

Exploring Households' Willingness to Pay for Improvements in Water Services: A Case Study in Terengganu, Malaysia (A Pilot Study)

Kuna S.¹, Mahirah K.¹, Azlina A. A.¹, Zuraini A.
School of Social and Economic Development,
University Malaysia Terengganu (UMT), 21030 Kuala Terengganu,
Terengganu, Malaysia.

Alias R.²
Faculty of Economics and Management,
University Putra Malaysia,
43400 UPM Serdang,
Selangor.

ABSTRAK

Malaysia mempunyai sumber air yang banyak terdiri dari sumber permukaan bumi dan air bawah tanah. Apabila populasi manusia meningkat secara berperingkat, permintaan bagi sumber air juga meningkat. Masalah-masalah yang dihadapi oleh Syarikat Air Terengganu Bhd. (SATU) berkaitan dengan sumber air di Terengganu adalah seperti, tekanan air rendah, kelimpahan air tangki, kebocoran saluran paip, saluran paip pecah dan kecurian saluran paip serta banyak lagi. Objektif utama kajian ini adalah untuk menentukan kesanggupan pengguna untuk membayar bagi harga air yang bersesuaian dan perubahan peningkatan dalam perkhidmatan air domestik di Terengganu. Kajian ini menggunakan kaedah Penilaian Kontinjen (CVM) dengan menggunakan 60 orang responden (isi rumah) di kesemua daerah di Terengganu. Beberapa faktor yang mempengaruhi kajian ini seperti, pendapatan penduduk, harga air, tahap pendidikan, saiz rumah, bangsa dan lain-lain telah diambil kira dalam kajian untuk menentukan kesanggupan membayar bagi peningkatan perkhidmatan sumber air domestik. Kesanggupan pengguna untuk membayar bagi kualiti air yang lebih baik dan perkhidmatan air yang cekap di Terengganu akan dinilai. Purata anggaran kesanggupan pengguna membayar bagi perkhidmatan air domestik pada tahap yang lebih baik adalah RM0.686 bagi 30m³ yang pertama. Nilai ini meningkat sebanyak RM0.186 dari harga semasa, iaitu RM0.50 bagi 30m³ pertama. Berdasarkan penemuan ini, beberapa polisi telah disyorkan untuk menyelesaikan masalah air yang serius di Terengganu.

Kata Kunci: Perkhidmatan air, kesanggupan pengguna untuk membayar, Kaedah Penilaian Kontinjen (CVM), permintaan air

ABSTRACT

Malaysia has abundant of water resources which consist of surface and groundwater. As human population increases gradually, the demand for water resources also increases. Syarikat Air Terengganu Bhd. (SATU) faces several problems related to water services in Terengganu such as, low water pressure, overflow tank, leaking pipeline, breaking and stealing of pipelines and many more. The main objective of this study is to determine consumer's willingness to pay (WTP) for an appropriate water pricing and improvement in domestic water service in the state. This study employs a pilot test study which is applying Contingent Valuation Method (CVM) with 60 respondents (households) in all districts of Terengganu. Several factors such as, resident's income, water price, level of education, size of house, race and others were taken into consideration during surveys in order to determine the willingness to pay (WTP). The customers' WTP for improved water quality and efficient water services for customers in Terengganu will be estimated. The estimated mean WTP for improved domestic water services is RM0.686 applies on first 30m³. The price is an increase about RM0.186 from the current price which is RM0.50 applies on first 30m³. Based on these findings, several policies have been recommended for serious water problems faced in Terengganu.

Keywords: water services, willingness to pay, Contingent Valuation Method, water demand

INTRODUCTION

Freshwater are the most important thing on this planet, needed by habitats, ecosystems and every living or non-livings. Terengganu faces many challenges in supplying water and resource management such as low water pressure, overflow tank, leaking pipeline and others. Terengganu water tariff was last reviewed in 1997 and it was 17 years ago. Since 1997, the prices of goods increase according to the current market price however the water tariff never increases since then, therefore Syarikat Air Terengganu SDN (SATU) also unable to invest in new projects to improve the water services due to budget constraint. The tariff has to be increased to support numerous functions of water services in order to deliver the best water supply to the consumers.

