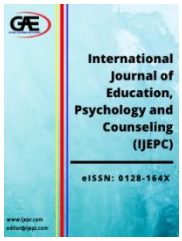
International Journal of Education, Psychology and Counseling
IJEPC
EISSN : 0128-164X
Volume 7 Issue 47 (September 2022) PP. 114-129
DOI 10.35631/IJEPC.747011



INTERNATIONAL JOURNAL OF EDUCATION, PSYCHOLOGY AND COUNSELLING (IJEPC)
www.ijepc.com

AN INVESTIGATION ON MALAYSIA CONSUMER'S WILLINGNESS-TO-PAY FOR WATER USING INCOME AND USE OF GOODS

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Article Info:

Article history:
Received date: 16.11.2020
Revised date: 09.05.2022
Accepted date: 03.06.2022
Published date: 01.09.2022

To cite this document:

Krishnan, G., & Abdul Wahid, N. (2022). An Investigation on Malaysia Consumer's Willingness-To-Pay for Water Using Income and Use of Goods. *International Journal of Education, Psychology and Counseling, 7* (47), 114-129.

DOI: 10.35631/IJEPC.747011

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Abstract:

It is quite common for people to under value public goods (like water); mainly because they are often provided for the public to use at the discretion of the government (e.g., with subsidy, discount) unlike other economic goods (like commercial products) offered for buyers at market price by practitioners. In Malaysia, the government subsidizes the price of water for the public to ensure they have easy access to drinking water and affordability. With continued increase of water demand, consumption and wastage, low water tariff is suggested as one of many factors contributing towards Malaysian public's inefficient water use. To curb inefficiency, the government is suggested to practice high water tariff; this however is a sensitive issue since the public views water both as a public (social) good and is a human right. So, the question of how much one is willing to pay (WTP) becomes an important issue to explore. WTP refers to the final decision made on how much cash the consumer is willing to pay for a supply of water. In Malaysia's case, WTP is linked to whether the public is willing to pay more for water services as they are used to paying less in the past. Ranges of water pricing consumers are willing to pay to get water provision in different countries have been reported in the literature; income and use of the good are the common economic determinants to measure WTP. This study investigates the role played by income and use of goods as components of basic economic model in influencing consumers' WTP to pay more for water tariff. The online survey was participated by 252 household representatives (paid water users) in Malaysia. From one-way ANOVA tests carried out, this study found that both income and use of goods acted as determinants of WTP.

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IJEPC
EISSN : 0128-164X
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Keywords:

Water Tariff, Income, Use Of Goods And Willingness To Pay

Introduction

The significance of water and its related problems is a serious issue resulting globally that the United Nations (UN) has listed it under Sustainable Development Goal number 6 - Clean Water and Sanitation (SDG 6). The emphasis of SDG 6 is on water as a fundamental human right; whereby the UN requires governments to ensure their every citizen to have access to clean and safe water for drinking (WHO, 2019).

In Malaysia, the government has no problem in providing this access to its population. Since pre-Independence Day, the government has been subsidizing water price for the citizens as part of its responsibility in ensuring they have access to water as well as they can afford it. Unfortunately, the government is facing problems with the public's high expectation and critical perception that are mainly related to drinking, domestic or household water problem since Malaysians are quite demanding expecting to be provided with high-quality drinking water for their homes (Abdul Wahid, 2018; Abdul Wahid & Abustan, 2015). The public for instance expects the government and water operators to supply them with consumable water direct from the tap that is additionally expected to be tasty, safe and of quality. They can be quite opinionated on drinking water issues (e.g. on quality of water) as the perceptions were very much influenced by their socio- and demographic backgrounds (gender, age, household size, the state in which they live and are from, income, degree of education) although they lack knowledge on some of the investigated issues (Abdul Wahid et al., 2019). Failing to identify the water tariff charged by the state they live in (in Malaysia, each state has different water tariff) and in naming correctly the water services providers that operate in the state they live in are examples of such ignorance found by Abdul Wahid et al. (2019) as well as by Abdul Wahid's (2017) study when majority of respondents failed to do so.

