

## 6 References

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**Research Study on ‘Development of Performance Evaluation Index of  
Community Water Systems in Sri Lanka’**

Dear Madam/Sir,

I, the undersigned, am a postgraduate student reading for Master of Science in Construction Project Management at the University of Moratuwa. The questionnaire attached hereto is part of the captioned research study that I have been engaged in as a partial fulfillment of the said Degree programme.

The information collected through this questionnaire will be the basis for development of the Performance Indicators and Composite Index to evaluate the Performance of Community Water Systems in Sri Lanka. The Performance Indicators identified and presented in this questionnaire have been identified through a primary semi-structured survey with experts in the water sector. The main objective of this questionnaire is to evaluate those identified Indicators with respect to their importance and practicality under existing and real circumstances under which these Community Water Systems operate.

Hence I would greatly appreciate if you could spend few minutes of your valuable time to fill in the questionnaire. Your identity will remain strictly confidential to any third party unless you wish to remain identified by writing your details voluntarily in the blank space at the end of questionnaire. Also the information will be used solely for the academic purpose only and not for any commercial purpose.

Thanking you,

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(for identity verification, if  
required)

## Questionnaire Survey Form:

For each Indicator, mark 'v' in the relevant cage for the option that best reflects your understanding with respect to the Indicators' **IMPORTANCE** and **PRACTICALITY**.

Interpretations:

**IMPORTANCE:** An indicator is important if it is needed to make confident decisions about performance of water system

**PRACTICALITY:** An indicator is practical if necessary data can be obtained in a timely way and at a reasonable cost.

Note: Please indicate the level of **IMPORTANCE** and **PRACTICALITY** of the selected '**Evaluation Category**' (ie; SECTION 1: SERVICE COVERAGE PERFORMANCE), also. You can use the respective caging, provided along the same row of the category title in the 'grey area' at the top. This will be used to evaluate if the selected Category (which is already decided through semi-structured surveys, is really needed for the performance evaluation of the CWS under real circumstances.

SECTION 1: SERVICE COVERAGE PERFORMANCE INDICATORS																				
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE						PRACTICALITY										
				Not at all important (1)	Not very important (2)	Somewhat important (3)	Very important (4)	Extremely important (5)	Not at all practical (1)	Not very practical (2)	Somewhat practical (3)	Very practical (4)	Extremely practical (5)							
1.1	Water supply coverage	$\left[ \frac{\text{population with access to improved water}}{\text{total population}} \times 100 \right]$	%																	
1.2	Household working supply coverage	$\left[ \frac{\text{households with access to improved water}}{\text{total households within system coverage}} \times 100 \right]$	%																	
1.3	Stand post coverage	$\left[ \frac{\text{population served by standpipes}}{\text{total population}} \times 100 \right]$	%																	

SECTION 2: WATER CONSUMPTION & PRODUCTION PERFORMANCE INDICATORS																			
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE						PRACTICALITY									
				Not at all important (1)	Not very important (2)	Somewhat important (3)	Very important (4)	Extremely important (5)	Not at all practical (1)	Not very practical (2)	Somewhat practical (3)	Very practical (4)	Extremely practical (5)						
2.1	Water production per person	$\left[ \frac{\text{total annual water produced}}{\text{total population} \times 365 \text{ days}} \right]$	Litres/person/day																
2.2	Water production per connection	$\left[ \frac{\text{total annual water produced}}{\text{total connections} \times 12 \text{ months}} \right]$	m <sup>3</sup> /connection/month																
2.3	Distribution storage per person	$\left[ \frac{\text{total volume of water storage in distribution}}{\text{total population} \times 365 \text{ days}} \right]$	Litres/person/day																
2.4	Distribution storage per connection	$\left[ \frac{\text{total volume of water storage in distribution}}{\text{total connections} \times 12 \text{ months}} \right]$	m <sup>3</sup> /connection/month																
2.5	Water consumption per person	$\left[ \frac{\text{total volume of water sold}}{\text{total population} \times 365 \text{ days}} \right]$	Litres/person/day																
2.6	Water consumption per connection	$\left[ \frac{\text{total volume of water sold}}{\text{total connections} \times 12 \text{ months}} \right]$	m <sup>3</sup> /connection/month																