Therefore, the use and quantity of water delivered to households is an important aspect of domestic water supplies. It is estimated that a person requires 7.5 liters of water per day for drinking and others personal hygiene (Howard & Bartram 2003). In poor countries, domestic water consumption is less than the demand for agriculture and ecosystems, but wealthy countries exceeds these figures. Therefore, good water management is needed to reduce poverty and to improve human health.

Human being needs to lead a healthy and safety life style. Awareness of water management is poor among people. For instance, yellowish and smelly water tap, and others bad pollutions can harm the consumers. Thus, we need to have a water system that is able to provide better quality of water and minimize the use of natural resources, while giving better quality water that can improve human's health. A dam also can be built to provide better water management and also can avoid pollution and shortage of supply water.

BACKGROUND OF STUDY

Terengganu is located in the East Coast of Peninsular Malaysia. Terengganu has an area of 12,956 km² with 1.13 million people living in the state of Terengganu. (Department of Statistics Malaysia, 2014). The state is divided into 8 districts which are Kemaman, Dungun, Marang, Hulu Terengganu, Kuala Terengganu, Kuala Nerus, Setiu and Besut. Moreover, Kuala Terengganu is the main developing area with high growth population. Terengganu is also a main tourism location because it has many peaceful island such as Pulau Redang, Pulau Perhentian and Pulau Kapas.



Figure 1: Map of the State Of Terengganu
Source: Tourism Malaysia, 2014

Terengganu holds the charms and splendour from others state in Malaysia and the state is well known among tourists destination. The state also endowed with unmatched natural beauty, with long coastlines of beautiful beaches, stunning islands and tropical rainforest. This is one of the ways for urbanization and requires high demand of water and also needs systematic management of cities. Therefore, adequate water management and efficient strategy for progressive water supply in developed state is necessary. Effective technologies and innovations can be made to the water management in order to give a better water quality service to developing countries.

WATER SERVICES IN TERENGGANU

Terengganu had public water management industry before it was privatized in 1999 (Sangaralingam, M and Raman, M., 1999). Syarikat Air Terengganu Sdn Bhd (SATU) has become the exclusive water supplier to all eight districts in the state. Their missions are to provide continuous water services to consumers and also improve a higher water quality and service for customer. SATU main focus operation is to provide continuous good water service to consumers and bring innovation to improve water service such as repairing, effective service, maintaining the standard of water supply in the state. Meanwhile the corporate have more concern on the natural environmental, sustainable development, awareness of water conservation and upgrading water service in the Terengganu. In the year 2012, roughly 96% of water was supplied to the entire state. The two main water supply sources in Terengganu are from river extraction and dams. SATU serves about 55.8% for domestic users and 44.2% for non-domestic users (National Water Service Commission, 2013). Alternative sources are also used by some consumers.

PROBLEM STATEMENT

Malaysia is abundant with natural water resources such as from underground and surface water to supply water to the population. The number of population is rising annually and by year 2013 estimated population in Terengganu is around 1million and the demand for water has also increased gradually. Water pressure is one of the main problems that are faced by consumers in Terengganu. Moreover, capacity of water tank in Terengganu is another problem too. The amounts of water that can be stored in the tanks are very limited in capacity as the tank in Terengganu is small. Thus, this leads to many problems especially during the hot and dry season. During this climate change, the demand of water by consumers increases. However, due to the small tank capacity, the amount of water supplied does not meet the demand required.

In addition, quality of water tapped is another problem in the state. The usage of new concrete tanks and new pipes that have been coated with layers of concrete will cause the layers of concrete to corrode and it increases the pH level of water. This will cause adverse effect to human when they consume the water that is being supplied to them.