What Malaysia faces today is a situation whereby water is being under-valued by its citizen. Under valuation is a common circumstance for any public good. Water is continuously treated as a public good here with the government providing subsidy on water expenses for its population; the public also named the government as responsible party to provide households with good quality water at all times (Abdul Wahid & Abustan, 2015; Otaki, 2020). This is difficult to achieve as it involves costs that could not be covered with low charges of water tariff that the country currently practices and high consumption which means that a reevaluation on the tariff must be made as per assumed in basic economic model. Based on water consumer perspectives, willingness to pay refers to the final decision made on how much cash consumer is willing to pay for a supply of water. It is an economic concept and has been applied in water consumption related studies; many studies found consumers show various ranges of pricing that consumers are willing to pay to get water provision in various countries (Rama Chanderam and Abdul Wahid, 2017). In Malaysia for example, Abdul Wahid, Chew and Abustan (2015) reported that users were willing to pay for higher water tariff at RM5 or less of the water bill they pay. Household water use is another factor determining willingness to pay for improved water services (Coster & Otufale, 2014). Use of goods are relating with consumer demands and it is related to economic model (Dale Whittington, 1990).

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In this study, the role played by income and use of goods as components of basic economic model in influencing consumers' willingness to pay (WTP) more for water is thus examined. In this study, consumers with different category of income will be tested to explore whether they portray different WTP. In addition, consumers with different use of goods will also be tested.

The findings may provide insights for the government and water services industry as they could be used to discover appropriate techniques to reap public acceptance on the concept of growing water tariff for domestic use.

Literature Review

Willingness To Pay and Economic Model

In general, consumers' willingness to pay refers to the intention customers have in paying for something that they perceive as essential and of value. The act can be translated as 'inprinciple' WTP (whereby in principle, consumers agree to make the payment in question) or as in 'amount' WTP (whereby consumers have specifically identified the amount to pay). Abdul Wahid et al. (2020) summarizes "WTP as a condition when consumers are dealing with the level of increase in payment that leaves them to be indifferent to the pre- or post- situation of change that takes place" (p. 1149). Individuals make decisions as to the maximum amount they are willing to sacrifice to procure a good or to keep away from something undesirable (Abdul Wahid & Chew, 2015); or as a valuation method that would help them (from a point of view of users) to make estimation on how much money they have pay (without any force) to get a product or services (Abdul Wahid et al., 2017).

The literature has identified few theories that are associated with WTP. In addition, Liebe et al. (2016) highlighted on the different WTP assumptions that people make for public and economic goods that resulted in the difference of charges made for each of the goods. It is normal for public goods to be undervalued compared to economic goods that have more freedom for charges to be made by providers on the goods' transaction as long as they are within the boundary between a buyer's willingness to pay and a seller's willingness to accept. In the case of public goods like drinking water in Malaysia, the importance of WTP investigation is on the ability to identify whether Malaysian consumers would be willing or unwilling to pay more for water and services they consume or would like to consume in future, in terms of reasons why they are willing and on how much (Abdul Wahid et al., 2017). Rama Chanderam et al. (2017) explained the importance of WTP as an economic concept usable in identifying the amount of money consumers would be willing pay to get their supply of water services and water quality in Malaysia when they described several methods including contingent valuation (CB) to measure WTP; and that the decision made on WTP is regularly related with individuals' mentality and behaviour (Abdul Wahid et al., 2020). Contingent valuation (CV) is one prominent technique described by Carson & Hanemann (2005) in determining WTP. It involves asking respondents to directly indicated on the maximum amount of money they would be willing to pay to use aspects or the goods. In essence, CV measures the monetary values (or changes) of goods evaluated. The literature has acknowledged CV as both important and controversial technique to value public goods (Liebe et al., 2016).

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Many past studies on consumer's WTP were based on basic economic model as the underlying single theory applied; and that income and/or use of goods have been reported as components of this basic economic theory investigated, depending on the researcher's choice.

Income and WTP

The focus of basic economic model falls generally on two determinants of WTP, namely, income and use of the good (Liebe et al., 2016). Abdul Wahid and Chew's (2015) study found income as one of the four determinants on Malaysian household's willingness to pay for drinking water. Mainly, when consumer think about paying for improved goods/services quality, their options and responses to valuation questions will be constrained by way of their (disposable) income (Abdul Wahid et al., 2020). In other words, individual's income is correlated to the amount of cash they are willing pay for various cited reasons – like to acquire the public goods, to have higher satisfactory of public goods, or even to avoid any loss of perceived advantages of public goods (Abdul Wahid et al., 2017). This is why income is usually covered in stated preference surveys and why it is expected to have a positive impact on WTP (Carson et al., 2001). Several past studies reported on how households' income has shown considerable effect on WTP particularly when household's income is increased (Bogale & Urgessa, 2012; Cho et al., 2005; Genius et al., 2008; Jiang et al., 2010; Wendimu & Bekele, 2011). Dlamini (2015) explains that income elasticity is higher for environmental and public goods such as water, which means that the higher income will influence individuals' willingness to pay more. Based on the literature support, hypothesis one is proposed for this study.

