UNIVERSITY OF CO-OPERATIVE AND MANAGEMENT, SAGAING

DEPARTMENT OF CO-OPERATIVE STUDIES

HUMAN RESOURCE DEVELOPMENT PROGRAMME

MASTER OF PUBLIC ADMINISTRATION

A STUDY ON OPPORTUNITIES AND CHALLENGES OF SMART METER IMPLEMENTATION IN DEKKHINA THIRI TOWNSHIP, NAY PYI TAW

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2MPA – 42

JUNE, 2025

A STUDY ON OPPORTUNITIES AND CHALLENGES OF SMART METER IMPLEMENTATION IN DEKKHINA THIRI TOWNSHIP, NAY PYI TAW

A Thesis is submitted to the Board of Examiners in Partial Fulfillment of the Requirements for the Degree of Master of Public Administration. (MPA)

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JUNE, 2025

ACCEPTANCE

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JUNE, 2025

ABSTRACT

This study explores the public opportunities and challenges involved in implementing Advanced Metering Infrastructure (AMI), commonly known as smart meters, in Dekkhina Thiri Township, Nay Pyi Taw, Myanmar. The data source used in this study was primary and secondary data. The primary data were collected from smart user in Dekkhina Thiri Township. The sampling technique used for this study was simple random sampling. To collect primary data, 215 smart users selected from 958 smart users in Dekkhina Thiri Township. The personal interviews were conducted face to face interview method with questionnaires. The collected data were analyzed by descriptive and Multiple linear regression analysis. Findings revealed that education, income, and digital literacy significantly shape acceptance and understanding of the technology. While many respondents recognized benefits such as real-time monitoring, transparent billing, and improved energy efficiency, concerns emerged about installation costs, technical reliability, and data security. The study concludes that successful deployment of AMI requires not only technological readiness but also robust public communication, targeted education programs, and policies addressing affordability and trust. Recommendations include expanding awareness campaigns, enhancing technical support, and providing financial assistance to lower-income households to ensure equitable access to the benefits of smart metering.

ACLNOWLEDGEMENTS

This thesis was done at University of Co-operative and Management, Sagaing. I have received an excellent guidance. I appreciate all the supports that I got and the inspiration during my study.

At the beginning I would like to acknowledge my indebtedness to Dr. Moe Moe Yee, Rector of University of Co-operative and Management, Sagaing for acknowledging me to implement this study as a partial fulfillment of Master of Public Administration.

I would also like to express my appreciation and thanks to Professor Dr. Yi Aye, Rector (Retired) and Visiting Professor, University of Co-operative and Management, Sagaing, Professor Dr. Ni Ni Aung, Pro Rector (Retired), Monywa University of Economics, Professor Dr. Cho Cho Wai, Visiting Professor, University of Co-operative and Management, Sagaing.

I would like to express my appreciation to Professor Dr. Kyi Kyi Win, Programme Director and Head of Department of Co-operative Studies for her valuable time and guidance.

I would like to give special thanks for my supervisor Daw Soe Yu Nwe, she gave me a full supports from every aspects. Under her guidance I could have a very clear clue to work on the project and figure out the problems occurred in my study. Besides my supervisor, I would like to thank all the teachers who supported my study and helped me. I could not successfully complete my study without their guidance and help. Thanks for this great opportunity that I could get the chance to do this project which gave me a lot of treasure practicing experiences in my future career.

I would like to thank the staff of the Electricity Office for their assistance in exploring the challenges and opportunities associated with the implementation of Advanced Metering Infrastructure (AMI), also known as smart meters, in Dakkhina thiri Township. I would also like to thank the respondents from Shwe In Kyin Ward and Shwe Kyar Pin Ward for their generous assistance.

I would like to thank all the members of my teams at Group 5 and at Thesis team members. After study and test I got to know clearly on how to move forward. It is their kind supports that have made my study and life a wonderful time. Their immense knowledge and plentiful experience have encouraged me in all the time of my academic research and daily life.

Finally, my appreciation also goes out to my family and friends for their encouragement and support all through my studies and I thank my family for their financial support for the MPA. They support me all the time to complete my study. Also, to all the others who accompanied me during my study life, you gave me a wonderful and memorable time in my life.

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LIST OF ABBREVIATIONS

AMI	Advanced Metering Infrastructure
ESE	Electricity Supply Enterprise
YESC	Yangon Electricity Supply Corporation
MESC	Mandalay Electricity Supply Corporation
MOEP	Ministry of Electricity Power
EPGE	Electric Power Generation Enterprise
MEBILL	Myanmar Electricity Billing Mobile Application
MEB	Myanmar Electricity Billing
kWh	Kilowatt-hour
SPSS	Statistical Package for the Social Sciences
UNDP	United Nations Development Programme
SMNP	Smart Meter National Programme
DCUs	Data Concentrator Units
PPPs	Public-Private Partnerships
SMAA	Stochastic Multi-criteria Acceptability Analysis
AHP	Analytic Hierarchy Process
IEA	International Energy Agency
OMR	Off-site Meter Reading
RF	Radio Frequency
MDMS	Meter Data Management System
ADB	Asian Development Bank
JICA	Japan International Cooperation Agency
PLC	Power Line Communication
GSM	Global System for Mobile Communication
SCADA	Supervisory Control and Data Acquisition
IT	Information Technology
ASEAN	Association of Southeast Asian Nations
IoT	Internet of Things
INGO	International Non-governmental organization
NGO	Non-governmental Organization
VIF	Variance Inflation Factor

CHAPTER 1

INTRODUCTION

The rapid advancement of digital technologies has significantly influenced the energy sector, particularly through the adoption of Advanced Metering Infrastructure (AMI). As countries seek to modernize their power systems and enhance service efficiency, AMI has emerged as a key tool in achieving reliable, transparent, and sustainable electricity management. The installation of AMI smart meters capable of two-way communication between consumers and utilities has transformed the way electricity consumption is monitored and billed.

The earliest and most prominent implementation of AMI technology took place in countries such as Italy, the United States, and Sweden. Italy was among the first to roll out a nationwide AMI project in the early 2000s, led by the utility company Enel. This initiative successfully reduced electricity theft, lowered operational costs, and provided more accurate and timely billing for customers. In the United States, AMI has played a crucial role in supporting demand response programs, improving outage detection, and promoting energy conservation behaviors among consumers. Similarly, in Sweden, the adoption of smart meters facilitated hourly billing and enhanced the integration of renewable energy sources into the national grid.

Beyond these early adopters, numerous countries have followed suit, recognizing the substantial benefits offered by smart meters. AMI implementation has contributed to increased grid reliability, better energy demand forecasting, and more efficient utility operations. For consumers, the technology enables greater control over energy usage, cost savings through real-time consumption monitoring, and improved transparency in billing practices.

In Myanmar, the government has played a key role in guiding the implementation of the AMI system, beginning with pilot projects in Yangon in 2017 and gradually expanding to Mandalay and Nay Pyi Taw. With guidance from national leadership, efforts are being made to extend smart metering to all provinces, emphasizing the long-term goal of reducing power losses and enhancing service quality. In the context of Myanmar, where energy infrastructure is still developing, the introduction of government smart meters particularly in regions like Dekkhina Thiri Township, Nay Pyi Taw marks a significant step toward modernizing the power distribution system. This study investigates the implementation of smart meters in this township, focusing on both the opportunities and challenges faced by the government and the public. By examining public awareness, trust, cost-effectiveness, and convenience, the research aims to provide insights into the effectiveness and future potential of AMI deployment in Myanmar.

1.1 Rationale of the Study

This research seeks to identify key factors influencing public opportunities and challenges, including trust in implementation of smart meter, cost, data privacy concerns, and perceived benefits, to provide actionable insights for policymakers to improve adoption and ensure a smooth transition to smart metering systems.

Trust in implementation of smart meter plays a critical role in the successful implementation of public service initiatives, such as smart metering in Dekkhina Thiri Township, Nay Pyi Taw. Public confidence in government institutions is built through reliable service quality, transparent communication, accountability, and responsiveness to citizens' needs. In the context of electricity services, trust ensures public cooperation, fosters adherence to regulations, and encourages constructive feedback, which is essential for service improvement. For smart metering initiatives, establishing trust is particularly crucial to gain public acceptance and ensure the system's long-term success.