Urbanization makes the demand for water supply increase. Generally, the unexpected problems face by customer in an urbanized country is shortage of water and water pollution. At present, water tariff in the state is too cheap in order to generate enough funds to cover the cost for maintenance. Terengganu is ranked at 2nd place in 2012 which demonstrate the lowest water price, RM0.50 applies for first 30m³ for domestic water services in Malaysia. Cheaper water tariff becomes an obstacle in implementation of projects for innovation, upgrading water services and water management.

LITERATURE REVIEW

Contingent Valuation Method (CVM) has been applied to several of natural environmental research including water supply, sanitation, groundwater, river, lake and many more (Day and Mourato, 1998). Whittington (1987) specifically used CVM as a tool to evaluate water supply projects. According to Jiang, Jin, and Lin (2010), an increase in water tariff has provided an additional fund to enable the smoothness of water operation. The raised funds can be distributed for water management control such as pollution control, water treatment, operation and maintenance. To provide high quality water, higher water tariff has to be implemented because good water services can only attainable through higher costs (Hensher, Shore, & Train, 2005). Besides, in most literature it is said that higher water tariff can ensure that natural resources are used effectively and can avoid wastage from occurring (Bogale and Urgessa, 2012).

Although argued that higher water price in the literature as effective method but China found that they are willing to pay additional 10% from the current water tariff, this is because higher water tariff control the pollution and sewages of the water source (Jiang et al., 2010). Cho, Easter, McCann, and Homans (2005) found that people in rural Minnesota are more considerate to pay higher tariff to get drinking water that is less concentrated in iron and sulfate. However, the willingness of consumers is less when they do not realize the condition of the water currently provided to them. Interestingly,

Genius (2008) study has discovered that on average, the willingness level is still less for consumers who realize their quality level is disappointing and makes complain due to it. It is because consumers tend to think that the smell of chlorine is unavoidable

CONSUMER’S WILLINGNESS TO PAY (WTP)

Willingness to pay is defined as the readiness of an individual to pay higher amount of money for some goods or services (Breidert, 2006). Every human being has their own willingness to pay for getting maximum utility for one unit goods or service. The willingness to pay is a method to determine the price for the good where a market price does not exist such as environmental goods. Environmental goods is ‘public goods’ characteristics and have significant function in the ecosystems, for example clean water and air, landscape, diverse flora and fauna, and many more are not traded in the markets and price tag. Although natural environment goods price is unknown and the value is difficult to get, it provided usefully for the consumption and is important to have protection or control on the source to prevent from being polluted in future. Therefore, many researchers and countries have used the willingness to pay as a method to provide good and better water price. WTP is measured when a person purchases the good and how much they are willing to pay for the environment goods, such as the improvement of water quality. This study shows that, individual’s WTP differs according to their profile such as income, age, household size, demographic aspects, and many more.

RESEARCH METHODOLOGY

This paper uses WTP for single bounded CVM approach. In the questionnaire, the conventional dichotomous choice in CVM, it can be more efficient to this method and CVM approach will also uses closed-ended format to estimate in willingness to pay (WTP) (Haab and McConnell, 2002). It becomes easier for respondents to choose their best answer without wasting any time. Moreover, by using this approach respondents require to answer on the first bid which depends on “yes” or “no” responses in the first round. In equation 1 and 2 demonstrate how the changes in price of water, household income and education will affect the WTP. In equation 3 shows that average value of willingness to pay customer as below. The WTP is a dependent variable which is consumer’s willingness to pay for improved water services and independent variable are price of water and household income. The equation can be stated in linear regression form as below:

$$Q_d = f(\text{Price, Income}) \tag{1}$$

$$WTP = \alpha_0 + \alpha_1 Price_1 + \alpha_2 Income_2 + \mu_t \tag{2}$$

Where,

- WTP = Probability of willingness to pay, saying “Yes” or “No” to offered prices
- Price = Bid Water Price in Ringgit Malaysia (RM)
- Income = Household income in Ringgit Malaysia (RM)

$$VWTP = \frac{(constant + (\alpha_0 * Income) + (\alpha_1 * Edu))}{-(-price)} \tag{3}$$

