UNIVERSITI PUTRA MALAYSIA

CONSUMER PREFERENCES FOR DOMESTIC WATER SERVICES IN KELANTAN, MALAYSIA

MAHIRAH BINTI KAMALUDIN

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CONSUMER PREFERENCES FOR DOMESTIC WATER SERVICES IN KELANTAN, MALAYSIA

By

MAHIRAH BINTI KAMALUDIN

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy

November 2012

Dedications

To my lovely parent; Yah Omar and Kamaludin Ismail

My beloved husband, Azuar

My son, Adam

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

CONSUMER PREFERENCES FOR DOMESTIC WATER SERVICES IN KELANTAN, MALAYSIA

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November 2012

Chairman: Professor Khalid Bin Abdul Rahim, PhD

Institute: Institute of Agricultural and Food Policy Studies

The significance of water cannot be denied since it is basic need of human life. High rapid population growth and urbanization have increased the demand for water and this scenario is expected to create substantial challenges in the future. Kelantan faces numerous problems in its domestic water services such as frequent disruptions, low water coverage and dirty water supply which affect household activities. This study aims to measure consumer preferences for improved domestic water services in Kelantan with the objective of in determining appropriate water pricing in the state. This study employs Contingent Valuation Method (CVM) and Choice Modelling (CM) method in the study. A total of 552 respondents were randomly selected in each district in Kelantan for the data collection.

The CVM derives consumer's willingness to pay for improved domestic water services. The logit and probit model are defined according to dichotomous choice method to elicit the WTP of proposed price bid. The outcomes of the study show that as the price bid increases, the probability of saying "Yes" decreases. People with higher household income will likely agree to pay for changes in the services.

However, the relationship with household size is negative. The estimated mean for the WTP is RM0.60 applied on the first 35 m^3, which is a 9.09% above from the current prices.

The water service attributes in the CM method are water quality, water supply interruption, non revenue water and water prices. The Conditional Logit (CL) and Mixed Logit (ML) models were applied to estimate marginal values of the attributes. The result demonstrates that people are concerned about water supply interruption in the services.

The findings outline policy recommendation to policy makers, water companies and consumers especially on the numerous and serious issues in water services. The result of valuations in this study can convince the governments to assign more resources and investment for positive changes in the services. Appropriate water prices may help water providers with resources to improve facilities thus overcoming the problems in providing better services in the future. It also encourages water conservation among the consumers in their consumption.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KEUTAMAAN PENGGUNA TERHADAP PERKHIDMATAN AIR DOMESTIK DI KELANTAN, MALAYSIA

Oleh

MAHIRAH BINTI KAMALUDIN

November 2012

Pengerusi: Profesor Khalid Bin Abdul Rahim, PhD

Institut: Institut Kajian Dasar Pertanian dan Makanan

Kepentingan air tidak dapat dinafikan disebabkan keperluan asasnya kepada kehidupan manusia. Peningkatan tinggi populasi dan urbanisasi meningkatkan keperluan air dan senario ini dijangka mengalami cabaran yang besar pada masa hadapan. Kelantan mengalami pelbagai masalah perkhidmatan air domestik seperti kekerapan gangguan air, liputan air yang rendah dan air kotor yang memberi kesan kepada aktiviti-aktiviti isi rumah. Kajian ini menilai pilihan pengguna terhadap perkhidmatan air domestik di Kelantan dengan bertujuan untuk menentukan harga air bersesuaian di dalam negeri. Kajian ini menggunakan kaedah *Penilaian Kontinjen* (CVM) dan kaedah *Choice Modelling* (CM). Seramai 552 responden telah dipilih secara rawak di setiap daerah di Kelantan bagi tujuan pengumpulan data.

Kaedah CVM digunakan untuk menilai kesanggupan membayar pengguna bagi perkhidmatan air yang lebih baik di dalam negeri. Model-model seperti logit dan probit ditakrifkan mengikut kaedah pilihan dikotomi untuk menilai kesanggupan

membayar bagi tawaran harga yang dicadangkan. Hasil kajian mendapati apabila terdapat kenaikan harga tawaran, kebarangkalian berkata "Ya" semakin berkurang. Responden berpendapatan isi rumah yang tinggi berkemungkinan akan bersetuju untuk membayar bagi perubahan dalam perkhidmatan. Walaubagaimanapun, perhubungan antara saiz isi rumah adalah negatif. Purata taksiran bagi kesanggupan membayar adalah sebanyak RM0.60 yang dikenakan untuk $35m^3$ yang pertama, ia merupakan peningkatan sebanyak 9.09% dari harga semasa.

