INFORMATION DOCUMENT

REGULATED INDUSTRIES COMMISSION

CUSTOMERS WILLINGNESS TO PAY FOR CHANGES IN WATER, WASTEWATER AND ELECTRICITY SERVICES IN TRINIDAD AND TOBAGO – A SURVEY

(Executive Summary)

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Preface

This document discusses the quality of water and electricity utility services, and the willingness to pay for changes in the level of service offered by utilities, in Trinidad and Tobago. The data for the study were collected in a collaborative effort between the Regulated Industries Commission (RIC) and Kameel Virjee, a PhD Candidate of McGill University, Canada. Analysis of the data arising from this collaborative effort was conducted by Kameel Virjee.

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Acronyms

CSO – Central Statistical Office

CSSP – Continuous Survey Sample of Population

CVM – Contingent valuation method

DCE – Discrete choice experiments

CM – Choice modelling

FSE – Full service equivalent

IIA – Independence from irrelevant alternatives

NHA – National Housing Authority

RIC – Regulated Industries Commission

RUM – Random utility maximization

T&TEC – Trinidad and Tobago Electricity Commission

WASA – Water and Sewerage Authority

WTP – Willing/willingness to pay

Executive Summary

This report discusses the results of a willingness to pay (WTP) survey conducted in Trinidad and Tobago in 2003. The survey sought to ascertain domestic consumers' perceptions of the quality and price of utility services, and the ability of the service providers in the water and electricity sectors to provide improved services. Water and wastewater services are supplied by the Water and Sewerage Authority (WASA), while electricity services are provided by the Trinidad and Tobago Electricity Commission (T&TEC). The objectives of the survey were two fold:

- Assessing current service levels for the two sectors for residential consumers; and
- Estimating the willingness to pay for changes to service levels.

The survey sampled 1,419 households throughout the two islands using a sampling design based on the Central Statistical Office's (CSO) Continuous Survey Sample of Population (CSO, 1987). Overall, the non-response rate to the survey was 12.5%, most of which was due to errors in listing records and difficulty in accessing some remote areas.

To estimate the willingness to pay for changes to water supply, wastewater and electricity services, the contingent valuation method (CVM) was used. An iterative bidding game was employed as the monetary elicitation tool. The starting point of the bidding game was based on a review of the literature and set at the median current bill amount for the particular utility service being investigated.

In addition to the CVM, the survey utilized discrete choice experiments (DCE) to value attributes of water supply options. Two different designs were employed for those with in-house piped connections and for those without. The selection of the attributes was based upon a survey of the CV literature and consultation with sector experts, as there is little precedent in the DCE literature of its application in valuing water supply improvements. It was imperative that the attributes selected were of practical relevance to respondents but also that they were tractable from a policy standpoint and, therefore, reliability, pressure and quality were chosen to represent the level of water service to customers. For non-piped users, two additional attributes were included in each choice set; a binary variable for whether the supply was a standpipe or an in-house connection and a connection cost. In both user classes, choice sets also included a price variable, to allow for estimation of compensating variation, or WTP. In all, each respondent answered 12 choice sets with 4 alternatives, including a status quo option, in each. The combination of levels utilised was set using an experimental design for generic choice sets (Kuhfeld, 2003).

The questionnaire was administered during May and June, 2003 to the pre selected respondents. Thirty enumerators conducted the fieldwork in Trinidad and six were employed for the Tobago sub sample. All supervisors and enumerators were required to

attend a one-day training session led by the survey design team. Three data entry clerks were engaged to digitize paper responses.

The socioeconomic profile departed slightly from population characteristics, in that the surveyed respondents were mostly female. About 80% of those surveyed had primary or secondary education as their highest level of education. The average income of the respondents in the sample was $2,900.00, which compares with population values when income excludes informal sources.

The survey found that awareness of the Regulated Industries Commission (RIC), was minimal. Only 8% of respondents indicated awareness of the RIC.