Moreover, cultural and behavioral factors can influence acceptance. In some regions, long-standing habits of informal electricity use or mistrust in state institutions make it difficult to introduce new systems. Resistance may not stem from the technology itself, but rather from fear of change, lack of understanding, or perceived loss of control.

To address these issues, governments and utility providers must adopt a people centered approach. Community engagement, transparent communication, affordable pricing models, and hands-on training are essential to building acceptance. By addressing these challenges and leveraging smart meter opportunities, governments and utilities can unlock the potential for a more efficient, transparent, and sustainable energy system, benefiting both consumers and the nation. The study aims to explore public Opportunities and Challenges of government-led smart metering implementation, specifically focusing on Advanced Metering Infrastructure (AMI).With growing global emphasis on energy efficiency, AMI plays a critical role in enhancing energy management, reducing losses, and enabling real-time monitoring. However, public acceptance and understanding are crucial for successful implementation.

1.2 Objectives of the Study

The general objective of this study is centered on evaluating the implementation of government smart meters in Dekkhina Thiri Township, Nay Pyi Taw. The specific objectives are:

1. to study the characteristics of smart meter users in Dekkhina Thiri Township
2. to analyze opportunities and challenges of Advanced Metering Infrastructure (AMI)

1.3 Method of the Study

This study adopts a mixed-methods approach to assess public opportunities and challenges related to the government's smart meter implementation in Dekkhina Thiri Township, Nay Pyi Taw. The data source used in this study was primary and secondary data. The primary data were collected from smart user in Dekkhina Thiri Township. The sampling technique used for this study was simple random sampling. To collect primary data, 215 smart users selected from 958 smart users in Dekkhina Thiri Township. The personal interviews were conducted face to face interview method with questionnaires. The collected data were analyzed by descriptive and Multiple linear regression analysis. The secondary data was collected from academic papers, books, articles, and government reports.

1.4 Scope and Limitation of the Study

This study examines the experiences and opportunities and challenges of smart meter users in Dekkhina Thiri Township Township, Nay Pyi Taw, focusing on the opportunities and challenges of government smart meter implementation. A sample of 215 respondents out of the 958 electricity consumers were selected from Shwe InKyin and Shwe Kyar Pin wards with a 95% confidence level and a 6% margin of error. Conducted in February 2025, the study is limited to smart meter users and does not represent the views of conventional meter users or other regions in Myanmar. However, the findings offer valuable insights that may inform similar initiatives across the country.

1.5 Organization of the Study

This study consists of five chapters. Chapter 1 is the introduction which includes the rationale, objectives, method, scope and limitations and organization of the study. Chapter 2 is literature review, Public implementation and Acceptance of Smart Metering, Barriers to Smart Metering Adoption, Opportunities and Benefits, Review on Previous Studies and Conceptual Framework of the Study. Chapter 3 discuss Overview of AMI Meter System in Myanmar, Survey analysis is present in Chapter 4, which includes Survey Design of the study. Chapter 5 is conclusion, with findings and suggestions recommendations from the study.

CHAPTER 2
LITERATURE REVIEW

This chapter integrates the fundamental literature that is linked to the implementation of smart meter technology has gained widespread attention globally as an essential tool for modernizing energy management systems. Despite these advantages, smart metering initiatives in developing countries face distinct challenges. Infrastructure limitations, such as unstable internet connectivity, can hinder real-time data transmission, particularly in rural or remote areas. Economic constraints mean that even minimal upfront costs can become barriers for some households.

2.1 Emerging Smart Meters

Advanced metering infrastructure (AMI) is an integrated system of smart meters, communication networks, and data management systems, which facilitates two-way communication between the utilities and consumers. Smart meters form the core of an AMI. They measure energy flow like conventional electronic meters. The 'smart' component arises from their ability to collect and transmit the consumption and supply related data at specified time intervals, on a real-time basis. The data can be communicated through various channels and is stored in a centralized server, from where it can be extracted and analyzed to generate useful insights.

The AMI aids in the seamless operation of power utilities by facilitating higher billing efficiency through remote and accurate bill generation, enabling better network health through real-time monitoring of critical parameters, and improving service delivery through outage management system (CEA 2016). Utilities can also use the high-frequency consumption data for demand forecasting, predictive modeling, and to study peak demand patterns, which can assist them in infrastructure planning and cost-effective power procurements.

Smart meters form the basis of a smarter grid, which in turn offers a significantly high level of control and responsiveness to varying grid conditions. A smart grid would also enable higher penetration of distributed energy in the grid than would otherwise be possible. Even the customers could rely on smart meters for monitoring and managing their electricity demand and expenses. In short, besides facilitating efficiency in the meter to cash cycle, AMI offers multiple avenues for utilities for improved operations, planning, and facilitating the clean energy transition (Wood Mackenzie 2019).

2.2 Public Implementation and Acceptance of Smart Metering

The implementation of Advanced Metering Infrastructure (AMI) meters, also known as smart meters, marks a significant shift in electricity management, especially in developing countries. These systems not only modernize electricity metering but also support real-time monitoring, automatic billing, and greater energy efficiency. However, despite their technological advantages, the success of smart metering projects largely depends on public Implementation and acceptance.

Several key factors influence how the public perceives and accepts AMI meters. Among them, awareness and understanding of the technology play a critical role. Many users are unfamiliar with how smart meters work, leading to confusion and sometimes resistance. A lack of basic information regarding the system's benefits such as accuracy in billing, detection of power theft, and ease of payment can fuel distrust or skepticism.

Trust is another major component. Users must have confidence in both the technology and the institutions managing it. If the public perceives the utility provider or government as inefficient or untrustworthy, even a well-functioning system may be met with suspicion. Concerns over data privacy, for example, are common in various countries where smart meters are implemented.

Cost also directly affects Opportunities and Challenges. Although AMI meters ultimately help users monitor and manage their consumption better, the initial installation cost or changes in billing methods may be viewed negatively, particularly among lower-income households. If users are unaware of the long-term savings potential or if the cost structure is not communicated transparently, the technology may be seen as a financial burden.

Usability is equally important. Systems like the Mebill mobile application, which allow users to check electricity usage, pay bills, and receive updates through smartphones, significantly improve user experience. However, digital literacy and access to smartphones can be a barrier, particularly in rural or underdeveloped areas. For maximum acceptance, the system must be intuitive, accessible, and supported by user education.

Government intervention is crucial in shaping public attitudes toward smart metering. Clear, consistent communication from official sources helps build trust and understanding. Policies that support local production of AMI meters, such as the collaboration with Ever Meter Company, also reinforce national data security and economic development, both of which can positively influence public sentiment. In addition, enabling features such as remote disconnection for non-payment, fraud detection, and automated billing align with E-Government goals and demonstrate the government's commitment to modern public services. For older adults and those with low digital literacy, the transition can feel overwhelming and unnecessary.

Overcoming these social barriers requires targeted public education campaigns, community engagement, and technical support. The government and electricity providers must take an inclusive approach, ensuring that all citizens regardless of income level, education, or technological familiarity can understand and benefit from the system. From a technical perspective, AMI meter systems rely heavily on stable and secure infrastructure.

Data security is another major concern. As AMI systems handle sensitive information such as user identity, consumption patterns, and billing data, they become potential targets for cyber-attacks or misuse. While this helps mitigate foreign data access, it does not fully eliminate internal risks, particularly if cyber-security protocols are not rigorously enforced.

Lastly, policy and regulatory issues can slow down or obstruct the adoption of AMI systems. Lack of clear regulations, delayed policymaking, and insufficient coordination between governments departments often lead to implementation bottlenecks. Moreover, public trust in regulatory institutions plays a crucial role. If citizens perceive that smart meter installations lack transparency or are not accompanied by adequate accountability mechanisms, they may resist adoption.