Di dalam kaedah CM terdapat sifat-sifat perkhidmatan air seperti kualiti air, gangguan bekalan air, air tidak berhasil dan harga air. Model-model seperti *Conditional Logit* (CL) dan *Mixed Logit* (ML) digunakan untuk menganggar nilai margin bagi sifat-sifat tersebut. Hasil kajian mendapati orang ramai mengutamakan sifat gangguan bekalan air di dalam perkhidmatan.

Penemuan kajian menggariskan cadangan polisi kepada penggubal dasar, syarikat air dan pengguna terutamanya kepada pelbagai isu yang serius di dalam perkhidmatan air. Keputusan penilaian kajian dapat meyakinkan kerajaan untuk memperuntukkan lebih banyak sumber dan pelaburan bagi perubahan positif di dalam perkhidmatan. Harga air yang bersesuaian dapat membantu pembekal air dengan sumber-sumber yang dapat meningkatkan kemudahan untuk mengatasi masalah dalam menyediakan perkhidmatan yang lebih baik pada masa akan datang. Ia juga dapat menggalakkan penjimatan air di kalangan pengguna dalam penggunaan mereka.

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And to God, who made all things possible.

I certify that a Thesis Examination Committee has met on **20th November 2012** to conduct the final examination of **Mahirah binti Kamaludin** on her **Doctor of Philosophy** thesis entitled "**Consumer Preferences for Domestic Water Services in Kelantan, Malaysia**" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the students be awarded the Doctor of Philosophy.

Members of the Thesis Examination Committee were as follows:

Mohd Mansor bin Ismail, PhD
Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Chairman)

Amin Mahir bin Abdullah, PhD
Associate Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Internal Examiner)

Zaiton binti Samdin, PhD
Associate Professor
Faculty of Forestry
Universiti Putra Malaysia
(Internal Examiner)

Indah Susilowati, PhD
Professor
Faculty of Economics
University of Diponegoro
Indonesia
(External Examiner)

_____

SEOW HENG FONG, PhD
Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of **Doctor of Philosophy**. The members of the Supervisory Committee were as follows:

Khalid bin Abdul Rahim, PhD
Professor
Faculty of Economics and Management
Universiti Putra Malaysia
(Chairman)

Alias bin Radam, PhD
Associate Professor
Faculty of Economics and Management
Universiti Putra Malaysia
(Member)

Mohd Rusli bin Yacob, PhD
Senior Lecturer
Faculty of Environmental Studies
Universiti Putra Malaysia
(Member)

_____
BUJANG BIN KIM HUAT, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been done duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

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MAHIRAH BT. KAMALUDIN

Date: 20 NOVEMBER 2012

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LIST OF ABBREVIATIONS

AKSB	Air Kelantan Sdn Bhd
CM	Choice Modelling
CVM	Contingent Valuation Method
DOE	Department of Environment
JBA	Jabatan Bekalan Air
JPP	Jabatan Perkhidmatan Pembentungan
KeTTHA	Ministry of Energy, Green Technology and Water
MLD	Million litre per day
NRW	Non Revenue Water
WTP	Willingness to pay

CHAPTER 1

INTRODUCTION

Water is a replenishable but it is also a depletable resource. Water is not only a resource of economic value but it is also a basic component of human's natural environment and is a necessity as well. The importance of water to life cannot be denied and water is the most precious substance among all of our natural resources. About 70% of the earth's surface is covered by water which includes rivers, lakes, oceans and streams (Shakhashiri, 2009). Water is an important element to sustain all sorts of life on earth. We need water to sustain ourselves and for other myriad reasons. Water has been a nucleus for its existence in every civilization. As such, there is no substitute for water and nothing can trade with this vital resource.

Consumption of water varies tremendously throughout the year especially for household purposes. There have been increases in water demand every year. The household depends on a range of water sources with different characteristics such as quality, price, reliability and many more (Nauges and Whittington, 2010). If we follow the demand, there has always been a shortfall in water supply, so new sources and alternatives must be found. The uses of water vary such as for bathing, drinking, heating, cooling, cleansing and many more. It is also valuable for industrial processes, and also for recreational swimming, boating, waste disposal and ecosystem support. Demand of water is increasing and water resources are also progressively being exploited everywhere. Because of that we see large scale impacts on the rural environment in ecological, social and economic terms. Water management is becoming gradually more comprehensive and complicated because of

large growth rates in population, commercial activities and industries around cities and towns, increasing water consumption, water pollution, land use conflicts and climate changes. Thus, any new development of water resources should be found immediately in order to meet the increasing water demand. At the same time water also faces rigorous inspection from environmentalists and conservationists.

