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PUBLIC PERCEPTION ON WATER PRICING IN PENANG

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Abstract

Increasing demand and consumption in water threatens water security and is a hindrance to achieve the Sustainable Development Goal (SDG) 6 – Clean Water and Sanitation. As a developing country, Malaysia is still highly dependent on water resources to support economic growth for agriculture, industry and domestic consumption. Penang state records the highest domestic water consumption in the country although it is considered a water-stressed state. The state government has employed integrated water management to sustain the water supply and reduce consumption. Water pricing is one of the approaches that can be used for both supply management and the control of demand management. This paper aims to examine the relationship between the demographic characteristic as factors affecting the water consumption of the Penangites with the perception of water price through a questionnaire survey. A total of 341 respondents from the north-eastern part of George Town, Penang, were randomly selected in this research. The analysis was carried out using SPSS to run the Chi-square test, whereby the p-value is used to indicate the relationship between each demographic variable with Penangites' perception of water tariff. The results show that only age and gender have a significant relationship with the perception of water price. Besides that, there is no significant relationship among education level, income and ethnicity on perception of water price. The research concludes that Penang's water tariff could be reviewed and increased in terms of different block tariff as one of the mechanisms to reduce domestic demand and consumption.

Keywords: Water demand, perception, water tariff, water pricing, Penang, Malaysia.

1.   Introduction

Clean and accessible water for all by 2030 is one of the targets in UN Sustainable Development Goal (SDG) 6. As a tropical country, Malaysia is very rich in water resources as it receives a high amount of rainfall each year. Penang, one of the most urbanized states in Malaysia, has achieved the SDG 6 where clean water is available to almost 100% of local citizen (Jaseni, 2014). They also enjoy the lowest tariff compared to other states in Malaysia, which is USD 0.052 (RM0.22) for the first 20,000 liters. This tariff is relatively low and cheap if compared to other countries like Thailand, Singapore, and Vietnam. However, the highest domestic water consumption in Malaysia was recorded in Penang, which is average 276 liters per capita per day (l/c/d). The amount is much higher than the national average of 201 l/c/d in 2017.

Penang is a water-stressed state because about 80% of its raw water withdraw from Muda River that originates from Ulu Muda in Kedah (Chong, 2018). Ulu Muda is a tropical rainforest that provides tons of ecosystem services to the northern region of Malaysia (Penang, Kedah, and Perlis). One of the most important ecosystem services is freshwater for agriculture, industry and domestic consumption. However, this forest is facing degradation due to human activities. Massive logging and commercial plantation activities in Ulu Muda have affected the quantity and quality of Muda River, harming the water supply in northern Peninsular Malaysia (Mok, 2019). Besides that, Tan et al. (2019) reported that monthly precipitation over the Muda River Basin inclined to decrement during the southwest monsoon (dry season). Moreover, surface temperature at the Muda Dam has been incremented at magnitudes of 0.22~0.32 oC/decade during the 1985-2015 period. Consequently, water scarcity issue might be occurred in the future if no climate adaptation strategies been implemented.

2.   Problem Statement

Penang is highly dependent on Muda River for freshwater supply. Therefore, degradation of Ulu Muda along with high water consumption might lead to water security issue in the future. In order to sustain the water supply, Penang government implemented several water management strategies, mainly top-down approach and emphasis on supply-side management (Chan, 2004).

Domestic consumer in Malaysia is less price-sensitive. Nevertheless, water price could be a tool of demand management to deliver the message on important of water to consumer. Figure 1 shows that per capita domestic water consumption in Penang was incremented from 2000 to 2010 (PBA, 2018). Domestic water consumption slightly dropped from 291 l/c/d in 2010 to 285 l/c/d in 2011 when a Water Conservation Surcharge (WCS) was introduced. RM0.24 of WCS has been charge per 1,000 litres for consumption above 35,000 litres per month.

Demographic factor such as age, gender, marital status, income, family background, education, occupation, and family size will affect consumer behaviour and water demand (Kumar, 2014). For example, woman is often the primary water user in domestic consumption. Chen et al. (2012) in their survey found that education level also one of the main factors that affect the pattern of water consumption. However, research on the relationship between water price and demography is still rarely reported.