To address these concerns, governments must establish clear guidelines regarding data protection, billing transparency, and consumer rights. Regular audits, grievance mechanisms, and transparent communication about the purposes and benefits of AMI systems are essential for building public trust.

The adoption of AMI smart meters is a step toward a more modern, efficient and transparent energy system. However, the path to full implementation is hindered by economic, social, technical, and policy related barriers. Addressing installation costs, raising public awareness, improving infrastructure reliability, and ensuring strong regulatory frameworks will be important to overcoming these obstacles. With continued government support and public engagement, these barriers can be gradually reduced, paving the way for a smarter and more equitable electricity future.

2.3 Opportunities and Benefits of Implementing Smart Meter

Smart metering offers a transformative opportunity to modernize the energy sector, bringing long-term benefits to both consumers and the government. For consumers, smart meters provide greater control over electricity usage by offering real-time data, enabling households to adopt energy-saving behaviors that lower their bills. Additionally, these systems reduce billing disputes and increase transparency, fostering trust between consumers and utility providers. For the government, smart meters contribute to a more sustainable energy infrastructure by minimizing manual labor, reducing energy theft, and enhancing revenue collection.

The data generated by smart meters also equips policymakers with valuable insights to optimize electricity distribution and improve grid management, ensuring a more reliable and balanced power supply across regions. Moreover, smart meters enhance energy efficiency and reduce electricity losses. Utility companies can quickly identify and address issues like power outages, voltage fluctuations, and energy theft, leading to reduced technical losses. Consumers benefit from detailed usage insights, enabling them to adjust consumption patterns during peak and off-peak hours, further conserving energy.

The successful implementation of smart meters often relies on collaboration between public and private sectors through Public-Private Partnerships (PPPs). These partnerships facilitate funding, innovation, and efficient management of the infrastructure while sharing responsibilities between stakeholders. Governments can leverage private sector expertise to accelerate adoption, and private companies gain business opportunities, creating a mutually beneficial system.

Smart Metering installations offer a wide range of benefits for various stakeholders. For utility customers, they provide better access to data for managing energy use, more accurate and timely billing, improved rate options, faster outage restoration, and power quality information. Customer service and field operations benefit through reduced meter reading costs, fewer off-cycle read trips, elimination of handheld meter reading equipment, decreased call center transactions, and fewer collections and connection or disconnection activities. Revenue cycle services, including billing and revenue protection, gain from reduced back-office rebilling, early detection of meter tampering and theft, and fewer billing errors. Transmission and distribution, marketing, and load forecasting functions are enhanced by improved transformer load management, better capacitor bank switching, data that increases efficiency and reliability, more effective grid system design, and service area power quality insights. Marketing and load forecasting also see reduced costs in collecting load research data. From a utility general perspective, smart metering leads to fewer regulatory complaints, improved customer premise safety, a better risk profile, and reduced employee safety incidents. Finally, external stakeholders benefit through improved environmental outcomes and stronger support for Smart Grid initiatives.

Implementing smart meters and integrating smart grid technologies in the Mediterranean region presents a multitude of opportunities and benefits for the countries involved. Here is a consolidated paragraph highlighting these opportunities and benefits:

In the United Kingdom, for instance, the rollout of smart meters faced challenges when early devices lacked compatibility across energy suppliers. This caused confusion and reduced user trust. Over time, with better communication and improved technology, user satisfaction increased significantly.

In India, the government's efforts to install smart meters under the Smart Meter National Programme (SMNP) met resistance due to limited awareness and fear of inflated bills. Public education campaigns and simplified mobile payment solutions helped mitigate some concerns.

Japan saw more successful adoption due to its well-established digital infrastructure and strong communication strategies that clearly outlined the benefits to consumers, such as energy conservation and real-time monitoring.

In France, the advanced meters offer several key benefits such as:

1. Enhanced integration of intermittent renewable energy sources into the grid, optimizing connections and production understanding.

2. Support for electric vehicle charging control, reducing peak-hour strain on the grid, improved network operation with smart substations, sensors, and remote control, enhancing user service quality.

3. Efficient meter data collection and remote operations save significant costs and contributing to financial balance.

For smart grids, the goal is to accelerate the energy transition by quickly adapting electricity networks to changes like decentralised production and bidirectional flows, meeting evolving needs and ensuring cost-effectiveness.

For Greece, consumers benefit from real-time energy consumption tracking and flexible pricing, leading to cost savings and environmental gains. Operators gain improved grid reliability and data insights for informed decision-making.

Italy is in the "first phase" of the diffusion of first-generation electronic meters (roughly, from 2001 to 2014). The main justification for the diffusion of this technology was cost savings and greater reliability and speed of reading and managing reading data. Once cost efficiency is achieved, goals evolve with smart meters. End-use energy efficiency is a long-term goal, which depends on consumers' ability to harness demand-side potential. In the short to medium term, the priority objective of smart meter integration is the efficient management of an increasingly complex grid, which accommodates increasing amounts of intermittent renewables and profound changes in load distribution (EV).

In Portugal, studies were developed on the benefits and costs of smart meters. The Energy Services Regulatory Authority (ERSE) concluded the positive value of the option in the electricity sector, taking into consideration the cost reduction of smart meters due to the evolution of the global market for electric and telecommunications equipment, the long-term tendency of rise in electricity cost and electrification (giving more value to the potential benefits of smart grids on energy efficiency), consumption management, and the reduction of losses. In addition, the demand side flexibility markets rest on the ability to have detailed and fast available information. In the quantification of the expected outcomes, the highlighted benefits are:

1. Consumption reduction by consumers.
2. Decrease in commercial losses (fraud).
3. Cost reduction of local operation activities, including the reading of meters.
4. Avoid costs by acquiring conventional meters

Globally, smart meter initiatives have demonstrated significant benefits, such as improved energy conservation and better customer engagement (Faruqui et al., 2010). However, challenges like affordability, public awareness, technical issues, and resistance to change have been recurring themes in multiple studies (Darby, 2010). In developing countries, these challenges are further compounded by infrastructure limitations and socio-economic factors (Zhang et al., 2016).

2.4 Review on Previous Studies

Shahinzadeh, H., & Hasanalizadeh-Khosroshahi, A. (2014) studied implementation of Smart Metering Systems with challenges and solutions. This research delves into the complexities of integrating smart metering systems within electrical grids. The authors pinpoint two primary challenges: the financial burden associated with deployment and the intricate nature of system implementation. They advocate for the infusion of intelligence into power grids as a pragmatic approach to modernize utility services. The study underscores the significance of addressing security vulnerabilities in smart metering systems and emphasizes the collaborative role of manufacturers, suppliers, and regulators in safeguarding AMI infrastructures. Insights from this study are particularly pertinent for policymakers and utility providers aiming to adopt AMI technologies.

Anas et al. (2012) conducted the using Smart Meters in AMI addressing the prevalent issue of electricity theft. This paper explores the efficacy of smart meters in curbing unauthorized energy consumption. The authors highlight the enhanced security features of smart meters, which make them less susceptible to tampering compared to traditional electromechanical meters. Through mathematical modeling, the study evaluates technical losses and demonstrates how AMI systems can significantly reduce non-technical losses. The findings suggest that implementing smart meters can lead to substantial economic benefits, especially in regions where electricity theft is rampant.

Ezhilarasi et al. (2023) study a cost-effective Smart Metering approach towards affordable deployment strategy. This study proposes a budget-friendly strategy for deploying smart metering systems, particularly in developing nations. The authors identify high initial costs and technological constraints as major barriers to widespread adoption. They recommend upgrading existing metering infrastructure as a cost-effective alternative to complete system overhauls. A consumer opinion survey conducted as part of the study supports the feasibility of this approach, indicating strong public backing for affordable smart metering solutions. These insights are invaluable for policymakers seeking economical pathways to implement AMI systems.

Bandi et al. (2023) study the intricate case of Smart Meters focusing on rural mini-grid systems. This research examines the challenges associated with selecting and implementing smart meters. Utilizing stochastic multi-criteria acceptability analysis (SMAA) and narrative analysis, the study reveals operational difficulties, such as installation complexities and maintenance issues, faced by technicians. The authors emphasize the importance of considering local contexts and stakeholder experiences to ensure successful deployment. These findings are particularly relevant for areas like Dekkhina Thiri Township, where infrastructure limitations pose significant hurdles to AMI implementation.