1.1 Water Scenario in Malaysia

Malaysia is a fortunate country where water resources are abundant everywhere. The country is located in the Equatorial zone which receives hot weather and a wet humid equatorial climate regime with heavy yearly rainfall averaging from 2000 mm to 2500 mm annually (Tourism Malaysia, 2010). The Malaysian Water Association (2011) states that water consumption for domestic (63.5%) and non-domestic (36.5%) in 2010. Recently, the water scenario is changing from one of a relatively abundant resource to one which is becoming scarce (Raja, 2005). This is happening since there are rapidly growing demands and pressures on the water resources because of urbanization, population growth, expansion of agriculture and many more. On the other hand, large population also contributes to the rise in water pollution which affects the environmental well being in the country. Thus, every state in Malaysia should keep its development to a level that is still within the carrying capacity of the river basins and works towards protecting and restoring the environment.

Nowadays, the water supply is failing to meet demand as water supplies are facing problems with non-revenue water (NRW), water quality and water scarcity in some places (Asian Development Bank, 2001). Malaysia also experienced a water crisis

where consumers had to go without consistent water supply for months in 1998 when *El Nino* struck the country. Weather conditions are affecting consumers since water is a precious source to their daily life. Rapid economic and social development are placing heavier demands on water resources, sometimes, it is difficult for water companies to cater for the demand of large populations especially when they lack capital. Water companies should deal with the problems since water is a necessity for human life. However, there are too many problems in water supply which means that sometimes they cannot manage it as maintenance is just too costly.

1.2 Water Resources and Supply

Water sources in Malaysia are heavily dependent on rainfall since Malaysia lies well inside the Equatorial zone which averages 2000 mm to 2500 mm rainfall annually, mostly due to the Southwest and Northeast monsoons. The northeast monsoon occurs from November until March, and the Southwest monsoon between May and September. Proportion of raw water resources in 2010 are direct extraction from river (83.6%), storage dams (15.1%) and groundwater (1.3%) (Malaysian Water Association, 2011). Easy availability of surface water from more than 150 rivers in the country is the main reason for the lack of groundwater use in Malaysia. Total annual water demand has been expanding year by year due to rapid population growth and growth of industries. Water supply management and development is not centralized from state to state. Water industry in Malaysia involves public and private participation. Certain states have their own private water companies such as Air Kelantan Sdn. Bhd. (AKSB), Syarikat Bekalan Air Selangor (SYABAS), Syarikat Air Terengganu (SATU) and many more. But in certain states water is still under Public Work Department control, for instance in Sarawak, Labuan and Perlis.

Thus, it is difficult to manage as a whole since each state has their own state water authorities and different water tariffs.

However, the water companies have the responsibility to supply enough water and improve the quality of existing water resources, and at the same time, they are identifying any untouched water resources available. This is to ensure water supply is adequate and sustainable for the population. New dams will be constructed and new water intakes and the water supply will be sourced. The water supply coverage is projected to increase by a total of 96.8% in 2010 with the expansion in capacity based on 9th Malaysia Plan. But the real value for average water supply coverage served to population is 94.2% in 2010 (Table 1.1). The states with the lowest coverage of water supply in rural and urban areas in 2010 are Kelantan (57%) and Sabah (79%) since most of their water sources come from groundwater.

Table 1.1: Urban and Rural Water Supply Coverage, 2009-2010 (% of population)

State	2009			2010		
	Urban	**Rural**	**Average**	**Urban**	**Rural**	**Average**
Johor	100.0	99.5	99.8	100.0	99.5	99.8
Kedah	100.0	96.3	98.0	100.0	96.5	98.2
Kelantan	57.7	54.7	55.7	57.9	56.1	57.0
Labuan	100.0	100.0	100.0	100.0	100.0	100.0
Melaka	100.0	100.0	100.0	100.0	100.0	100.0
Negeri Sembilan	100.0	99.5	99.8	100.0	99.5	99.8
Pulau Pinang	100.0	99.6	99.9	100.0	99.7	99.9
Pahang	100.0	96.0	97.8	100.0	96.0	98.0
Perak	100.0	98.0	99.2	100.0	98.0	99.2
Perlis	100.0	99.0	99.4	100.0	99.0	99.4
Sabah	99.2	52.3	76.3	99.5	58.4	79.0
Sarawak	99.5	61.5	86.2	99.5	61.7	93.3
Selangor	100.0	99.0	99.9	100.0	99.0	99.5
Terengganu	98.6	82.5	90.7	98.6	92.7	95.7
Malaysia	**96.8**	**88.4**	**93.0**	**96.8**	**89.7**	**94.2**