PER CAPITA DOMESTIC CONSUMPTION IN PENANG, 2000 – 2018.
litres/capita/day (l/c/d)
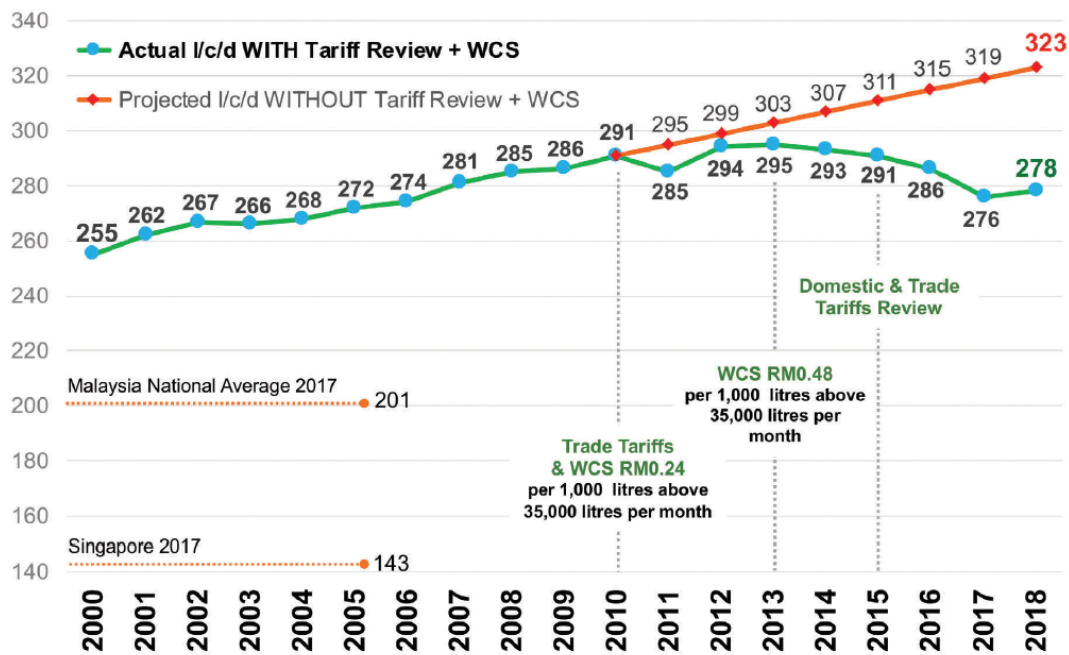
Figure 01. Water Conservation Surcharge, 2015 Water Tariff Review and Impact on Per Capita Domestic Water Consumption in Penang (Source: PBA, 2018).

3. Research Questions

Is there any significant relationship between the demography variables (age, gender, ethnic education level, and income) and the perception on water price among the Penangites?

4. Purpose of the Study

The purpose of this study is to investigate the perception of domestic consumer in Penang on water pricing, focusing on the demographic pattern analysis. This study also investigates the perception of local citizen on the awareness of water issue in Penang.

5. Research Methods

5.1. Questionnaire Survey

This research was conducted using a quantitative questionnaire survey, focusing in the north-eastern part of Penang Island. This region was selected because the source of water supply is mainly from Muda River. A total of 341 respondents was selected using random sampling method. The population of the north-eastern part of George Town is 395,714, hence the sample size is 341 people based on the Krejcie and Morgan (1970) sample size table. Some questions within the questionnaire were formulated by referring to the Toolkit for Ecosystem Services Site-based Assessment (TESSA) questionnaire template (Peh et al., 2013). Data collection was started from March 2019 to June 2019.

5.2. Statistical Package for Social Science (SPSS) Analysis

Statistical Package for Social Science 20 (SPSS) by IBM software was used to investigate the collected data. Chi-Square test was used to identify the relation among demography variable and perception of respondent to water tariff. A significance level of 95% confidence level was used in this research. Hence, P-value less than 0.05 indicates there is a significant relationship, and vice versa.