<b>SECTION 3: NON-REVENUE WATER PERFORMANCE INDICATORS</b>																			
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE					PRACTICALITY										
				Not at all important (1)	Not very important (2)	Somewhat important (3)	Very important (4)	Extremely important (5)	Not at all practical (1)	Not very practical (2)	Somewhat practical (3)	Very practical (4)	Extremely practical (5)						
3.1	NRW per Supply	$\left[ \frac{\text{total volume of water (Supplied - Sold)}}{\text{total volume of water supplied}} \times 100 \right]$	%																
3.2	NRW per Distribution pipe length	$\left[ \frac{\text{total volume of water (Supplied - Sold)}}{\text{total length of distribution system}} \times 365 \text{ days} \right]$	m <sup>3</sup> /km/day																
3.3	NRW per Connection	$\left[ \frac{\text{total volume of water (Supplied - Sold)}}{\text{total connections}} \times 365 \text{ days} \right]$	m <sup>3</sup> /connection/day																

SECTION 4: METERING PRACTICES PERFORMANCE INDICATORS																				
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE						PRACTICALITY										
				Not at all important (1)	Not very important (2)	Somewhat important (3)	Very important (4)	Extremely important (5)	Not at all practical (1)	Not very practical (2)	Somewhat practical (3)	Very practical (4)	Extremely practical (5)							
4.1	Metered connection coverage	$\left[ \frac{\text{total number of metered connections}}{\text{total number of connections}} \times 100 \right]$	%																	
4.2	Metered water sold	$\left[ \frac{\text{total volume of metered} - \text{water sold}}{\text{total volume of water sold}} \times 100 \right]$	%																	
4.3	Estimated billing level	$\left[ \frac{\text{total no of estimated bills}}{\text{total number of bills}} \times 100 \right]$	%																	
4.4	Estimated billing consumption	$\left[ \frac{\text{total volume of estimated} - \text{water sold}}{\text{total volume of water sold}} \times 100 \right]$	%																	
4.5	Defective meter level	$\left[ \frac{\text{total number of defective meters}}{\text{total number of meters}} \times 100 \right]$	%																	
4.6	Defective meter replacement efficiency	$\left[ \frac{\text{total number of defective meters replaced}}{\text{total number of defective meters}} \times 100 \right]$	%																	
4.7	Unmetered connection level	$\left[ \frac{\text{total number of unmetered connections}}{\text{total number of connections}} \times 100 \right]$	%																	
4.8	Meter testing for accuracy	$\left[ \frac{\text{total number of meters tested for accuracy}}{\text{total number of meters}} \times 100 \right]$	%																	

SECTION 4: METERING PRACTICES PERFORMANCE INDICATORS																				
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE						PRACTICALITY										
				Not at all important (1)	Not very important (2)	Somewhat important (3)	Very important (4)	Extremely important (5)	Not at all practical (1)	Not very practical (2)	Somewhat practical (3)	Very practical (4)	Extremely practical (5)							
4.9	Meter reader efficiency	$\left[ \frac{\text{total number of meters read during the year}}{\text{total number of meter readers} \times 365 \text{ days}} \right]$	Nos./day/reader																	

SECTION 5: PIPED NETWORK PERFORMANCE INDICATORS																				
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE						PRACTICALITY										
				Not at all important (1)	Not very important (2)	Somewhat important (3)	Very important (4)	Extremely important (5)	Not at all practical (1)	Not very practical (2)	Somewhat practical (3)	Very practical (4)	Extremely practical (5)							
5.1	Pipe beaks rate	$\left[ \frac{\text{total number of pipe breaks during the year}}{\text{total length of distribution system in km}} \right]$	Breaks/km/year																	
5.2	Leakage repair rate	$\left[ \frac{\text{total number of leaks repaired}}{\text{total number of leaks reported}} \times 100 \right]$	%																	
5.3	Leakage repair cost	$\left[ \frac{\text{cost of leakage repair works during the year}}{\text{total length of distribution system in km}} \right]$	Rs./km/year																	