H1: Consumers with different household's income category will show different willingness to pay more for water.

Use of Public Goods and WTP

Use of public good in query is another determinant that has been used by past studies when investigating WTP. Use of good is very much related to the economic concept of value and thus is placed under the basic economic theory. For example, people's decision to use public good may be due to perception that it could amplify their satisfactory of (certain) lifestyles or well-being. If this is the reason behind people's use of the public good, then, it indicates for a direct behavioural link to be established between the public good and their well-being through the concept of "use values". The link can still be made in the situation where people does not use the good in question. In such a case, the direct link between the public good and individuals' well-being would be the perceived "knowledge" that the people have about the good; whereby the linkage can still be expressed under "use values" (e.g. existence value). According to Carson et al. (2001), the latter link is expected to be weaker than a link based on direct use, as such, it is assumed that customers will be willing to pay more than the non-users. A study by Bogale & Urgessa (2012) for instance showed the effect by use of goods on WTP. Coster & Otufale (2014) reported how use of water was found to be linked with people's demand and that WTP connected with good's charges. In another study, Reynaud et al., (2018) explain how people with higher living standards consume more water as besides drinking, it is used for various other purposes such as for water fountain, swimming pools and gardening landscape maintenance; thus, usage (use of goods) is significant with consumers' willingness to pay.

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Based on this, hypothesis two is proposed here:
H2: Consumers who use tap water for drinking (use of goods) will show different willingness to pay more for water than those who do not use it.

Research Framework

Figure1 shows the research framework of the study that applies the model of basic economic theory whereby two hypotheses on income (H1) and use of goods (H2) have been proposed as determinants of Malaysian consumer's willingness to pay for water.

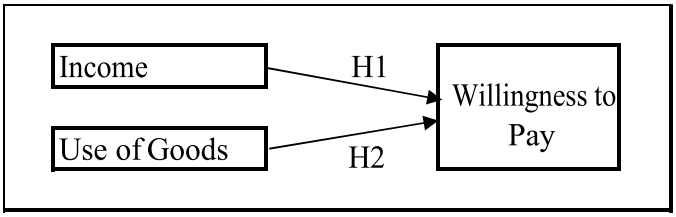

Figure 1: Research Framework Investigating Consumer's Willingness-To-Pay for Water Using Income and Use of Goods

Research Methodology

This study investigates the role played by income and use of goods as components of basic economic model in influencing consumers' willingness to pay for water tariff. As such, the study was designed to be empirical in nature with online survey targeted for paid household water users in Malaysia. Data are collected via social chat group and work group using snowballing sampling method. This resulted in a total of 252 household representatives fitting the category required for this study who participated in the online survey. The number achieved is in line with Sekaran's (2013) recommendation on sample size.

For this paper, we only focused on investigating the role played by two variables, namely, income and use of goods as these two have been identified as determinants in basic economic model thus, suitable to use in investigating consumer's WTP of water.

The study's questionnaire items were either adapted or adopted from past studies (i.e. Abdul Wahid & Chew, 2015; Khan & Mohsin, 2017; Sangroya & Nayak, 2017; Aziz et al., 2017). Section 1 of the questionnaire focuses on qualifying questions to filter those not the targeted consumers from taking part.

As for Section 2, the emphasis is on identifying respondent's on their monthly household "net income" (this is measured first by openly asking respondents to fill in their income willingly), and via stipulated income categories provided for them to choose (i.e. lowest category is RM1500 and below while the highest category is RM9000 and above). Different techniques were used to ensure information needed on income will be filled in by respondents. Missing open values for instance will be replaced by the means of the categories they filled in while the remaining missing values will be imputed by applying an income regression. For subsequent analyses, the equalized disposable income is used. This is calculated when the household net income is divided by the square root of the number of all household members. This way, the mean value of income can be achieved. Section 2 also focuses on measuring consumer's use of goods. Here, the "use of tap water" is measured by asking how often respondents use tap

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water provided at home for drinking water prior to the survey. For analysis purposes, the binary variable will be coded with 1= consume for drinking; and 0= do not consume tap water for drinking.

