Is your waste management good for the environment? | 3.53 | 1.042 | 30 |
| Are you aware of the importance of solid waste management to the environment? | 4.37 | 0.850 | 30 |
| Do you know the importance of sorting waste into categories that are good for the environment? | 4.30 | 0.750 | 30 |
| Are you satisfied with the solid waste management service in your home | 3.03 | 1.066 | 30 |
| Is the service provided timely and effective in your residential area? | 2.87 | 1.106 | 30 |
| Is the collection from the MDJ sufficient to manage your solid waste? | 2.77 | 1.104 | 30 |
| Is the trash can easily reached? | 2.67 | 1.647 | 30 |

APPENDIX D

Logistic Regression Model

| Variable | B | S.E. | Wald | df | Sig. | Exp(B) |
|---------------------------------------|--------|-------|---------|----|--------|--------|
| Gender | 0.633 | 0.503 | 1.589 | 1 | 0.207 | 1.884 |
| Age | 0.260 | 0.209 | 1.540 | 1 | 0.215 | 1.297 |
| Education Level | 0.370 | 0.181 | 4.172 | 1 | 0.041* | 1.447 |
| Occupation | 0.772 | 0.264 | 8.546 | 1 | 0.003* | 2.164 |
| Household Income Level | 1.024 | 0.370 | 7.652 | 1 | 0.006* | 0.359 |
| Number of Household | 0.434 | 0.339 | 1.631 | 1 | 0.202 | 1.543 |
| Type of House | -0.672 | 0.260 | 6.674 | 1 | 0.010* | 0.511 |
| Home status | 0.987 | 0.696 | 2.010 | 1 | 0.156 | 2.683 |
| Bid | 0.088 | 0.081 | 1.174 | 1 | 0.279 | 1.092 |
| Constant | -4.785 | 2.495 | 3.679 | 1 | 0.055* | 0.008 |
| Pseudo R² | | | 0.409 | | | |
| Log likelihood | | | 124.919 | | | |
| Percentage of right prediction | | | 71.5% | | | |

Note: * Significant at 5% level