Most contingent valuation surveys start with general or simple questions aimed at making the respondent comfortable to answering questions. The question in the questionnaire begins with “How much you are willing to pay RMxx for improvements in domestic water service so that your households will enjoy a high service in the future?” “The respondents will answer two possible answers such as “Yes” and “No”. They will “take it” or “leave it” to the offered new prices for suggested improvements in water services. An example of single bounded dichotomous choice CVM (Figure 2) is shown as below:

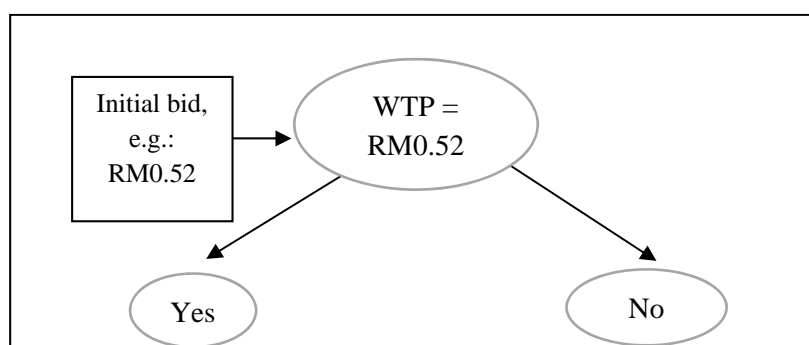


Figure 2: Example of “Single Bounded” Dichotomous Choice CVM

There is a probability of answering “yes” based on Equation 4, if and only the bid stated is below than consumers’ maximum willingness to pay. This implies that consumers are willing to pay for a certain amount regarding to the programs of improvements in services. Though, Equation 5 explains for the willingness to pay of consumers is less than the proposed price amount (PRICE). It shows that consumers are not willing to pay for the presented price amount. The consumers’ willingness to pay can be presented by using model formulation which formulated by Hanemann (1991) which is given as below:

$$\text{Probability \{Yes\}} = \text{Probability \{WTP > BID\}} = 1 - G(\text{BID PRICE}; \theta) \quad (4)$$

$$\text{Probability \{No\}} = \text{Probability \{WTP < BID\}} = G(\text{BID PRICE}; \theta) \quad (5)$$

Sampling Procedure

A stated preference technique is used to investigate issues on WTP. Therefore, surveys are conducted by using Contingent Valuation Method (CVM) in order to determine willingness to pay for improved domestic water services for a sample of households in Terengganu. CVM involves a structured questionnaire of consumer’s WTP at specified prices in a hypothetical situation. Respondents will be given a set of questionnaire and amount for willingness to pay depends on how much they are afforded to pay to improved water service in this project. In this pilot study, a sample which involves of households who have registered active accounts with SATU and domestic users in Kuala Terengganu, Terengganu. Moreover, Head of households is our targeted respondent since they contribute monthly water bill. We inform to respondents that the study will help the Syarikat Air Terengganu Sdn. Bhd. (SATU) and water provider can understand expectation of customers for improved water service.

Results

A total of 60 respondents were chosen to participate in this pilot study. Table 1 presents the offered price to customer for improved water services. The respondents were already informed that the study conducted would provide a better perspective of water industry which would enable water companies to improve water services. The descriptive analyses for the variables are detailed in Table 2. The major respondents were women (61.7%) since they are mostly available at home and are more involved in household chores. Most of the respondents have educational level up to secondary level and the most common type of residence is terrace (48.3%). Most of them are Malays (76.7%) and this is mainly because the most population in Terengganu are Malays. In occupational prospects, most of them were from others sectors (36.7%), private (28.3%), government (18.3%), and businessman (16.7%).

