

**IMPROVING DISTRIBUTION RELIABILITY  
THROUGH ELECTRICITY TARIFF AND THEIR  
FINANCIAL IMPLICATIONS**

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## **DECLARATION**

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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(Dr. Asanka Rodrigo)

## **ABSTRACT**

Under price and revenue cap regulations, utilities are encouraged to minimize their costs which may even result low reliability. As the reliability of electricity supply has a very high impact on the country's economy as well as quality of life of people, regulators are required to address reliability at electricity tariff setting. The objective of this study is to identify different approaches the other countries use to provide incentives for distribution reliability improvement through electricity tariff and also to identify potential financial implications such mechanisms may have on the distribution utilities. These aspects are morefully described in Chapter 1.

Chapter 2, 3 and 4, respectively includes an extensive literature review including the distribution reliability regulation mechanisms adopted by India, Philippine, Australia, Hungary and Great Britain, the mechanism identified in the Distribution Performance Standards Regulations (DPSR) of Sri Lanka and a mathematical reliability based pricing model called 'Joint Pricing Model'.

Most of the countries use two incentive mechanisms, to provide incentives to improve the overall reliability of the utility and to compensate individual customers for poor service. Further, incentive mechanism is based on reliability target setting and measuring the utilities performance relative to the targets, where most of the countries set targets based on the historical performance of the utility.

Based on overall reliability, most countries have mechanisms to provide a bonus for achieving the performance targets and a penalty otherwise and to compensate individual customers, all the countries studied use Guaranteed Service Levels (GSL) mechanism, where the customers are entitled to a direct payment if the reliability of their supply is poorer than the GSL. Further, the GSL payment rates are specified in the regulatory instrument (eg. regulation) itself.

Chapter 5 gives the study methodology, which is formulated based on the findings of Chapter 2, 3 and 4. Further, based on the study methodology the financial implications on the distribution utilities under different incentive mechanisms are estimated, using distribution areas of Lanka Electricity Company as an example. The calculations of financial implications are given in Chapter 6.

Chapter 7 gives a summary of the financial impact under each incentive mechanism and a further discussion on the incentive mechanisms. Chapter 8 gives the recommendations based on the study and the future work required in the area of study is given in Chapter 8.

**Keywords:** Distribution Reliability, Financial Incentives, Tariff, Penalty, Bonus

## DEDICATION

To my mother Mrs. Ramya Krunasena  
and my father Mr. Ananda Nagasinghe  
who made many sacrifices  
to make me who I am today.

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## CONTENTS

DECLARATION .....	i
ABSTRACT.....	ii
DEDICATION .....	iii
ACKNOWLEDGEMENT .....	iv
LIST OF FIGURES .....	viii
LIST OF TABLES .....	viii
LIST OF ABBREVIATIONS .....	x
1. INTRODUCTION .....	1
1.1. Background .....	1
1.2. Identification of the Problem.....	3
1.3. Objectives of the Study .....	3
2. LITERATURE REVIEW .....	4
2.1. India- Maharashtra Electricity Regulatory Commission.....	4
2.1.1. Reliability Indices .....	5
2.1.2. Exempted Events .....	5
2.1.3. Data Logging and Reporting.....	5
2.1.4. Reliability Standards .....	6
2.1.5. Compensation for Customers.....	6
2.1.6. Incentives for Distribution Licensees .....	7
2.2. Philippine .....	7
2.2.1. Reliability Indices .....	7
2.2.2. Exempted Events .....	8
2.2.3. Reliability Standards .....	8
2.2.4. Compensation for Customers.....	9
2.2.5. Incentives for Distribution Licensees .....	10
2.3. Australia .....	10
2.3.1. Reliability Indices .....	11
2.3.2. Exempted Events .....	11
2.3.3. Reliability Standards .....	12
2.3.4. Compensation for Customers.....	13

