

CONTENTS

| | |
|--|------|
| APPROVAL PAGE | iii |
| SELF DECLARATION AGAINST PLAGIARISM | iv |
| ABSTRACT | v |
| ACKNOWLEDGMENTS | vi |
| DEDICATION | vii |
| PREFACE | viii |
| CONTENTS | ix |
| LIST OF TABLES | xi |
| LIST OF FIGURES | xiii |
| CHAPTER I Introduction | 15 |
| 1.1 Background | 15 |
| 1.2 Statement of the Problem | 23 |
| 1.3 Objectives | 23 |
| 1.4 Scope and Delimitation | 24 |
| 1.5 Hypothesis | 24 |
| 1.6 Research Metodology | 25 |
| CHAPTER II Literature Review | 27 |
| 2.1 IoT (Internet Of Things) | 27 |
| 2.2 IoT Connectivity Technology | 29 |
| 2.3 Long Range Wide Area Network (LoRaWAN) | 29 |
| 2.3.1 LoRaWAN Architecture | 31 |
| 2.3.2 Advantages and disadvantages of using LPWAN especially LoRaWAN | 34 |
| 2.3.3 Smart Meter Device | 35 |
| 2.4 Techno Economic Analysis (TEA) | 35 |
| 2.5 Regulatory Aspect | 36 |
| 2.6 Technical Aspect | 38 |
| 2.6.1 Capacity Planning Aspect | 39 |
| 2.6.2 Coverage Planning Aspect | 39 |
| 2.7 Economy Aspect..... | 41 |

| | | |
|------------------------|---|------------|
| 2.7.1 | Cost Structure..... | 41 |
| 2.7.2 | Economy Feasibility Indicator | 42 |
| CHAPTER III | Method and Scenario of Smart Metering..... | 44 |
| 3.1 | Research Frame Work | 44 |
| 3.2 | System Model Smart Metering for Electricity | 46 |
| 3.2.1 | Smart Metering Technical Requirement | 46 |
| 3.3 | Research Scenario | 47 |
| 3.3.1 | Research Area | 48 |
| 3.4 | Model TEA..... | 52 |
| 3.4.1 | Technical Feasibility | 53 |
| 3.4.2 | Economic Feasibility..... | 57 |
| 3.4.3 | Regulation Feasibility | 60 |
| CHAPTER IV | Feasibility Analysis..... | 61 |
| 4.1 | Technical Analysis | 61 |
| 4.1.1 | Calculation for IoT Network Planning..... | 61 |
| 4.1.2 | Network Planning Simulation | 73 |
| 4.2 | Economic Analysis | 85 |
| 4.2.1 | Cost Structure..... | 86 |
| 4.2.2 | Economic Feasibility Analysis..... | 95 |
| 4.2.3 | Key Decisions Criteria for Smart Metering Electricity | 100 |
| 4.3 | Regulation Analysis | 102 |
| CHAPTER V | Conclusion and Recommedantion | 107 |
| 5.1 | Conclusion and Recommendation | 107 |
| 5.2 | Recommendations | 109 |
| 5.3 | Future Works | 109 |
| REFERENCES..... | | 110 |
| APPENDIX | | 114 |