Section 3 emphasizes on respondent's willingness to pay for water tariff. A seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) was used to evaluate the eight WTP items measured in the study, namely, on tariff, charge should be more for water wasters than non-water wasters, WTP more for current quality of water, WTP pay more if current quality is improved, level of water services acquired at home, current water value, on WTP if water services quality is improved and WTP more if the water supply to my household is free from health risk.

Section 4 is the last section in the questionnaire which focuses on getting respondents' background information (e.g., gender, level of education, income, marital status, etc.) to help build the profile for analysis.

This study used SPSS 25.0 for descriptive analysis and ANOVA analyses to determine direct relationships between the independent variables and the dependent variable. In general, ANOVA or analysis of variance is used to test for differences among more than two populations. It is an extension of the t-test that is usually applied when testing for two population means.

According to Sow (2014), ANOVA is the best practise to test the existence of either positive or negative relationship between variables as in the analysis, the means of two groups or more will be compared in relation to the dependent variable(s). Therefore, for this study ANOVA is best statistic to analyse the significance of relationship between independent and dependent variables. Some scholar mentions that t-test will be best tools to support 2 independent group especially to test Use of goods, but the literatures show that post -hoc statistical test of ANOVA will have better control on Type 1 error and result interpretation will more justifiable. Type one error means for the significant output, the tested statistics show insignificant (Banerjee, UB, J S, & S, 2009).

Results

Profile of Respondents

The profile of respondents is presented in table 1. It shows that the participating respondents to be 100% Malaysians and quite balanced in number in terms of gender (51.6% male, 48.4% female) but skewed in ethnicity with Indians dominating the total sample (44%). Majority of them are from the age group of 26-30 years old (28.2%), possessing Bachelor's degree (50.4%), are working in the private sector/business (73.0%) and are earning between RM3001-RM6000 (43.7%). Majority of them were either married or being single parents (59.1%), from the state of Penang (44.8%) and live in the sub-urban area (54.4%).

Table 1: Profile of Respondents

Demographic	Profile	Frequency	Percentage (%)
Citizenship	Malaysian Citizen	252	100
Gender	Male	130	51.6

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	Female	122	48.4
Age (years)	18-25 years old	40	15.9
	26-30 years old	71	28.2
	31-35 years old	66	26.2
	36-40 years old	46	18.3
	41-45 years old	22	8.6
	46 and above years old	7	2.8
Education	Bachelor's Degree	127	50.4
	Master's Degree	56	22.2
	PhD / Doctorate	5	2.0
	Certificate / Diploma	44	17.5
	Secondary School	20	7.9
Employment	Private Sector/ Business	184	73.0
	Public Sector	64	25.4
	Unemployed	4	1.6
Ethnicity	Indian	111	44.0
	Chinese	78	31.0
	Malay	61	24.2
	Other	2	0.8
Marital status	Married/Single Parents	149	59.1
	Not married	103	40.9
Income (RM)	RM3000 and Below	80	31.7
	RM3001-RM6000	110	43.7
	RM6001 and Above	62	24.6
State where household is located	Pulau Pinang	113	44.8
	Kedah	11	4.4
	Kelantan	6	2.4
	Selangor	22	8.7
	Kuala Lumpur	23	9.1
	Negeri Sembilan	19	7.5
	Johor	9	3.6
	Melaka	19	7.5
	Perak	13	5.2
	Pahang	5	2.0

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	Perlis	5	2.0
	Terengganu	7	2.8
Household's Area (Locality)	Suburban Area	137	54.4
	Urban Area	35	13.9
	Rural Area	80	31.7
Water consumed in a month (m^3)	Below $10m^3$	96	38.1
	11 to 20 m^3	68	27.0
	21 to 30 m^3	36	14.3
	31 to 40 m^3	12	4.8
	41 to 50 m^3	6	2.4
	$51m^3$ and more	2	0.8
	I don't know	32	12.7

Findings

Descriptive statistics was conducted to observe the distribution of data in the study. Table 2 and Table 3 display the summary of descriptive statistics. The gathered data was from 252 respondents who participated in the study.