(Source: Malaysian Water Association, 2011)

Water availability is derived from two different sources which are surface water and groundwater. Surface water consists of fresh water in lakes, streams, and rivers that collect and flows on the earth's surface (Tietenberg, 2000). Malaysia has abundant surface water resources compared to its groundwater resources, but they are still not managed properly and many parts have issues on water stress (Chan, 2009). Malaysia has a total annual surface water of 566, 000 million m^3 per year, 26% in Peninsular Malaysia, 54% in Sarawak and 20% in Sabah. Groundwater resources is

estimated about 14, 700 million m^3 per year in Peninsular Malaysia, 5,500 million m^3 per year in Sarawak and 3, 300 million m^3 per year in Sabah (International Commission on Irrigation and Drainage, 2009).

Groundwater collects in porous layers of underground rock known as aquifers (Tietenberg, 2000). Groundwater is found underground in the cracks and spaces in soil, sand and rock. The groundwater quality standard is determined based on the National Guidelines for Raw Drinking Water Quality from the Ministry of Health (Revised December 2000). About 60% to 65% of groundwater utilization is for domestic and municipal purposes, 5% for irrigation and 30% to 35% for industry. Groundwater resources are still underutilized and it is mainly used for domestic purposes in rural areas. Even though groundwater is limited in comparison to surface water, groundwater still makes a significant contribution in terms of yield and availability. It will be an essential source in meeting future water demands for the public supply. Groundwater utilization is significant in less developed states such as Kelantan, and Sabah and groundwater is only seen as a substitute for surface water in certain places (Lee, 2007). Groundwater utilization for industry is usually for cooling and cleaning. For agricultural purposes, it is still undeveloped and generally confined to isolated agricultural areas or areas which are outside of irrigation schemes. However, its use faces problems that include over-extraction, contamination and subsidence. Groundwater is used in the drinkable water supply in the mineral water industries of Kelantan and Perlis so it is well treated before bottling.

Drinking water is acquired from rain, rivers and groundwater in rural areas. These places have problems due to the availability of suitable sources in terms of quality

and quantity. These clean water sources are connected through gravity feed systems, sanitary wells and by the collection of rainwater. In urban areas, there are different things happening and many water supply systems are overloaded because of rapid growth in demand everyday.

1.3 Water Industry Players

There are many related Ministries and industry players that are accountable in ensuring adequate water supply to cater to the public, besides ensuring good quality water product in the country. The Ministry of Energy, Green Technology and Water (KeTTHA, the Malay acronym for Kementerian Tenaga, Teknologi Hijau dan Air) regulates the water industry in Malaysia and there are also other departments which are related to the water industry. The Water Supply Department (JBA, the Malay acronym for Jabatan Bekalan Air) provides technical advice to Ministries and other agencies in planning, designing, implementation and management of water supply programs.

The Sewerage Services Department (JPP, the Malay acronym for Jabatan Perkhidmatan Pembentungan) is responsible for providing a sewerage system that meets quality standards of effluent and sewerage and ensures that the sewerage services are more efficient and responsive to customers. The National Water Services Commission (SPAN, the Malay acronym for Suruhanjaya Perkhidmatan Air Negara) was formed in March 2007 to advise the Minister on all matters in relation to the national policy objectives of the water supply and sewerage services laws and to implement and promote the national policy objectives. The responsibility of the Department of Environment (DOE) is to monitor the river basins to find out the

water quality in relation to major pollution sources while, the Ministry of Health (MOH) monitors the raw water quality in the reservoirs at the intake points of treatment plants. Finally, there are the water suppliers and they supply piped drinking water from the treatment plants to the consumers.