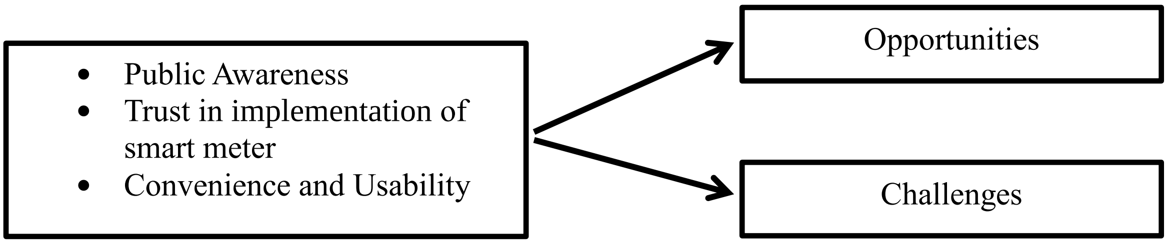
Cagno et al. (2018) study Smart Metering projects with an interpretive framework for successful implementation. This paper presents a comprehensive framework for the successful deployment of smart metering projects. Analyzing various European initiatives, the authors identify key factors influencing the adoption of smart meters, including technological readiness, economic considerations, and regulatory environments. The study underscores the necessity of understanding stakeholder needs and addressing consumer concerns to enhance acceptance. By aligning project objectives with user requirements, the framework aims to facilitate smoother integration of smart metering systems.

Masako Numata, Masahiro Sugiyama, and Gento Mogi (2020) study barrier analysis for the deployment of renewable-based mini-grids in Myanmar using the Analytic Hierarchy Process (AHP).This study analyzes the barriers to deploying mini-grids in Myanmar, focusing on challenges such as low demand, lack of long-term data, and limited electrification in off-grid villages. It discusses the difficulties in creating demand beyond basic applications like lighting and mobile phone charging. The study provides historical data on electrification efforts in Myanmar, highlighting the slow adoption of electrical appliances in newly electrified villages. These findings underscore the importance of demand creation and consumer engagement in the successful deployment of smart metering systems like AMI in rural areas.

2.5 Conceptual Framework of the Study

Public plays a central role in the success of government-led technological initiatives, particularly in infrastructure upgrades like smart meter deployment. This study investigates the opportunities and challenges faced by the public regarding the government's implementation of smart meters (AMI) in Dekkhina Thiri Township, Nay Pyi Taw. The study focuses on three key independent variables: public awareness, trust in implementation of smart meter, and convenience and usability of the AMI system. These variables are hypothesized to significantly influence two dependent variables opportunities (such as improved billing transparency, reduced losses, and digital integration) and challenges (such as technological resistance, usability concerns, and policy trust deficits). Many conceptual frameworks have been developed to assess the success of smart technology adoption; this study adopts a public Opportunities and Challenges based framework grounded in behavioral and institutional theories. The conceptual model shown in Figure 2.1 is designed to capture the interaction between individual-level and system level factors that influence the perceived outcomes of AMI implementation.

Figure 2.1 Conceptual Framework of the Study



Source: Adapted from Bouckaert, G., & Van de Walle, S. (2003)

This framework links the independent variables to the dependent variable, illustrating how factors like awareness, trust, cost, privacy, and convenience shape public opportunities and challenges of the smart metering implementation. Thus, this framework offers a comprehensive lens through which to assess the public’s readiness and engagement with AMI systems in a semi-urban Myanmar context, providing useful guidance for policymakers and energy authorities.

CHAPTER 3
BACKGROUND OF THE STUDY

This chapter presents background of the Advanced Metering Infrastructure (AMI), purpose of implementing AMI in Myanmar, current status of smart meter implementation in Myanmar, public engagement and consumer awareness opportunities, and challenges in implementation in Myanmar.

3.1 Background of Advanced Metering Infrastructure (AMI) System

In 2016, Yangon City took a significant step toward modernizing its electricity management by introducing a smart meter system known as the Advanced Metering Infrastructure (AMI) in two of its townships. This innovative technology aimed to enhance the efficiency, transparency, and reliability of electricity usage and billing. Building upon this pilot project, the AMI system was expanded to Mandalay City and Nay Pyi Taw in 2022, reflecting the government's broader strategy to implement smart metering across Myanmar. By 2023, five out of ten townships in Nay Pyi Taw had successfully adopted the system, including Dekkhina Thiri Township, which will be the focus of this study. Although the adoption of smart meters is aligned with the government's broader energy sector reform, studies on the opportunities and challenges specific to Myanmar remain limited. This study aims to address this gap by exploring the public opportunities and challenges of smart meter implementation in Dekkhina Thiri Township, Nay Pyi Taw.

The AMI system, often referred to as an automatic meter system, is a technologically advanced solution that replaces traditional electricity meters. Unlike older systems, AMI meters allow for centralized data monitoring and control, ensuring better accuracy in billing and improved service delivery. The AMI system consists of Data Concentrator Units (DCUs) that can connect and retrieve real-time data from meters within a 100-meter radius using SIM cards and the internet. Even in areas with interference or restricted meter access, readings can still be collected efficiently through portable readers.

Among the types of smart meters, the two main categories are prepaid meters and pay as you go meters. While prepaid meters are widely used in some developed countries, they are not centrally controllable and are less suited to contexts with prevalent electricity theft. In Myanmar's context, where illegal power connections are still a challenge, the government has opted to use pay as you go AMI meters, which offer external control capabilities and can detect fraud in real time from a central control center. These meters also allow for remote disconnection of power in cases of non-payment, enhancing enforcement capabilities.

The Ministry of Electricity has prioritized the rollout of AMI systems due to these benefits. Although initial attempts in some townships like Yangon's Daw Bone and Pabedan in 2017 faced challenges, the system has now been fully implemented in 20 out of 58 Yangon townships, with partial implementation in 36 others. Under the directive of the government, efforts are ongoing to expand AMI adoption across other provinces and cities to minimize power losses and improve energy management.

A key component of the AMI system's user interface is the Mebill mobile application, developed using the Myanmar Electric Bill (MEB) software. This app allows users to check their electricity usage, view billing details, and make payments online through any local bank. This digital shift supports the development of E-Government initiatives and promotes the use of secure online transactions. The use of locally developed AMI meters by Ever Meter Company also ensures data security, keeping sensitive information within national control.

In 2017, Yangon Electricity Office introduced a smart meter system called AMI, which can reduce transmission waste, optimize maintenance, and make the whole system more efficient and streamlined. This system was implemented by the Ministry of Electricity Power (MOEP) in their attempt to deliver effective electricity service to the public. Their goal was to implement smart meters that would enable them to regulate electricity supply, track use, and bill customers via a single automated system. They also aimed to contribute to the development, improvement and extension of the E-Government sector and electronic services to the public. This method removes human error and significantly reduces the potential for corruption. AMI was launched as a pilot projection 1 August, 2018 in Daw Bone Township. As a result of the system's implementation, power loss decreased significantly, by 7%, all off-site meter reading (OMR) meters installed since 2012 can be easily converted to the AMI system without modifying the meter's internal components (Bangkok Post 2019). This AMI system can not only improve the budget of the Electricity Department, it can also decrease the need for human resources, data entry for meter units, and other financial transactions. Moreover, the central control system provides real-time information on the meters and transformers in use, so maintenance and expansion can be planned in advance. Human error can be reduced in calculating the cost for the usage of meter units, and AMI software and billing software written in the official Myanmar language can greatly support E-Government development.

The Advanced Metering Infrastructure (AMI) represents a significant transformation in the way electricity is measured, monitored, and managed. As part of the global trend toward smart grid technologies, AMI systems enable two-way communication between utility providers and consumers through the use of smart meters and data management platforms. In Myanmar, the adoption of AMI is seen as a crucial step toward modernizing the national electricity distribution system and improving service reliability, transparency, and efficiency.