Table 1 demonstrates five offered prices (price bid) to consumers and every respondent in the survey do not get the similar offered prices. The reason is to avoid starting point bias in the survey. The presented prices were starting at RM0.52 to the maximum offered price which is RM0.60.

Table 3, represent regression result. As predicted, the ‘PRICE’ variable has a negative sign at 10% of significant level. It implies that the probability of saying “Yes” diminishes as offered bid price increases among consumers under hypothetical market. Respondents refuse the offered price as it rises and this is reliable with demand theory since consumers respond to higher cost. Household income shows positive sign and significant level at 1%, thus it is a significant determinant. Household income should have positive sign because the determinant suits to economic theory which expresses that WTP for “good” increment with income. Individuals have a tendency to spend more especially households with good income are willing to pay higher for water bill if there is an increment in water costs. Table 4 present the respondents’ willingness to pay for improved water services in Terengganu is (RM 0.686 which applies on the first 30m³). The survey conducted shows that households in Terengganu are willing to pay more to get better water services and improved quality of water services. Maximum and minimum ability to pay by household are RM 1.80 and RM 0.52 respectively which applies on the first 30m³. They demand high water consumption, however higher water cost can be a burden for them. Thus, it is consistent with demand theory; as price increases, the quantity requested will decreases.

CONCLUSION

This study is able to improve and brings an innovation in the water services based on economic valuation perspectives. The previous tariff should be increased to a price that is affordable to consumer as well as to support the services provided by suppliers. Therefore, consumers need to give support to water provider in developing good management policies and enhance the contribution for sustainable development in water services in Terengganu. This research can convince the government to allocate more investment and financial aids to the industry. The main policies focus on getting maximum benefit to all parties involved in the industry such as the policy maker, water companies and customers. A new suggested fair water price will bring maximum profit to all parties (producers and consumers). At minimum, revising water tariff can also help out in financial term. Increasing water price can lead to economic effectiveness of water utilization among consumers. Consumers' awareness is also needed as consumers need to be educated about the benefits, value and important of water service to be improved. This research and development are some of the efforts that should had been taken to improve the quality of water services and in practicing good water management to cater to the consumers' demand. Households will have benefits in terms of health, economic development, upgrade lifestyle and most importantly they are having clean and quality water at homes. Public information and education is a critical water conservation priority. Multi-stakeholders and participatory approaches which are involving consumers and water suppliers, governmental agencies and non-governmental organization needs to be encouraged. Raising awareness of water issues at all levels is deemed critical in the successful implementation of water conservation programmes, events and activities.

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Table 1: Consumer Responses to Offered Price

Price Bid	Willingness To Pay		Total
	No	Yes	
RM0.52	2	10	12
RM0.54	3	9	12
RM0.56	6	6	12
RM0.58	3	9	12
RM0.60	3	9	12
Total			60

Table 2: Characteristics of Respondents (n=60)

Characteristics	Frequency	Percent
Gender		
Male	23	38.3
Female	37	61.7
Race		
Malay	46	76.7
Chinese	13	21.7
India	1	1.7
Education Level		
PhD/ Master	1	1.7
Degree	15	25
Diploma	14	23.3
Secondary	20	33.3
Primary	8	13.3
No education	2	3.3
Occupation of Household		
Government sector	11	18.3
Private sector	17	28.3
Businessman	10	16.7
Others	22	36.7
Type of Residence		
Bungalow	4	6.7
Terrace	29	48.3
Apartment/ Flat	3	5
Others	24	40

Table 3: Variables in the Equation

	coefficient	S.E.	T- statistics	Sig.
PRICE	-10.290	11.175	.848***	.357
INCOME	.001	.000	6.170*	.013
Constant	5.020	6.186	.659***	.417

a. Variable(s) entered on step 1: BD1, INCOME.

Table 4: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
VWTP	60	.52	1.80	.6868	.17738
PRICE	60	.52	.60	.5600	.02852
INCOME	60	400.0	18000.0	2736.667	2440.2151
Valid N (listwise)	60				