1.4 Water Institutions

Previously, water resources fell under the respective state jurisdiction under Malaysia's Federal Constitution. Treatment and distribution of water was undertaken totally by state agencies which include the State Public Works Department, the State Water Supply Department and the State Water Supply Board (Lee, 2007). In the early 90s, many states decide to establish water supply companies through corporatization (via the establishment of limited liability firms wholly-owned by the state). Currently, water supply institutions differ from state to state as shown in Table 1.2;

Table 1.2: Water Supply Entities in Malaysia

Water Supply Institution	State
Water Supply Organization	Perlis
	Perlis Public Works Department (Water Supply Department)
	Sarawak
	Sarawak Public Works Department
	Kuching Water Board
	Sibu Water Board
	Kedah
	Kedah Water Supply Department
	Wilayah Persekutuan Labuan
	WP Labuan Water Supply Department
	Pahang
	Pahang Water Supply Department
	Sabah
	Sabah Water Department
	Perak
	Perak Water Board
Privatized Water Company	Kelantan
	Air Kelantan Sdn. Bhd. (AKSB)
	Johor
	SAJ Holdings Sdn. Bhd.
	Pulau Pinang
	Perbadanan Bekalan Air Pulau Pinang Sdn. Bhd.
	Selangor
	Syarikat Bekalan Air Selangor Sdn. Bhd. (SYABAS)
	Terengganu

	Syarikat Air Terengganu Sdn. Bhd. (SATU)
	Melaka Syarikat Air Melaka Berhad (SAMB)
	Negeri Sembilan Syarikat Air Negeri Sembilan Sdn. Bhd. (SAINS)

(Source: Malaysia Water Association (MWA), 2009)

1.5 Problem Statement

Water is needed for survival, used for a variety of purposes, namely for irrigation, industry, domestic water supply, fisheries and mining, among other things. Malaysia is abundant with water resources which consist of surface and groundwater to fulfill consumer's necessities. In future, it is expected that there will be problems of water supply shortage due to rapid urbanization in the country. In the past, water was plentiful and adequate for the size of the population, but now, water is becoming a rare commodity around the globe.

The 9th Malaysia Plan states that Kelantan is ranked at 13th place in Malaysia based on development composite index by state and a large share of the population lives in rural areas. Kelantan is categorized as a state with high levels of poverty (4.8%) in Malaysia (Economic Planning Unit, 2009). A few states which are less developed in Malaysia struggle to improve water coverage mostly in rural areas including Kelantan (Lee, 2011). Kelantan is faced with problems in the water sector. The state demonstrates the lowest coverage of water supply for both urban (57.9%) and rural (56.1%) areas by 2010 (Malaysian Water Association, 2011). Kelantan lacks financial sources in order to improve their water supply coverage to serve the

population. Additionally, Kelantan seems to have the highest levels of non-revenue water (NRW) among other states (52.41%), low production capacity and a low domestic consumption per capita per day in 2010 (Malaysian Water Association, 2011).

In Kelantan, most water sources come from groundwater and groundwater utilization is most significantly there (Malaysian Water Association, 2011). Nevertheless, the groundwater is faced with problems too, such as over extraction, subsidence and contamination. A statistic by the Malaysian Water Association demonstrates water services complaints based on leakage, water quality, and water pressure, which shows that the rising complaint on water quality from 2009 to 2010. Some rivers in the state contain dangerous heavy elements such as mercury and arsenic which may cause a health hazard to the people (Nik, 2011). Moreover, the Deputy Education Minister of Malaysia announces that about 39 out of 77 schools in the state has a critical level of water supply (Ili, 2012). The water dilemma in Kelantan is a long standing problem and the water services are declining.

In addition, the delivery system of water supply is extremely bad and consumers are affected by water shortages, especially those who are located in rural areas. The treatment plants are also poorly maintained which can be seen through the outflow of low quality tapped water. A research by the Association of Water and Energy Research Malaysia (2011) highlights some cases in Kelantan with low coverage performance, dirty and smelly water supply and frequent unscheduled interruption.

In the water industry, NRW seems to be a major problem and an embarrassing issue since it leads to water losses (Raja, 2005). With increasing water scarcity around the world, reducing leakages and wastage becomes ever more important. The Ninth Malaysian Plan states that the government has made a strategy to reduce the rate of NRW year by year as it has identified the current situation to be very wasteful and creates losses for the country. In Kelantan the NRW rate is the highest in the country (52.41%) in 2010 which illustrates why reducing the NRW is the main focus for Air Kelantan Sdn. Bhd. (AKSB). On the other hand, it incurs other problems since to reduce NRW by changing old and rusty pipes cost lots of money. Still, the reduction of NRW is an important aspect to improve water supply economically as water losses in the distribution system will reduce. Through the low tariff and cheap water price paid by consumers, sometimes water companies cannot afford to carry out the NRW reduction works, such as pipeline replacement, leak repairs, leakage detection, consumer meter replacement, pressure management and many more. At the same time, water companies should not only concentrate on increasing water supply because of the profit motive, but also should concentrate on demand management.