Advanced Metering Infrastructure (AMI) is a comprehensive system that includes smart meters, communication networks, and data management systems designed to automate and enhance the measurement and management of electricity usage. Unlike traditional electromechanical meters, smart meters in AMI systems can record energy consumption at regular intervals (e.g., every 15 or 30 minutes) and transmit this data automatically to utility providers.

The core components of an AMI system include:

1. **Smart Meters**: These are digital devices installed at consumer premises to measure electricity consumption accurately and in real time.

2. **Communication Networks**: These allow two way data exchange between the smart meters and central utility systems, using technologies like Radio Frequency (RF), Power Line Communication (PLC), and GSM/3G/4G.

3. **Meter Data Management System (MDMS)**: This system collects, stores, and analyzes data from the smart meters, supporting billing, outage management, load forecasting, and demand response programs.

The primary advantage of AMI is its ability to provide utilities and consumers with real-time information on energy usage, which promotes more efficient energy consumption and better decision making.

The AMI system deployed in Myanmar consist various hardware and software components designed to collect, transmits, and analyzes electricity consumption data. The smart meters used in Myanmar are generally classified into two types: single-phase meters for residential users and three-phase meters for larger commercial and industrial customers. These meters are capable of measuring energy usage at regular intervals, detecting power quality issues, and supporting remote disconnect and reconnect features. The technical specifications are often aligned with international standards, though variations exist depending on the manufacturer.

Communication technology is a key component of the AMI ecosystem. In Myanmar, three main types of communication technologies are being employed: Radio Frequency (RF), Power Line Communication (PLC), and Global System for Mobile Communication (GSM). RF is primarily used in urban areas with a dense concentration of users, enabling short-range but fast communication. PLC, which uses existing power lines to transmit data, is applied in areas with a stable grid. GSM/3G/4G technologies are widely used for remote or hard to reach regions where cellular signals are available, providing utility companies with a flexible and scalable data transmission method.

Smart meters in Myanmar are integrated into centralized control systems for data collection and analysis. This integration is made possible through the Meter Data Management System (MDMS), which receives, stores, and processes real-time usage data from meters. The MDMS works alongside Supervisory Control and Data Acquisition (SCADA) systems and billing platforms to ensure accurate metering, prompt billing, and effective monitoring. These systems help reduce manual intervention, improve operational efficiency, and allow for demand-side management strategies, outage detection, and theft identification.

The deployment of AMI in Myanmar is managed by several public utility organizations under the MOEP. The Electric Power Generation Enterprise (EPGE) is responsible for electricity generation and plays a coordination role between national and regional entities. Regional electricity distribution and maintenance are handled by YESC in Yangon, MESC in Mandalay, and ESE for other regions. These organizations are tasked with installing, maintaining, and operating smart meters as well as providing customer support and data management.

In terms of implementation, the government has entered into partnerships with both private and international stakeholders. Technical collaboration has been established with meter manufacturers from China, Japan, and South Korea, while funding and consultancy support have been provided by ADB, JICA, and the World Bank. IT companies also play a crucial role in developing data platforms and cloud-based MDMS. These partnerships help overcome local capacity gaps and enable technology transfer.

Pilot projects have been critical in evaluating the effectiveness of AMI systems in Myanmar. Early projects were launched in Nay Pyi Taw and Yangon to test the performance of different meter types and communication models. Based on positive results, a phased nationwide rollout strategy was developed. This strategy prioritizes regions with high energy losses, urban zones with available infrastructure, and commercial hubs. The long-term plan includes eventual expansion to all households and businesses connected to the national grid, thereby enabling a uniform, data-driven power distribution system.

3.2 Purpose of Implementing AMI in Myanmar

The implementation of AMI in Myanmar is driven by multiple national goals and sectorial challenges. Myanmar's electricity sector has faced persistent issues such as technical and commercial losses, frequent power outages, limited coverage in rural areas, and inefficiencies in billing and revenue collection. The government, through the Ministry of Electricity Power (MOEP), recognizes AMI as a strategic solution to address these problems and support broader reforms in the energy sector.

Key purposes for implementing AMI in Myanmar include:

1. **Reducing Non-Technical Losses**: By improving the accuracy of meter readings and reducing human intervention, AMI can significantly curb electricity theft and billing errors.

2. **Improving Revenue Collection**: Automated and timely billing enhances cash flow and reduces delays in payment collection for utility companies.

3. **Enhancing Consumer Services**: Consumers can monitor their energy usage in near real-time, leading to greater awareness and control over electricity consumption, ultimately supporting energy-saving behaviors.

4. **Facilitating Load Management**: Real-time data enables utility providers to forecast demand more accurately and implement load balancing strategies to avoid overloads or blackouts.

5. **Laying the Groundwork for Smart Grid Development**: AMI is a foundational technology for building a more integrated and intelligent power system, capable of supporting renewable energy sources, electric vehicles, and distributed generation in the future.

In the context of Myanmar, the AMI rollout also aligns with national digital transformation efforts and regional energy integration goals within ASEAN. Despite challenges related to infrastructure, technical expertise, and funding, the government's initiative to implement AMI reflects its commitment to building a more efficient, reliable, and consumer centric power sector.

3.3 Current Status of Smart Meter Implementation in Myanmar

The implementation of smart metering systems in Myanmar is relatively recent, aligning with global trends in modernizing energy infrastructure. The adoption began with pilot projects in the early 2010s, particularly in urban regions like Nay Pyi Taw and Yangon. These pilot phases were initiated under the guidance of the Ministry of Electricity Power (MOEP) with support from international donors such as the Asian Development Bank (ADB) and Japan International Cooperation Agency (JICA). Between 2015 and 2020, the government expanded the project to include more urban zones and selected high-loss areas. In 2021, large scale smart meter rollouts were initiated in key municipalities as part of Myanmar's broader digital transformation strategy in the energy sector. Despite political and logistical challenges, deployment continues incrementally in prioritized regions.

Currently, smart meters have been installed predominantly in urban and semi-urban zones where infrastructure and communication networks are relatively reliable. Areas such as Yangon, Nay Pyi Taw, and Mandalay have seen the most concentrated efforts, particularly under the management of respective regional electricity supply corporations like Yangon Electricity Supply Corporation (YESC), Mandalay Electricity Supply Corporation (MESC), and the Electricity Supply Enterprise (ESE). Meanwhile, rural regions face slower deployment due to terrain difficulties, lack of consistent electricity access, and financial constraints.

The government plays a central role in smart meter implementation through various key institutions. The Ministry of Electricity Power (MOEP) provides overall policy direction and supervises the program. The Electric Power Generation Enterprise (EPGE) handles electricity generation and coordinates with regional distribution bodies such as YESC, MESC, and ESE. Development partners, private vendors, and IT service providers also play vital roles, contributing equipment, financing, and technical expertise. Together, these stakeholders form a collaborative network supporting the strategic implementation and expansion of AMI systems across Myanmar.

Table 3.1 Completion of AMI System and Automatic Billing System

Enterprise / Corporation	AMI	Automatic Billing	Total
Electricity Supply Enterprise (ESE)	5	5	10
Yangon Electricity Supply Corporation (YESC)	22	37	59
Mandalay Electricity Supply Corporation (MESC)	3	14	17
Total	30	56	86

Source: Ever Meter Company Data, 2023

Table 3.1 shows the implementation status of AMI system and automated payment system in ESE, YESC and MESC. ESE is being implemented in 5 townships with AMI and automated payment system in the remaining 5 townships. YESC is being implemented in 22 townships with AMI and automated payment system in the remaining 37 townships. MESC is being implemented in 3 townships with AMI and automated payment system in the remaining 14 townships. A total of (86) townships have been implemented in Myanmar. And then, the installation and maintenance of the AMI Data Server and AMI Control and Monitoring Center at ESE, YESC, and MESC has been completed.