6. Findings

6.1. Demography characteristic

Statistical Package for Social Science 20 (SPSS) by IBM software was used to investigate the collected data. Chi-Square test was used to identify the relation among demography variable and perception of respondent to water tariff. A significance level of 95% confidence level was used in this study. Hence, P-value less than 0.05 indicates there is a significant relationship, and vice versa.

This study focused on age, gender, ethnic, education level, and income analysis. Table 1 shows the demography of the 341 respondents. The respondents were all from Penang, gender-balanced (43.1% male vs. 56.9% female), largely adult (92.7% of the age between 20 to 64 years old) and majority Malay ethnic (44%). For the education level, 57.8%, 34.9% and 7.3% of the respondents hold secondary, graduate, primary education levels, respectively. In term of the household income, we further divided them into three groups of B40, M40 and T20 based on the Department of Statistic Malaysia (2017). Table 1 shows 83.3% of the respondents from the B40 category, while another 13.8% from the M40 category and 2.9% from the T20 category.

Table 01. Demography of the respondents (N = 341)

| Demography	Range	Percentage (%)
Age	Teenager (13-19)	2.3
	Adult (20-64)	92.7
	Senior citizen (65 and above)	5.0
Gender	Male	43.1
	Female	56.9
Ethnic	Malay	44.0
	Indian	27.6
	Chinese	26.7
	Others	1.8
Education level	Primary (Standard 1 to 6)	7.3
	Secondary (upper and lower secondary, Diploma)	57.8
	Graduate (Degree, Master & PhD)	34.9
Income	B40 (RM3860 and below)	83.3
	M40 (RM3680-RM8319)	13.8
	T20 (RM 8319 and above)	2.9

6.2. Relationship between the demography variable (age, gender, ethnic education level, and income) and the perception on water price

This paper set a hypothesis that demography variable (age, gender, ethnic, education level, and income) have a significant relationship with the perception of water pricing. Table 2 shows the Chi-square test result (p-value) of the relationship between demography variable and the perception on the water price. We found that only age and gender have a significant relationship with the perception on water pricing (p-value less than .05). By contrast, there is no significant relationship between ethnic, education level and income with the perception on water price (p-value more than .05).

Figure 2 shows the perception of respondents on current water tariff. About 73% of the respondents feel that the current water tariff is normal, meanwhile, 18.2% of the respondents think that the water price is slightly high. Only 4.4% of the respondents feel the water price is too high. On the other hand, about 4.7% of the respondents feel the water price is too low and slightly low. Water subsidy from government is the reason causing domestic water tariff is so cheap among the country. In 2018, Penang subsidies RM83.6 million to domestic water tariff (PBA, 2018). A well precise water pricing system should be considered as policy tool to identify water security issues in all over the countries (Soto Rios et al., 2018)

Table 02. Analysis between demography and water price

Demography Variable	*p* value
Age	.010*
Gender	.029*
Ethnic	.160
Education Level	.464
Income	.348
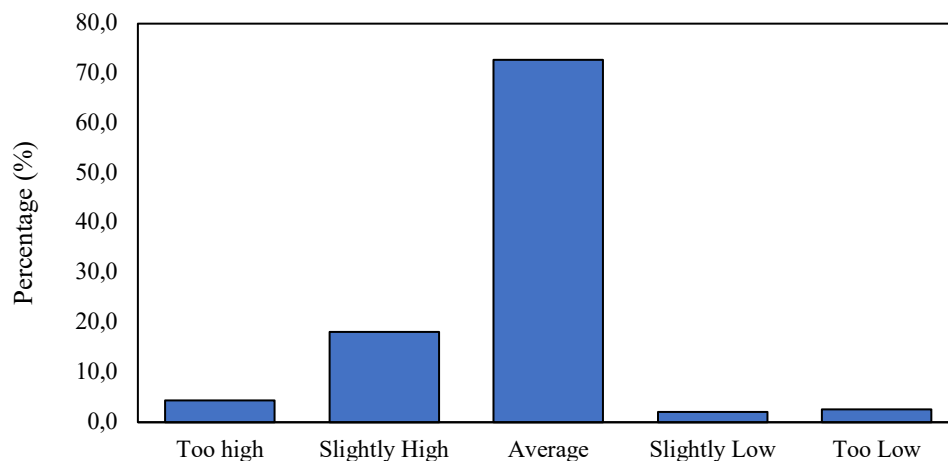
Figure 02. Perception on Water Tariff