Currently, water tariffs seem too cheap and it is unable to generate enough revenue to cover the full cost of capital investment, operation and maintenance. Water tariff in 2009 only covered 78% of operating expenses (National Economic Planning Unit, 2010). Kelantan ranked at 3rd place in 2011 which demonstrates lowest water prices for domestic water services (RM0.55 for first 35m^3). If the price is too low, the water company will be unable to maintain and sustain its operations and if the price of water is too cheap it leads to water wastage. Inexpensive water and its ample supply makes consumers take water for granted. Low pricing of water can cause a serious

wastage of water, since demand is responsive to price. Consumers are using far too much water than they should be. It is therefore appropriate to measure and monitor the price of water carefully, especially since it has become scarce nowadays. People believe that they can afford to pay the water bill thus they over use water every day and they do not take any positive actions to conserve water (Chan, 2009). Water conservation practices are not broadly considered among consumers due to excessive water consumption. Water seems to be undervalued in their eyes, in view of the fact that the cost of water is a very small part of their budget and it comes to them easily, even though water is the most precious natural resource. Thus, by charging new and higher prices; it will induce lessening quantity in water demand (Nauges and Whittington, 2010).

Positive changes in the price are a chance for consumers to enjoy a clean and reliable water. Probably, water price increases will raise consumer awareness of water consumption and encourage water saving behavior. The current water price is too cheap until it leads to water wastage and over usage, since everybody has easy access to water (Chan, 2009). New water prices would allow water companies to provide an adequate incentive for a more sustainable use of water. An investment from consumer's side will support numerous upgrading projects and it will secure sustainable and adequate water supply in the end.

Thus, an important question remains to be answered; are consumers willing to pay for higher service standards with the intention to improve the domestic water service quality?. It is important to determine people's willingness to pay and how many percent increases that they are willing to contribute for better transformation.

Moreover, there are many factors in affecting water demand which can tell us how people's willingness to pay would change when the price increases. The water demand analysis has crucial information on the relationship between household water consumption, prices and other socioeconomic characteristics (Strand and Walker, 2005). This study will investigate which factors that most affecting people's willingness to pay.

1.6 Research Objectives

i) General Objective

This study aims to investigate the consumer preferences for improved domestic water services in Kelantan.

ii) Specific Objective

Specific objectives of the study are as follows:

a) To determine the factors that influence consumer preferences for improved domestic water services in Kelantan.

b) To determine efficient water pricing in Kelantan.

c) To evaluate water service attributes in Kelantan.

1.7 Significance of the Study

Water scarcity and access to water has become an emerging problem in developing countries. Thus, it is important to provide the public with services that what they are really want and how much they are willing to pay (The World Bank Water Demand Research Team, 1993). Normally, water prices are established based on supply costs. Therefore, there is a need to ask potential consumers about how much they would be willing to pay and their preferences for a given level of service. It will describe at which level is the best consumer's willingness to pay for domestic water services in Kelantan. Hence, the focus of this study is the determination of the value of complete access to improved domestic water services through a willingness to pay approach. The information is desired so that the water company can make a better estimation of the amount to charge its customers. In addition, estimated new price can be used as a tool to avoid water wastage and educate water saving behavior among consumers.

High rapid population and urbanization has increased the demand for water and is expected to undergo substantial changes in the future. Water companies should manage the problem as soon as possible in order to satisfy consumer's needs. But, sometimes, low water prices can limit water companies' ability to enhance their service quality and cover their capital costs. Water supply failing to meet demand is putting pressure on water users. Water supply problems also have clear impacts on social stability and economic productivity, thus solutions in dealing with water shortages are needed. In order to help with the development, such as upgrading projects, it is important to know how much amount that individual households are willing and able to pay for water services. The information from this study is also

needed to enable the water supply company to maintain and upgrade its facilities to provide a satisfactory service level in future.

This study identifies strengths and weaknesses of market demand in the water industry in order to improve quality, quantity, and coverage area with a new standard for key performances. For that reason, the most significant product of this study is to provide a clear guideline for policy makers to achieve their economic targets without disturbing long term economic prospects. The results give a better view of the future in the water industry and offer recommendations for policy makers to influence public policy. The government must address the numerous, serious, water issues facing the nation and manage appropriate balance between the supply side (water resources availability and delivery systems) and demand side (adequate, quality and quantity of water). It is important to ensure policies implemented improve the water industry in this country. The government responsibilities on planning, development and management of water resources is an important issue for achievement of economic sustainability and water governance in the country.

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