3.4 Public Engagement and Consumer Awareness

Public engagement is a critical component of successful AMI implementation. In Myanmar, the general public's awareness of smart meters is still developing. Urban residents show increasing interest in features such as real-time billing and energy monitoring. However, there remains a considerable knowledge gap, especially in rural and low-income areas. Many consumers are unfamiliar with how smart meters work and are often skeptical about changes in billing patterns or potential data privacy issues.

To build public trust and increase understanding, utility companies and the MOEP have launched several outreach programs. These include educational campaigns through television, radio, and printed materials, as well as community based workshops and demonstrations. These efforts aim to explain how smart meters function, their benefits in reducing energy waste, and how users can monitor and control their energy usage more effectively.

Customer service mechanisms have also been improved to handle the growing volume of inquiries and complaints related to smart meters. Dedicated service centers, hotlines, and online portals have been established in major cities to assist consumers with meter readings, billing clarifications, and technical issues. These services are vital for improving consumer satisfaction and ensuring the long-term acceptance of AMI technologies.

In Myanmar, the adoption of locally developed AMI meters by Ever Meter Company plays a crucial role in enhancing national data security and building public trust. By keeping both the hardware and software under domestic control, the risk of data leakage to foreign entities is significantly reduced. This approach aligns with broader policy objectives aimed at modernizing electricity management across the country. The AMI system offers a transformative opportunity to improve energy efficiency, reduce losses, and enhance billing accuracy. However, realizing these benefits depends not only on robust technical infrastructure but also on strong public engagement. In areas like Dekkhina Thiri Township, the success of AMI implementation hinges on factors such as trust, usability, awareness, and affordability. Given the prevalence of electricity theft and non-payment in Myanmar, the government must strike a careful balance between the cost of implementing AMI systems and the public's willingness and ability to pay. Learning from global best practices while tailoring solutions to local needs will be essential to fostering a supportive environment for smart meter adoption and ensuring long-term sustainability.

3.5 Opportunities and Challenges in AMI Implementation in Myanmar

Despite the progress made, Myanmar faces several major challenges in implementing AMI systems. Technically, the country's electricity infrastructure remains underdeveloped, especially in rural areas where frequent power outages and communication failures disrupt the performance of smart meters. The integration of AMI systems with outdated utility systems poses additional technical difficulties.

Financial constraints are another major issue. The high upfront cost of smart meters, data management systems, and communication infrastructure presents a significant burden for the government and utility providers. Limited public funding and dependency on foreign aid slow down the pace of implementation, and long-term investment strategies are still being developed.

The completion of AMI meter installation can be seen in Table 3.1. There are still townships in YESC, MESC and ESE that have not yet installed AMI meters, and this is planned in this year's budget, but due to the natural disaster and earthquake, there is no way to continue this year.

There is also resistance from both consumers and utility staff. Some consumers distrust the technology due to misconceptions about increased billing or data collection. On the other hand, utility workers may resist AMI systems due to fear of job displacement or lack of familiarity with digital tools. Overcoming these challenges requires continuous capacity building, training, and public education.

Despite these challenges, AMI presents substantial opportunities for Myanmar's energy sector. The ability to monitor and manage electricity usage in real time can greatly improve energy efficiency. Consumers can adjust their behavior based on real-time data, while utilities can implement demand response strategies to reduce peak loads and operational costs.

The implementation of AMI also lays the foundation for the development of smart grids. Smart meters are essential components of an intelligent electricity system capable of integrating renewable energy sources, battery storage, and electric vehicles. With the growing availability of Internet of Things (IoT) devices, Myanmar can adopt more sophisticated energy management technologies over time.

Lastly, Myanmar has opportunities for greater regional and international cooperation. Participation in ASEAN smart energy initiatives and collaboration with neighboring countries can provide access to funding, technology, and best practices. These partnerships can accelerate the adoption of AMI and contribute to Myanmar's long-term energy security and sustainability goals.

According to the comparison in the previous meter system relied heavily on manual labor, requiring significant staff strength, whereas the Advanced Metering Infrastructure (AMI) system utilizes modern technology to streamline operations. Meter readings in the past were conducted visually or through handheld devices, which are now replaced with automation under the AMI system. Similarly, electricity bill collection and the preparation of electrical forms were managed manually but are now automated.

Human error was a common issue at multiple levels in the previous system; however, the AMI system minimizes or eliminates such errors. Unlike the older system, which did not allow for technical upgrades, the AMI system is capable of technological enhancement. Record keeping under the old system required considerable physical space and incurred monthly costs, while AMI allows data to be stored efficiently on servers.

In terms of public service delivery, the previous system offered little support, but the AMI system provides effective and quality service. Timely work execution was also not feasible with the old system, whereas AMI enables timely and informed action. The integration with E-Government services was not possible before, but the AMI system is ready for such integration. Furthermore, employees had no access to user-friendly software in the earlier system, whereas AMI features easy to use tools. Lastly, electricity bill payments required a visit to the electricity office under the old system, but now, customers can conveniently pay online through any bank.

This comprehensive comparison clearly highlights the efficiency, accuracy, and convenience brought by the AMI system over the traditional meter system.

CHAPTER 4

SURVEY ANALYSIS

This chapter is divided into two major sections. The first section presents survey design. The second section presents the analysis of data which collected from 215 smart meter users in Dekkhina Thiri Township.

4.1 Survey Design

This survey is mainly focus on public opportunities and challenges related to the government's smart meter implementation in Dekkhina Thiri Township, and whether the local people in that area perceive more the positive or negative point of view on the implementation of smart meter in Dekkhina Thiri Township. All of the sample smart meter users are located within Dekkhina Thiri Township. During the study period, 958 smart meter users located in the study area. The number sample is calculated using the Yemane, 1967 formula where the total population is 958 smart users in two wards.

$$n = \frac{\mathrm{N}}{1 + \mathrm{N}(e)^2}$$

$$n = \frac{958}{1 + 958(0.06)^2}$$

$$n = 215$$

The sample of 215 smart meter users was collected among 958 members from two wards in Dekkhina Thiri Township and the population distribution (distribution of wards) is shown in Table (4.1).

Table 4.1: Study Area

Wards	Number of Smart Meter Users	Frequency	Percent
Shwe Ingyin	756	151	70%
Shwe Kyr Pin	202	64	30%
Total	**958**	**215**	**100%**

Source: Researcher's Survey Data, 2025

This survey area is covered to the smart meter implemented are in the Dekkhina Thiri Township, Shwe Ingyin Ward 70% and Shwe Kyr Pin Ward 30% as the survey main target is to learn about their opportunities and challenges toward the smart meter implementation and almost 90% of survey respondents are from the urban area.

A total of 215 local people are conducted across the smart meter implementation area such as Dekkhina Thiri Township by questionnaire. The questionnaires are included respondents' personal profile, their opportunities and challenges on the Government's smart meter implementation. Main language was Myanmar and all key points are added by Myanmar language for easy answering. Data was statistically analyzed by SPSS 27. The results data are presented with tables. Survey form is attached in Appendix. This study uses the simple random sampling method to draw the sample size from population; only 215 respondents were selected as sample. A total of 215 sample random sample size is conducted across the smart meter implementation area in Dekkhina Thiri Township by questionnaire. In the survey results, firstly it made to identify the respondents' personal information. This includes determining the respondents' age, gender distribution, education, employment status, monthly income for their families and then about the consumption of electricity.

The second part illustrates the knowledge which reflects that what the local people know about implementation of Smart Meter such as what is the main cooperated country with Myanmar Government, how many townships currently implemented, about how smart meters work and their impact on electricity consumption and how smart meters can help improve electricity efficiency and reduce power wastage. Then, the government trust of the respondent that they have work directly or indirectly to their families and relatives, and also ask about the plan that they have for the future related with Smart Meter implementation. In addition, it describes opportunities and challenges of respondents on convenience and usability of smart meter and also presents public opportunity and challenges mainly focus on the weather good or bad the local people point of view on the Government smart meter implementation, shown by the tables by analyzing agreement level base on seven Likert scale (7= strongly agree to 1= strongly disagree).

Finally, which is also the largest part in the survey that focuses on public opportunities and challenges related to the government's implementation of smart meters by analyzing regression and also show the analysis of the results by regression models.