SECTION 6: COST & STAFFING PERFORMANCE INDICATORS																				
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE					PRACTICALITY											
				(1) Not at all important	(2) Not very important	(3) Somewhat important	(4) Very important	(5) Extremely important	(1) Not at all practical	(2) Not very practical	(3) Somewhat practical	(4) Very practical	(5) Extremely practical							
6.1	Unit operational cost of water sold	$\left[ \frac{\text{total annual operational expenses}^*}{\text{total annual volume of water sold}} \right]$	Rs./m <sup>3</sup> sold																	
6.2	Unit operational cost of water produced	$\left[ \frac{\text{total annual operational expenses}^*}{\text{total annual volume of water produced}} \right]$	Rs./m <sup>3</sup> sold																	
6.3	Staff per thousand connections	$\left[ \frac{\text{total number of staff}}{\text{total number of connections in '000}} \right]$	Nos./'000 connections																	
6.4	Staff per thousand population served	$\left[ \frac{\text{total number of staff}}{\text{total population in '000}} \right]$	Nos./'000 population																	
6.5	Water sold per year per staff	$\left[ \frac{\text{total annual volume of water sold}}{\text{total number of staff}} \right]$	m <sup>3</sup> /staff/year																	
6.6	Cost of Direct work	$\left[ \frac{\text{cost of O\&M work carried out by community}}{\text{total annual O\&M cost}} \times 100 \right]$	%																	
6.7	Cost of Managed work	$\left[ \frac{\text{cost of O\&M work carried out by thirdparty}}{\text{total annual O\&M cost}} \times 100 \right]$	%																	

SECTION 6: COST & STAFFING PERFORMANCE INDICATORS																
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE					PRACTICALITY							
				Not at all important	Not very important	Somewhat important	Very important	Extremely important	Not at all practical	Not very practical	Somewhat practical	Very practical	Extremely practical			
6.8	O&M financial expenditure per connection	$\left[ \frac{\text{total cost of O\&M activities}}{\text{total number of connections}} \right]$	Rs./connection													
6.9	Staff cost vs. operational cost	$\left[ \frac{\text{total annual staff cost (including benefits)}}{\text{total annual O\&M cost}} \times 100 \right]$	%													
6.10	Electrical cost vs. operational cost	$\left[ \frac{\text{total annual electrical energy cost}}{\text{total annual O\&M cost}} \times 100 \right]$	%													

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SECTION 7: SERVICE QUALITY PERFORMANCE INDICATORS																				
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE					PRACTICALITY											
				Not at all important (1)	Not very important (2)	Somewhat important (3)	Very important (4)	Extremely important (5)	Not at all practical (1)	Not very practical (2)	Somewhat practical (3)	Very practical (4)	Extremely practical (5)							
7.1	Water supply reliability	$\left[ \frac{\text{total hours of uninterrupted service}}{365 \text{ days} \times 24 \text{ hrs}} \times 100 \right]$	%																	
7.2	Customers with discontinuous supply	$\left[ \frac{\text{connections with discontinuous supply}}{\text{total connections}} \times 100 \right]$	%																	
7.3	Water quality – Physical	$\left[ \frac{\text{number of water samples passed}}{\text{total samples tested}} \times 100 \right]$	%																	
7.4	Water quality – Chemical	$\left[ \frac{\text{number of water samples passed}}{\text{total samples tested}} \times 100 \right]$	%																	
7.5	Water quality – Biological	$\left[ \frac{\text{number of water samples passed}}{\text{total samples tested}} \times 100 \right]$	%																	
7.6	Water complaints received	$\left[ \frac{\text{number of complaints received}}{\text{total number of connections}} \times 100 \right]$	%																	
7.7	New connection response	$\left[ \frac{\text{cumulative number of days to connect to system}}{\text{total number of new connections}} \right]$	Days																	