2.3.5.	Incentives for Distribution Licensees .....	13
2.4.	Great Britain .....	14
2.4.1.	Reliability Indices .....	14
2.4.2.	Exempted Events .....	15
2.4.3.	Reliability Standards .....	16
2.4.4.	Compensation for Customers.....	16
2.4.5.	Incentives for Distribution Licensees .....	17
2.5.	Hungary .....	18
2.5.1.	Governance .....	18
2.5.2.	Reliability Indices .....	18
2.5.3.	Exempted Events .....	19
2.5.4.	Reliability Standards .....	20
2.5.5.	Compensation for Customers.....	21
2.5.6.	Incentives for the Distribution Licensees .....	21
2.6.	Summary of International Best Practices .....	22
3.	<b>ELECTRICITY DISTRIBUTION PERFORMANCE STANDARDS REGULATIONS OF SRI LANKA .....</b>	<b>25</b>
3.1.	Review of Regulations on Reliability .....	25
3.1.1.	Reliability Indices .....	25
3.1.2.	Exempted Events .....	26
3.1.3.	Reliability Standards .....	26
3.1.4.	Compensation for not achieving Individual Performance Targets .....	27
3.1.5.	Incentives for Distribution Licensees .....	28
3.1.5.1.	Compensation based on SAIDI and SAIFI .....	28
3.1.5.2.	Compensation for ENS.....	29
3.1.5.3.	Compensation for MAIFI.....	30
3.2.	Comparison with International Best Practices .....	30
4.	<b>JOINT PRICING MODEL .....</b>	<b>33</b>
4.1.	Differentiating Tariff Rates based on Individual Reliability Indices- Value Engineering Theory .....	33
4.2.	Combining the Differentiated Tariff rates, by Calculating Weights and taking the Weighted Average- Joint Pricing .....	34
4.2.1.	Multi index Entropy Weighing Method.....	35

4.2.1.1.	Steps for calculating weights.....	35
5.	STUDY METHODOLOGY .....	36
6.	CASE STUDY: LECO DISTRIBUTION AREAS .....	40
6.1.	Performance Indices .....	40
6.2.	Setting Performance Targets .....	41
6.3.	Comparison of Targets Vs. Actuals .....	43
6.4.	Determining the Financial Impact under each Incentive Mechanism.....	45
6.4.1.	Charging a penalty for not achieving performance targets .....	45
6.4.1.1.	Supply cost calculation.....	45
6.4.1.2.	SAIDI based penalty .....	47
6.4.1.3.	SAIFI based penalty, .....	48
6.4.2.	Penalty or bonus mechanism.....	50
6.4.2.1.	SAIDI based bonus/ penalty.....	50
6.4.2.2.	SAIFI based bonus / penalty .....	51
6.4.3.	Compensation for individual customers .....	53
6.4.3.1.	Supply Cost .....	53
6.4.3.2.	Compensation calculation .....	53
6.4.4.	Differentiated electricity tariff based on Joint Pricing Model .....	55
6.4.4.1.	Differentiating tariff rates - Value Engineering Theory.....	55
6.4.4.2.	Calculation of weights using Entropy Method.....	58
6.4.4.3.	Combining the differentiated tariff rates-Joint Pricing .....	60
7.	COMPARISON OF RESULTS AND DISCUSSION.....	63
7.1.	Comparison of Results .....	63
7.2.	Discussion .....	64
7.2.1.	Individual Compensation Mechanism .....	64
7.2.2.	Penalty Only Mechanism .....	65
7.2.3.	Penalty or Bonus Mechanism .....	66
7.2.4.	Differentiated Tariff under Joint Pricing Model .....	67
8.	RECOMMENDATIONS .....	68
9.	FUTURE WORK.....	70
	REFERENCES LIST .....	71



## LIST OF FIGURES

Figure 5-1: Study Methodology .....	36
Figure 6-1: Comparison of Target Vs Actual of SAIDI 2015 .....	44
Figure 6-2: Comparison of Target Vs Actual of SAIFI 2015 .....	44
Figure 6-3: Breakdown of 2015 electricity Cost in LKR millions .....	45
Figure 7-1: Comparison of Financial Implications .....	63