4.2 Demographic Information and Socioeconomic Information

In order to identify the profile of respondents (smart meter users) from surveyed wards, data related to the gender of the smart meter users, age of the smart meter users, educational level of the smart meter users, household income, their employment status, electricity payment, monthly electricity use and monthly electricity cost are collected from the smart meter users. And then, the study described the profile of smart meter users of the surveyed wards in Table (4.2).

Table 4.2 The Respondent Profile

Variable	Classification	Frequency	Percent
Gender	Male	100	46.5
	Female	115	53.5
Age Group	20–29	45	21
	30–49	76	35.5
	50 and above	94	43.5
Education	High School	51	23.5
	Bachelor's Degree	34	16
	Master's Degree	48	22.5
	Ph.D.	40	18.5
	Other	42	19.5
Employment Status	Student	17	8
	Unemployed	27	12.5
	Business Owner	26	12
	Private Employee	19	9
	Government Employee	31	14.5
	NGO	37	17
	INGO	29	13.5
	Retired	29	13.5
Household Income	Below 300,000 Ks	40	18.5
	300,000-500,000 Ks	45	21
	500,000-1,000,000 Ks	54	25
	Above 1,000,000 Ks	44	20.5
	Don't know	32	15
Years in Township	Less than 1 year	61	28.5
	1–5 years	40	18.5
	6–10 years	58	27
	More than 10 years	56	26

Source: Researcher's Survey Data, 2025

Table 4.2 shows the demographic information of respondents. In this survey, 53.5% of the respondents are male and 46.5% of female respondents are collected from both Shwe Kyr Pin Ward and Shwe Ingyin Ward. The finding shows that male respondents are 14 persons more than female respondents in the study.

In the age group level, most of respondents are 50 and above (43.5%) while the age group between 20 to 29 years is least 21% % in the study. According to the education level data, 23.5% of respondents are high school level and 22.5% of respondents are Master's Degree level, and the rest are educated. So, it can be found that most of respondents are people with bachelor's degree and master's degree and also all respondents are good education level.

According to the result of occupation, the occupation of respondents are government employees that is 14.5%, private employees are 9%, 12% of respondents is working in their own business, NGO and INGO employees are 30.5% while 12.5% of respondents is unemployed. So, it found that mostly respondents have employment.

In the family monthly income analysis, it shown that family income 500,000 to 1,000,000 kyats is 54 people or 25%, 300,000 to 500,000 kyats income families are 45 respondents with 21%, above 1,000,000 kyats family monthly income 44 person or 20.5%, below 300,000 Ks income families are 40 respondents with 18.5% and don't know family income person are 32 person 15% of the study. There have no family who have got over 30 million incomes monthly in study respondents which is describe as an 'don't know' group because some people don't want to speak out their family income. The survey shows, the family income 500,000 between 1,000,000 under kyats the most response group which is 25% or more than respondent in the study.

Table 4.3 shows about socioeconomic information of respondents related to electricity usage. Regarding public awareness, 16% of the participants first learned about smart meters through information provided by the electricity provider (e.g., YESC), 19% through neighbors or friends, 20.5% from government announcement, 14.5% from media (TV, radio, etc.), 17% from social media platforms and 13% from others. A smaller group (13%) cited other sources, including television, flyers, or community meetings.

Table 4.3 The Respondent's Socio-economic Information

Variables	Classification	Frequency	Percent
First learn about smart meter	Government announcement	44	20.5
	Neighbors/Relatives	41	19
	Social media	37	17
	Electricity bill statement	34	16
	Media (TV, radio, etc.)	31	14.5
	Other	28	13
Monthly Electricity Use	Below 100 kWh	55	25.5
	100 - 200 kWh	56	26
	200 - 300 kWh	55	25.5
	Above 300 kWh	49	23
Monthly Electricity Cost	500 – 50,000 Ks	27	12.5
	50,001 – 100,000 Ks	32	15
	200,001– 300,000 Ks	35	16.5
	100,001–150,000 Ks	43	20
	200,001– 300,000 Ks	35	16.5
	Above 300,000 Ks	40	18.5
Electricity Payment	Direct to Counter	59	27.5
	Through an agent	47	22
	Online/mobile banking	65	30
	Other	44	20.5

Source: Researcher's Survey Data, 2025

When asked about their average monthly household electricity consumption, 26% indicated usage between 100–200 kWh, 25.5% consumed 200–300 kWh, 25.5% used below 100 kWh, and 23% reported consumption exceeding above 300 kWh.

In terms of monthly electricity expenses, 20% spent between 100,001–200,000 Kyats, 18.5% spent above 300,000 Kyats, 16.5% spent between 200,001–300,000 Kyats, 17.5% spent between 150,001–200,000 Kyats, 15% spent between 50,001–100,000 Kyats and 12.5% spent between 500-50,000 Kyats. A smaller portion 12.5% reported spending 500-50,000 Kyats monthly on electricity.

Regarding electricity bill payment methods, the majority of respondents 27.5% reported paying their electricity bills in person at a payment center, while 30%

used mobile payment platforms, 22% passed on through an agent and 20.5% relied on other methods, such as bank transfers or family members handling the payments.

Most respondents 26% had been living in Dekkhina Thiri Township for more than 10 years, with 27% residing there between 6 - 10 years, 28.5% had living for less than 1 year and the remaining 8.5% for 1- 5 years. This long-term residency suggests a population well-acquainted with the local infrastructure and services.

4.3 Perception of Respondents on Smart Meter Implementation

This section reveals opinions about public awareness of local people on implementation of smart meter. Respondents were asked to give their opinions on the following statements by using the Likert scale. They were given perception levels in respect of the following statements. The level of agreement are shown as Strongly Disagree = 1, Disagree = 2, Somewhat Disagree = 3, Undecided = 4, Somewhat agree = 5, Agree = 6 and Strongly Agree = 7 in the following tables.

Table 4.4 shows public awareness of local people on implementation of smart meter. The results in the table show that the highest level 23.3% of respondents agreed that the public has been adequately informed about how smart meters work and their impact on electricity consumption. In addition, it found that the lowest level 21.4% of respondents agreed with awareness of the potential cost implications of using smart meters compared to traditional meters. According to the overall average mean 3.5 results, smart meter users were generally unable to accurately decide on all statements. Therefore, it is assumed that smart meter users have no awareness towards smart meter implementation.

Table 4.5 shows trust of local people in implementation of smart meter. The results in the table show that the highest level 55.81% of respondents agreed with fair and accountable in the decision-making process regarding smart meter implementation. In addition, it found that the lowest level 46.97% of respondents agreed that the government can improve the quality services by using online systems and the government provides enough information to the people. According to the overall average mean 3.62 results, smart meter users were not clearly given perception on all statements. Therefore, it cannot be assumed that smart meter users trust the implementation of smart meter at all, nor can it be assumed that they do not.