SECTION 7: SERVICE QUALITY PERFORMANCE INDICATORS																				
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE						PRACTICALITY										
				Not at all important (1)	Not very important (2)	Somewhat important (3)	Very important (4)	Extremely important (5)	Not at all practical (1)	Not very practical (2)	Somewhat practical (3)	Very practical (4)	Extremely practical (5)							
7.8	New connection waiting list	$\left[ \frac{\text{number of outstanding new connections}}{\text{total number of new connections}} \times 100 \right]$	%																	
7.9	Problems solved by internal actions	$\left[ \frac{\text{no. of problems solved by people themselves}}{\text{total number of problems}} \times 100 \right]$	%																	
7.10	Water supply reliability	$\left[ \frac{\text{total hours of uninterrupted service}}{365 \text{ days} \times 24 \text{ hrs}} \times 100 \right]$	%																	

SECTION 8: BILLING & COLLECTION PERFORMANCE INDICATORS																				
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE						PRACTICALITY										
				Not at all important (1)	Not very important (2)	Somewhat important (3)	Very important (4)	Extremely important (5)	Not at all practical (1)	Not very practical (2)	Somewhat practical (3)	Very practical (4)	Extremely practical (5)							
8.1	Avg. revenue per water volume sold	$\left[ \frac{\text{total annual operating revenue}}{\text{total volume of water sold}} \times 100 \right]$	Rs/m <sup>3</sup> water sold																	

<b>SECTION 8: BILLING &amp; COLLECTION PERFORMANCE INDICATORS</b>																				
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE					PRACTICALITY											
				Not at all important (1)	Not very important (2)	Somewhat important (3)	Very important (4)	Extremely important (5)	Not at all practical (1)	Not very practical (2)	Somewhat practical (3)	Very practical (4)	Extremely practical (5)							
8.2	Avg. revenue per connection	$\left[ \frac{\text{total annual operating revenue}}{\text{total number of connections}} \times 100 \right]$	Rs/connection/year																	
8.3	Average tariff	$\left[ \frac{\text{sum of revised tariff of unit volume of water}}{\text{total number of revisios}} \times 100 \right]$	Rs./m <sup>3</sup>																	
8.4	Residential fixed component of tariff	$\left[ \frac{\text{avg. of fixed component of residential tariff}}{\text{average tariff}} \times 100 \right]$	%																	
8.5	Collection period	$\left[ \frac{\text{year end accounts receivable}}{\text{total annual operating income}} \times 365 \right]$	Days																	
8.6	Collection ratio	$\left[ \frac{\text{cash income}}{\text{total billed revenue}} \times 100 \right]$	%																	
8.7	Late payments	$\left[ \frac{\text{total of arrear payments}}{\text{total sales}} \times 100 \right]$	%																	



SECTION 9: FINANCIAL PERFORMANCE INDICATORS																				
Questionnaire Reference	Indicator	Formulae	Unit	IMPORTANCE					PRACTICALITY											
				Not at all important (1)	Not very important (2)	Somewhat important (3)	Very important (4)	Extremely important (5)	Not at all practical (1)	Not very practical (2)	Somewhat practical (3)	Very practical (4)	Extremely practical (5)							
9.1	Operating cost coverage	$\left[ \frac{\text{total of annual operating revenues}}{\text{total annual operating costs}} \times 100 \right]$	ratio																	
9.2	Debt service ratio	$\left[ \frac{\text{total of cash income}}{\text{total of debt service}} \times 100 \right]$	%																	
9.3	Cost recovery ratio	$\left[ \frac{\text{total of (tariff revenue + subsidies + others)}}{\text{total of O\&M costs}} \times 100 \right]$	Ratio																	
9.4	Profit (Loss)	$\left[ \frac{\text{total of annual (sales - expenditure)}}{\text{total of sales}} \times 100 \right]$	%																	