Table 2: Descriptive Analysis on Income group

WTP	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
RM3000 and Below	80	4.0438	1.39380	.15583	3.7336	4.3539	1.00	7.00
RM3001 to RM6000	110	4.0091	1.40900	.13434	3.7428	4.2754	1.00	7.00
RM6001 and Above	62	4.3750	1.50766	.19147	3.9921	4.7579	1.00	7.00
Total	252	4.1101	1.43150	.09018	3.9325	4.2877	1.00	7.00

As shown in Table 2, Minimum and Maximum values for each of the three (3) groups of income is 1 and 7 respectively. Income group RM6001 and above recorded the highest min (4.3750) with standard deviation of 1.50766; this group has the least number of members (62 persons) while Income group RM3000 and below shows the lowest mean (4.0438) with standard deviation of 1.39380; overall, this group has 80 members (second highest amongst the three group of income).

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Table 3: Descriptive Analysis on Use of Goods WTP

WTP	N	Mean	Std. Dev.	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Yes, tap water used for drinking	245	4.1071	1.44543	.09235	3.9252	4.2890	1.00	7.00
No, tap water is for other uses	7	4.2143	.86517	.32700	3.4141	5.0144	1.00	7.00
Total	252	4.1101	1.43150	.09018	3.9325	4.2877	1.00	7.00

Similar analysis was carried out for use of goods. As can be seen from Table 3, majority of respondents (245 or 97.2%) use the tap water provided at their home for drinking while the rest (7 persons or 2.8%) use the provided water for other uses in the house (e.g. for washing, shower, etc.). The non-user group achieved the highest means (4.2143) with a standard deviation of 0.86517 while the user group recorded mean at 4.1071 and a standard deviation of 1.44543. In addition, 1 and 7 represents the minimum and maximum values for both groups similar to the income groups.

Hypotheses Testing

In this study, the null hypotheses (Ho) rather than the alternative hypotheses (Ha) were tested. The two hypotheses were tested using One way-ANOVA analysis. This test allows researcher to analyse relationship between two variables by comparing the mean of the dependent variable between two or more groups within the independent variable (Sow, 2014). When the p-value is lesser than the significance level of 0.05, then it is considered statistically significant which means that the tested hypothesis is supported (Yang, 2019).

Table 4: ANOVA Test Result for Income Group to WTP

WTP	Sum of Square	df	Mean Square	F	Sig
Between Groups	5.825	2	2.913	1.426	.242
Within Groups	508.525	249	2.042		
Total	514.350	251			

A one-way ANOVA was conducted to test the null hypothesis (H_{01}) on the similarity of willingness to pay more for water (the dependent variable) based on consumer's income category (the independent variable). In this study, the income as the independent variable has three (3) levels; namely, RM3000 and below, RM3001-RM6000, and lastly, RM6001 and above. Results in Table 4 show F statistic at 1.426 (with 2 and 249 degree of freedom between

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EISSN : 0128-164X
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and within groups respectively) and that p-value was at 0.242 (p>0.05). As the F test in ANOVA was found to be not significant, the null hypothesis is thus not supported. The result indicates the WTP is dissimilar for consumers' income.

Table 5: Post Hoc Test (Games-Howell) for Multiple Comparisons

Dependent Variable: WTP	(I) Income	(J) Income	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Games-Howell	RM3000 and Below	RM3001 to RM6000	.03466	.20575	.984	-.4518	.5211
		RM6001 and Above	-.33125	.24687	.375	-.9168	.2543
	RM3001 to RM6000	RM3000 and Below	-.03466	.20575	.984	-.5211	.4518
		RM6001 and Above	-.36591	.23390	.265	-.9210	.1892
	RM6001 and Above	RM3000 and Below	.33125	.24687	.375	-.2543	.9168
		RM3001 to RM6000	.36591	.23390	.265	-.1892	.9210

Another Post Hoc Test (using Games-Howell statistic method) was run to confirm and further compare the results of the different groups tested by this H_{01}. The Post Hoc Test results in Table 5 show that the variances level of income group were all not significant (p>0.05). Thus, it is confirmed that the first null hypothesis is not supported; indicating that consumers with different income group do not share similar WTP.

A one-way ANOVA was conducted to test the second null hypothesis (H_{02}) whereby it is assumed that the variances for WTP (the dependent variable) should be relatively the same regardless of the respondents' use of goods. In this study, the independent variable, Use of Goods was categorised in two (2) level decisions, the Yes group (that tap water is used mainly for drinking) and No (that tap water not used mainly for drinking but for other uses) while the dependent variable was the WTP data. As discussed earlier, the decision to use ANOVA rather than t-test to validate the data was to avoid Type 1 error.