## LIST OF TABLES

Table 2-1: Reliability Indices- Maharashtra, India .....	5
Table 2-2: Reliability GSL Standards- Maharashtra, India .....	6
Table 2-3: Payments under GSL scheme- Maharashtra, India .....	6
Table 2-4: Accuracy Level and the percentage of GSL payment that can be recovered through tariff- Maharashtra, India .....	7
Table 2-5: Reliability Indices- Philippine .....	8
Table 2-6: Reliability Indices- Australia .....	11
Table 2-7: GSL standards for reliability-Australia .....	12
Table 2-8: GSL payments for reliability- Australia .....	13
Table 2-9: Reliability Indices- Great Britain .....	15
Table 2-10: Performance thresholds for Reliability GSL scheme- Great Britain.....	16
Table 2-11: Payments under GSL scheme- Great Britain .....	17
Table 2-12: Summary of the International Best Practices .....	22
Table 3-1: Reliability indices- DPSR .....	25
Table 6-1: SAIDI, SAIFI and CAIDI data for LECO for 2013-2015 .....	41
Table 6-2: Performance targets for 2015 .....	42
Table 6-3: SAIDI targets for Transmission Licensee (CEB) and LECO .....	43
Table 6-4: SAIFI targets for Transmission Licensee (CEB) and LECO .....	43
Table 6-5: Unit Supply Cost calculation .....	47
Table 6-6: Calculation of penalty based on SAIDI .....	48
Table 6-7: Calculation of penalty based on SAIFI .....	48
Table 6-8: Actual revenue reduction (penalty) based on SAIDI/ SAIFI .....	49

Table 6-9: Financial Implications on the utility under penalty only method.....	49
Table 6-10: Calculation of penalty/ bonus based on SAIDI .....	51
Table 6-11: Calculation of penalty/ bonus based on SAIFI.....	51
Table 6-12: Actual Penalty/ Bonus based on SAIDI and SAIFI .....	52
Table 6-13: Financial implications on the utility on Penalty/ Bonus incentive method .....	52
Table 6-14: Financial implications on the utility on compensation payment for customers .....	54
Table 6-15: Financial implications on the utility when penalty is applied on top of compensation payment for individual customers.....	55
Table 6-16: Financial implications on the utility when either penalty or bonus is applied on top of compensation payment for customers.....	55
Table 6-17: Calculation of component of unit cost vary with the reliability.....	56
Table 6-18: SAIDI based tariff differentiation .....	57
Table 6-19: SAIFI based tariff differentiation .....	58
Table 6-20: Entropy Method- Step 1 .....	58
Table 6-21: Entropy Method- Step 2 .....	59
Table 6-22: Entropy Method- Step 3 .....	59
Table 6-23: Entropy Method- Step 4 .....	60
Table 6-24: Entropy Method- Step 5 .....	60
Table 6-25: Calculation of Joint Pricing .....	61
Table 6-26: Ratio Calculation .....	61
Table 6-27: Profit/ Loss to CEB and LECO .....	62
Table 7-1: Comparison of financial implications to the utility under each incentive mechanism .....	63

## **LIST OF ABBREVIATIONS**

Abbreviation	Description
CEB	Ceylon Electricity Board
ARR	Annual Revenue Requirement
CAIDI	Customer Average Interruption Duration Index
CBD	Central Business District
CI	Number of Customers Interrupted per 100 Customers (100xSAIFI)
CML	Average Minutes without Power per Customer (SAIDI).
DPSR	Distribution Performance Standards Regulations of Sri Lanka
ENS	Energy Not Supplied
GSL	Guaranteed Service Level
LECO	Lanka Electricity Company
MAIFI	Momentary Average Interruption Duration Index
NER	National Energy Rules
Ofgem	Office of Gas and Electricity Markets
PUCSL	Public Utilities Commission of Sri Lanka
SAIDI	System Average Interruption Frequency Index
SAIFI	System Average Interruption Duration Index
STPIS	Service Target Performance Incentive Scheme
WTP	Willingness To Pay