Figure 3 shows the perception on water price of three different age groups, which are teenage (19 years old and below), adult (20 -64 years old) and senior citizen (65 years old and above). As working adult is the main water bill payer, their perception of water tariff is important to water authority and decision-maker to decide and implement price mechanism. Any increment of water price might receive the obstacles from this group as around 22% of them think the current water price is slightly high or high. Besides that,

there is different perception on water price in different age group. For example, 23.6% of senior citizen said the current water price is low, but only 3.8% of adult have the same thought. This scenario might be that senior citizen are more consent about saving water towards saving their monthly utilities expanses compared to adult and teenager as they might experience water shortage, water rationing or drought season.
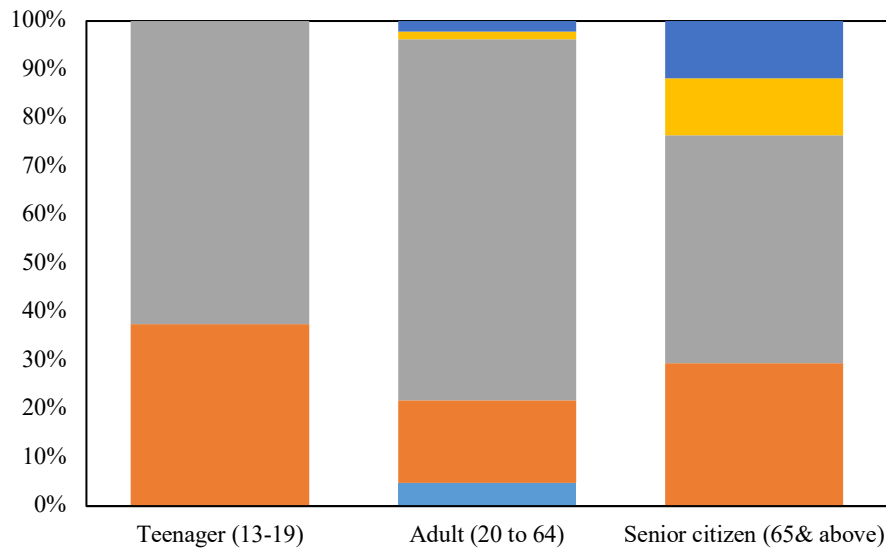
WHAT DO YOU THINK ABOUT THE CURRENT WATER TARIFF IN PENANG? Too Low
WHAT DO YOU THINK ABOUT THE CURRENT WATER TARIFF IN PENANG? Slightly Low
WHAT DO YOU THINK ABOUT THE CURRENT WATER TARIFF IN PENANG? Average
WHAT DO YOU THINK ABOUT THE CURRENT WATER TARIFF IN PENANG? Slightly High
WHAT DO YOU THINK ABOUT THE CURRENT WATER TARIFF IN PENANG? Too High

Figure 03. Perception on water tariff by age group

7. Conclusion

Climate change and human activities could lead to water security issue in any parts of the world. Water consumer should play their role to increase water use efficiently in the domestic sector, and to ensure sustainable water supply to achieve the sustainable development goal. Undeniable, water price is an effective mechanism to reduce the demand and consumption. The purpose of this research is to examine the relationship between the demographic characteristic as factors affecting the water consumption with the perception of water price in Penang. A total of 341 respondents were randomly selected in this research and the analysis was carried out using Chi-square test. The results show that only age and gender have a significant relationship with the perception of water price. Further study might focus on the willingness of Penangites to pay such as payment for ecosystem services (PES) in order to protect the water catchment area or invest on the water-saving device at their household. This could contribute to ensure water security especially when the state facing the water deficit from time to time.

Acknowledgments

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