About 80% of the survey respondents relied on a WASA water supply as their primary water supply. The remainder used water supplied by neighbours, rainwater or some other water supply. This figure is less than the coverage figures suggested by WASA (92%) since coverage, as defined by WASA, is the percentage of the population, under a utility's nominal responsibility, with easy access to water services either through a direct service connection or residing within 200m of a standpipe. This definition may be further extended to include communities with no access to pipe lines but are supplied by WASA with communal storage tanks facilities. The reliability of supply was found to be rather low; with only 27% of the surveyed respondents received a 24-hour water supply. Another result of the low reliability is the heavy investment in local storage facilities, and 68% of the sampled households had water tanks installed at their properties. About half the respondents found that the pressure of their water supply was adequate, though this could be as a result of the installation of water tanks and pumps. Water quality was reported to be acceptable with only 8% of the respondents finding the overall quality to be poor. Despite this 45% of the respondents to this survey treated their water, mostly by boiling.

Sanitation services were mostly self-provided by the household. Septic tank systems were the most frequently encountered sanitation system with almost 60% of the surveyed households relying upon such systems. Seventeen percent of the respondents had access to central sewerage facilities while about a quarter of the sample relied upon pit latrines for sanitation services. Residents of Tobago, particularly, had little access to sewerage systems and relied heavily upon septic tanks and pit latrines as sanitation facilities. However, there is a single sewerage system that serves residents of Scarborough and surrounding areas.

Electricity coverage was found to be very high, with 92% of the sample having access. Generally, the respondents felt the service level was high, though infrequent outages and power fluctuations do occur. In cases where compensation was claimed for damaged goods, respondents felt that the compensation paid by the utility was unfair. On average, surveyed households pay $216.00 bi-monthly for electricity service.

Willingness to Pay

The willingness to pay for changes in water supply was measured using two different methods, the contingent valuation method and discrete choice experiments, for each respondent.

The contingent valuation method described an ideal system to the respondent, where pressure, quality of water and reliability of supply would all be at their maximum levels. Logit models were used to analyse the resulting bids and it was found that income was correlated with WTP for all the respondents. Users who depended solely upon only a piped in-house connection were willing to pay more for an ideal water supply despite their current bill being high. Variation in the willingness to pay for an improved water system by non-piped users was influenced by geography as well as by storage supplies.

The choice models provided estimates of the value associated with changes in the levels of attributes defining a water supply system. It was found that reliability changes, in terms of the number of days per week that water would flow into the system for at least some part of the day, were more important to users currently using an in-house piped connection.

Table I shows the maximum WTP for changes to the ideal situation for an average piped and non-piped user as derived from econometric models based upon data from both the CVM and CM (or DCE).

Table I
Mean WTP predicted by contingent valuation method and choice models

	Mean WTP – Contingent Valuation method (per quarter)	Mean WTP – Choice Models (per quarter)
Piped Users	$144	$461
Standpipe Users	$186	$575

The wide variation in the WTP for changes between the two methods is most likely due to different sources of bias associated with each method. The CVM is subject to bias arising from the media and the context of the question. The value of WTP given by the CVM is depressed in this case due to a lack of confidence by the respondents in the potential for the utility to effect the described change. The CV scenario was, perhaps, doubtful in the mind of some respondents. The CM, however, by de-emphasizing the payment variable and allowing choices on the basis of attribute bundles alone, may reflect the WTP were the change to actually happen. In any case, the two estimates can be regarded as bounds of the true WTP for an increase in the water level service to the ideal situation.

Table II shows the mean WTP, by current service level, for upgraded sanitation facilities; where each household will have a central sewer connection.

Table II
Average WTP for wastewater service upgrades

Sanitation System	Average WTP (per quarter)
Central sewerage system	$85.82
Septic tank	$81.34
Latrine	$82.10

As can be noted, WTP does not vary across current sanitation service levels. A logit model explaining the variation in the WTP bids, however, implied that the satisfaction with the current sanitation services was a significant factor in explaining the WTP for connections to a central sewerage facility.