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DOI 10.35631/IJEPC.747011

Table 6: ANOVA Test Result for Use Of Group To WTP

WTP.	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.078	1	.078	.038	.846
Within Groups	514.272	250	2.057		
Total	514.350	251			

Results in table 6 show F statistic at 0.038 (with 1 and 250 degree of freedom between and within groups respectively) and that p-value was at 0.846 ($p>0.05$). As the F test in ANOVA was found to be not significant, this null hypothesis (H_{02}) is thus not supported. The result indicates the WTP is dissimilar for consumers' use of goods. In other words, WTP for consumers who use tap water for drinking is different than those who do not use it. As there were only two independent groups (YES and NO groups) tested here, it is thus not required for the Post-Hoc test to be carried out.

Discussion and Conclusion

This study focused on the issue of consumers' willingness to pay for household or domestic water. Household water has long been considered a public or social good in Malaysia. Following the assumptions of the economic basic model, this study investigated two variables, namely, income and use of goods as determinants of Malaysian consumers' willingness to pay more for domestic or household water tariff. Two alternative hypotheses were developed (H_1 and H_2). Results on both null hypotheses tested concluded that WTP for both income (H_{01}) and use of goods (H_{02}) variables were not similar; in other words, both alternative hypotheses are supported indicating that both income and use of goods are indeed determinants of consumers' willingness to pay more for water.

The findings are in line with previous studies; in particular Abdul Wahid & Chew (2015) and Liebe et al. (2016) on the significant role of income has on willingness to pay. As Liebe et al. (2016) explain, income should be correlating with the amount of money that consumers are willing to pay for water in order to obtain it. As per Abdul Wahid & Chew (2015), what is investigated in the current study is not only on whether consumers are willing to pay for water in general but rather on whether they are willing to pay for more than what they are currently paying rather than less. This finding is thus supporting Abdul Wahid & Chew's (2015) finding. According to Khuc (2013), study reported that for Vietnam people, high standard of living, income and education are the significant WTP influencers for safe drinking. In addition, what can be observed from the current finding is that the sensitivity of willingness to pay more for Malaysian consumers can be seen even for public good like water (this WTP is quite usual for economic good). This is in line with a study carried out by Genius et al. (2008) when estimating consumer's willingness to pay for water in the Municipality of Rethymno, Greece. Here, woman households with high income that were not using tap water for drinking purpose were found to be willing to pay more for other segments (other uses) to ensure they can have it.

The current study that confirms the importance of use of goods on willingness to pay can also be seen to be in line with past study. For instance, a local study performed by Kamaludin et al.

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International Journal of Education, Psychology and Counseling
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EISSN : 0128-164X
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(2013) found that while household size showed negative influence on willingness to pay, size plays an important role in use of the resource to maintain households' existing lifestyle. Abdul Wahid et al. (2019) provides examples how use of water is not only for drinking but for other uses involved in one's daily activities, for instance, like for washing clothes, for filling up of swimming pools, for recreational and health activities, or for maintaining a high end life styles. In Kamaludin et al. (2013), a bigger household size will show the tendency for use of more water as well as greater reduction on willing to pay for the resource.

There are some limitations on this research. The study was dominated by the Indian ethnic group and those from Penang state; reason was due to lack of access to wider contact groups; in addition to respondents' willingness to participate during the Covid-19 pandemic and movement control orders.

In conclusion, the study's findings have confirmed the usefulness of the basic economic model in determining WTP; with both income and use of goods found to be significant. The state governments and water providers could make use of the insights to understand how Malaysian household water consumers behave on the issue of WTP. For instance, any future plan by the government and water services providers to increase current water tariff should consider the importance Malaysian public put on economic based factors, namely, income and use of goods when deciding for WTP. The understanding can also be used to plan for education and awareness programs on importance of water as a scarce resource, as a public good that supposed to be not undervalued, and on the importance of sustainable consumption behaviour of the resource.

As for recommendation, it is suggested that future researcher could explore further other factors that may influence consumers' willingness to pay; the variables can be from other theories available such as theory of planned behaviours and theory of public goods besides the basic economic model factors (i.e., income and use of goods). As for respondents, it is suggested for future researcher to target for equal ethnic groups, gender, education background, occupation and other socio-demographic factors to analyse their willingness to pay so that in depth understanding of their behaviour can be gained. Investigating the topic on water is encouraged as it is listed it under the United Nations' Sustainable Development Goal number 6 - Clean Water and Sanitation (SDG 6).

Acknowledgement
The research for this paper was financially supported by Universiti Sains Malaysia research grant (RUI) 1001/PPAMC/8016059.

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EISSN : 0128-164X
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