The respondents in the sample were, on average, willing to pay less for an improved electricity supply than the current average bill reported in the survey. This can be explained by the extremely high satisfaction with current service levels. As users are mostly satisfied with their electricity service, the only change they would like to see is a lowered monthly bill. A logit analysis of the bids did show that the ownership of electric appliances was indicative of a higher WTP implying that customers are aware of the volumetric nature of electricity pricing. Also, users who experienced fewer outages were less likely to accept an improved electricity supply at a given increased price than an otherwise similar customer with more frequent outages.

The survey concluded that there is not full water coverage in Trinidad and Tobago, with lower income groups suffering from poor access more frequently than upper income groups. Another feature of these results was that they depart from estimates given by the utility, WASA, implying that system information at the utility may be lacking. Respondents to the survey are willing to pay for changes in water supply. The amount they are willing to pay is confounded with a lack of confidence in the WASA's ability to effect the changes described, as suggested by the divergence in the estimates of WTP given by the CV and CM methods. It is recommended that any increase in water rates be linked to improved service levels as the results from the attribute based valuation methods, DCE, provide evidence of significant willing to pay for changes to reliability in particular. This WTP is corroborated with the prevalence of local storage facilities installed at the users' expense. The results suggest that tariff increases can be justified on the basis that users want change to the current system and are willing to pay for it. This, however, is dependent upon the realization of those changes. It is to be noted that more accurate system information is required regarding the quality of water and service coverage of WASA.

The survey found that in Trinidad and Tobago there is a lack of infrastructure to carry waste away from households, and treat it before its release as effluent into the environment. The issues associated with this untreated disposal of residential wastewater pose significant environmental threats. The low WTP for access to wastewater services observed in this research implies that private solutions are sufficient for the current users' needs. This further implies that those users, in evaluating their WTP, consider only the

private benefits that accrue in wastewater upgrades, rather than the public benefits. Increased environmental awareness is required to underscore the necessity of wastewater treatment and, in turn, stimulate demand for enhanced sanitation facilities. This would increase the WTP for wastewater services and increase the potential for cost recovery in the sector. As a further policy initiative, demand may be further stimulated through the provision of subsidies for connection to centralised sewerage systems.

The willingness to pay for changes in the electricity was measured using CV. Based on the survey results the majority of surveyed users felt that the electricity supply is adequate in Trinidad and Tobago, with the elimination of infrequent outages being the only service upgrade demanded by respondents. The survey has found that since service levels generally meet the demands of users, there is a low WTP for service changes. Therefore any increase in rates cannot be justified on the basis of improved service levels.

SUMMARY OF FINDINGS	
BACKGROUND	
Socioeconomic Profile of respondents	▪ Majority were females ▪ 80% had primary or secondary education ▪ Average income was $2,900.00 monthly
AWARENESS OF RIC	
Awareness of the RIC	▪ 8% knew of the RIC ▪ 47% of the 8% knew of the functions of RIC
QUALITY OF SERVICE - WATER	
Coverage	▪ Approx. 80% relied on WASA as primary source (in-house & standpipe) ▪ –WASA estimates coverage to be 92%
Reliability of Supply	▪ When asked if the reliability was acceptable, only 23% indicated that it was poor to very poor. ▪ 60% of respondents had storage facilities. ▪ Average installed capacity was 610 gallons. ▪ It was inferred that this would allow for 5.5 days of supply. ▪ 47% felt that water pressure was good to excellent and ▪ 14% said it was poor to very poor.
Water Quality	▪ 8.4% found that overall water quality to be poor. ▪ 20% found the colour to be poor. ▪ 15% found taste to be poor. ▪ 45% indicated that they treat water.
Other considerations	▪ 30% used bottle water for drinking, spending on average $10.00 per week. ▪ The majority of respondents were satisfied with the level of customer service offered by WASA. ▪ Only 20% were dissatisfied. ▪ 45% indicated that over the years they have noticed an improved level of service since they lived at their present location.

SUMMARY OF FINDINGS	
Non-piped Customers	▪ 60% of non-piped customers were located > 200m from the nearest standpipe. ▪ 20% were > 800m from the nearest standpipe. ▪ 75% spend > 30 min. per day collecting water. ▪ 30% spent > 60 min. per day. ▪ Reason for non-connection was the unavailability of water mains nearby.
Billing	▪ 70% of standpipe users were unaware of their responsibility to pay water rates. ▪ Only 55% of all respondents indicated that they were responsible for paying rates. ▪ The remaining 45% were renters, persons unaware of their responsibility to pay, and those obtaining water illegally.
QUALITY OF SERVICE - WASTEWATER	
Wastewater Services	▪ 17% of survey respondents indicated having access to central sewerage system, vs. WASA's estimates of 20% sewerage coverage. ▪ 60% relied on septic tanks for sewerage disposal. ▪ 23% utilised pit latrines.
Wastewater Services	▪ Average bill for central sewerage facilities was $90.00 per qtr. ▪ Only 15% of respondents reported paying bills. ▪ 40% of septic tanks users had their tanks cleaned at least once in 4 yrs. at an average cost of $258.00 per cleaning.
QUALITY OF SERVICE - ELECTRICITY	
Coverage	▪ 92% coverage, ▪ This is not statistically different from the 97% coverage reported by T&TEC
Reliability of Electricity Services	▪ 83% felt this was good to excellent. ▪ 75% experienced infrequent outages. ▪ 6% experienced weekly outages
Voltage fluctuations	▪ – 70% of the respondents rarely

SUMMARY OF FINDINGS	
	experienced voltage fluctuations. 17% of them indicated that they frequently experienced voltage fluctuations.
Voltage fluctuations & damaged appliances	▪ 8% suffered damaged appliances ▪ < 2% reported making claims for damaged appliances ▪ 79% felt compensation was unfair
Bill Payment	▪ Average bi-monthly electricity bill was $216 (but this may have included arrears as a review of T&TEC's billing data revealed an average monthly billing of $79.00.) ▪ 97% of respondents paid their bills within a month
Customer Service (Treatment of Customer by Service Provider)	▪ 85% of the respondents were satisfied to very satisfied.

WILLINGNESS TO PAY – WATER SERVICES
Mean WTP predicted by contingent valuation method and choice models

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AVERAGE WTP - WASTEWATER SERVICES

Sanitation System	Average WTP (per quarter)
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SOURCES OF WATER SUPPLY

Water Source (% of users)	Port of Spain	San Fernando	Arima and environs	Rest of Trinidad	Tobago
In-house connection	**85**	**81**	**78**	**61**	**88**
Standpipe	**13**	**19**	**13**	**10**	**7**
Truck borne	2	-	2	5	-

Water Source (% of users)	Port of Spain	San Fernando	Arima and environs	Rest of Trinidad	Tobago
Neighbour	-	-	4	10	5
Rainwater	-	-	2	13	-
Other	-	-	1	1	-

Notes:
Bold type indicates water supplied by WASA

RELIABILITY OF SUPPLY BY CUSTOMER CLASS

Class of Supply	Hours per week in which water is available	Percentage of respondents in class
Class I	168	27%
Class II	120 – 168	7%
Class III	84 – 120	11%
Class IV	48 – 84	11%
Class V	0 – 48	44%

RELIABILITY OF SUPPLY BY INCOME GROUP

Income group	Class I	Class II	Class III	Class IV	Class V
Low	24 %	6 %	10 %	10 %	50 %
Middle	26 %	8 %	13 %	13 %	40 %
Upper	45 %	7 %	14 %	5 %	29 %

Notes:
Low income - less than TT$ 1500 per month
Middle income – TT$ 1500 to TT$ 5500 per month
Upper income – greater than TT$ 5500

BILLING – WATER SERVICES

Customer class	Number of Respondents	Average Billing (Survey)	Water tariffs (WASA)
A1 – Standpipe	27	$53	$33.75

A2 – Externally Serviced	67	$100	$67.50
A3 – Internally Serviced (no metering)	465	$169	Varies[a]
A4 – Internally serviced (metered)	6	$272	Varies[b]

Notes:

a. – A3 rate depends on the Annual Taxable Value of the building (ATV) and varies between $108 and $270 per quarter

b. – A4 rate is a two block volumetric rate: $1.75/$m^3$ for the first 150 m^3, $3.50/$m^3$ after.