Table 4.4 Public Awareness of Local People on Implementation of Smart Meter

Public Awareness		1	2	3	4	5	6	7
I am aware of the government's initiative to implement smart meters in Dekkhina Thiri Township.	Freq	-	-	56	60	28	48	23
	%	-	-	26.0	27.9	13.0	22.3	10.7
I have received sufficient information about the benefits of smart meters from government authorities.	Freq	1	1	48	62	23	55	25
	%	0.5	0.5	22.3	28.8	10.7	25.6	11.6
The public has been adequately informed about how smart meters work and their impact on electricity consumption.	Freq	28	27	29	27	20	50	34
	%	13.0	12.6	13.5	12.6	9.3	23.3	15.8
I understand how smart meters can help improve electricity efficiency and reduce power wastage.	Freq	20	37	24	33	22	51	28
	%	9.3	17.2	11.2	15.3	10.2	23.7	13.0
The government has provided enough opportunities for public engagement and feedback regarding smart meter implementation.	Freq	25	32	23	32	33	38	32
	%	11.6	14.9	10.7	14.9	15.3	17.7	14.9
I am aware of the potential cost implications of using smart meters compared to traditional meters.	Freq	20	19	39	34	24	46	23
	%	14.0	8.8	18.1	15.8	11.2	21.4	10.7
I feel that more awareness campaigns and training sessions are needed to educate the public on using smart meters.	Freq	27	33	28	25	23	54	25
	%	12.6	15.3	13.0	11.6	10.7	25.1	11.6
The current level of public awareness about smart meters is sufficient for a smooth transition to the new system.	Freq	26	30	27	36	24	47	25
	%	12.1	14.0	12.6	16.7	11.2	21.9	11.6
Overall Mean	**3.5**							

Source: Researcher's Survey Data, 2025

Table 4.6 shows convenience and usability regarding the smart meter by respondents' perception. According to the result of the table 4.6, 50.69% of the smart meter users agreed that smart meters reduce the need for manual meter readings, making the system more convenient and smart meters more reliable compared to traditional electricity meters. In addition, the installation process of 43.25% of smart meters is simple and does not cause major inconvenience was agreed by smart meters users. The average 3.65 results indicate that smart meter users generally do not agree with the convenience of using smart meters. This is because smart meter users are "undecided" on all statements. Therefore, it is assumed that smart meter users have not absolutely agreed with convenience and usability towards the implementation of smart meter.

Table 4.5 Trust of Local People in Implementation of Smart Meter

Trust in Implementation of Smart Meter		1	2	3	4	5	6	7
I trust that the government has implemented smart meters with the best interests of the public in mind.	Freq	32	31	28	21	33	44	26
	%	14.9	14.4	13.0	9.8	15.3	20.5	12.1
I believe that the government is transparent in sharing information about the smart meter project.	Freq	2	26	28	33	22	49	32
	%	11.6	12.1	13.0	15.3	10.2	22.8	14.9
I have confidence in the government's ability to manage and maintain the smart meter system efficiently.	Freq	25	30	23	33	25	50	29
	%	11.6	14.0	10.7	15.3	11.6	23.3	13.5
I trust that the government will address public concerns and challenges related to smart meter implementation.	Freq	24	16	37	30	30	51	27
	%	11.2	7.4	17.2	14.0	14.0	23.7	12.6
I feel that the government has taken appropriate measures to ensure data privacy and security in smart meters.	Freq	27	29	24	25	33	40	37
	%	12.6	13.5	11.2	11.6	15.3	18.6	17.2
The government has been fair and accountable in the decision-making process regarding smart meter implementation.	Freq	23	26	21	25	32	55	33
	%	10.7	12.1	9.8	11.6	14.9	25.6	15.3
Do you think the government can improve the quality services by using online systems?	Freq	30	32	28	24	24	50	27
	%	14.0	14.9	13.0	11.2	11.2	23.3	12.6
Compared to conventional electricity meter, I have more or less confidence in the performance of the government,	Freq	24	24	34	21	33	48	31
	%	11.2	11.2	15.8	9.8	15.3	22.3	14.4
I am confident that the government provides enough information to the people.	Freq	28	30	33	23	37	46	18
	%	13.0	14.0	15.3	10.7	17.2	21.4	8.4
Overall Mean	**3.62**							

Source: Researcher's Survey Data, 2025

Table 4.6 Convenience and Usability Regarding the Smart Meter

Convenience and Usability		1	2	3	4	5	6	7
Smart meters are easy to use and understand for daily electricity consumption monitoring.	Freq	35	31	29	22	23	50	25
	%	16.3	14.4	13.5	10.2	10.7	23.3	11.6
The installation process of smart meters is simple and does not cause major inconvenience.	Freq	34	30	28	30	28	45	20
	%	15.8	14.0	13.0	14.0	13.0	20.9	9.3
I find it convenient to track my electricity usage through the smart meter system.	Freq	23	23	26	36	23	61	23
	%	10.7	10.7	12.1	16.7	10.7	28.4	10.7
Smart meters provide real-time information that helps me manage my electricity consumption more effectively.	Freq	27	32	28	32	38	36	23
	%	12.6	14.4	13.0	14.9	17.7	16.7	10.7
The user interface and display of the smart meter are clear and easy to read.	Freq	24	33	23	30	25	54	26
	%	11.2	15.3	10.7	14.0	11.6	25.1	12.1
I am comfortable using the smart meter without needing frequent assistance from authorities.	Freq	35	24	26	27	31	46	26
	%	16.3	11.2	12.2	12.6	14.4	21.4	12.1
I believe that smart meters reduce the need for manual meter readings, making the system more convenient.	Freq	29	22	34	21	27	49	33
	%	13.5	10.2	15.8	9.8	12.6	22.8	15.3
The billing process has become more transparent and efficient with the implementation of smart meters.	Freq	38	29	23	25	33	46	21
	%	17.7	13.5	10.7	11.6	15.3	21.4	9.8
I find smart meters more reliable compared to traditional electricity meters.	Freq	25	35	27	19	22	55	32
	%	11.6	16.3	12.6	8.8	10.2	25.6	14.9
I have not experienced any major technical difficulties while using the smart meter.	Freq	36	26	26	19	22	53	33
	%	16.7	12.1	12.1	8.8	10.2	24.7	15.3
Overall, smart meters have improved my electricity usage experience and convenience.	Freq	21	26	27	35	24	56	26
	%	9.8	12.1	12.6	16.3	11.2	26.0	12.1
Overall Mean	**3.65**							

Source: Researcher's Survey Data, 2025

Table 4.7 shows public opportunities of government smart meter implementation. The results of the table show that the highest level 54.41% of respondents agreed that the introduction of smart meters can lead to job opportunities in the energy and technology sector. In addition, the lowest level 43.72% of respondents agreed that smart meters can help reduce electricity costs by allowing better control over energy usage. According to the overall average mean 3.5 results, smart meter users were generally unable to accurately decide on all statements.

Therefore, it cannot be assumed that smart meter users are fully aware of the opportunities towards smart meter implementation.

Table 4.7 Public Opportunities of Government Smart Meter Implementation

Public Opportunities		1	2	3	4	5	6	7
The implementation of smart meters provides an opportunity for more efficient electricity consumption.	Freq	28	22	37	29	21	57	21
	%	13.0	10.2	17.2	13.5	9.8	26.5	9.8
Smart meters can help reduce electricity costs by allowing better control over energy usage.	Freq	34	23	33	31	19	45	30
	%	15.8	10.7	15.3	14.4	8.8	20.9	14.0
The introduction of smart meters promotes technological advancements in the energy sector.	Freq	32	30	16	33	29	52	23
	%	14.9	14.0	7.4	15.3	13.5	24.2	10.7
Smart meters create opportunities for a more transparent and accurate billing system.	Freq	27	24	36	26	28	50	24
	%	12.6	11.2	16.7	12.1	13.0	23.3	11.2
The adoption of smart meters can lead to better energy management and sustainability.	Freq	26	32	33	19	28	52	25
	%	12.1	14.9	15.3	8.8	13.0	24.2	11.6
Smart meters encourage consumer awareness and responsibility in electricity usage.	Freq	27	17	26	31	26	57	31
	%	12.6	7.9	12.1	14.4	12.1	26.5	14.4
The use of smart meters can contribute to environmental benefits by reducing energy waste.	Freq	25	24	29	26	26	60	25
	%	11.6	11.2	13.5	12.1	12.1	27.9	11.6
The introduction of smart meters can lead to job opportunities in the energy and technology sector.	Freq	26	25	32	24	21	52	35
	%	12.1	11.6	14.9	11.2	9.8	24.2	16.3
Smart meters allow consumers to monitor their electricity consumption in real-time, leading to better financial planning.	Freq	26	25	32	24	21	52	35
	%	12.1	11.6	14.9	11.2	9.8	24.2	16.3
Smart meter implementation can strengthen the overall infrastructure of the electricity grid, reducing system failures.	Freq	25	30	23	34	35	53	15
	%	11.6	14.0	10.7	15.8	16.3	24.7	7.0
The introduction of smart meters can encourage the adoption of renewable energy sources in the future.	Freq	34	28	22	25	27	51	28
	%	10.2	11.6	10.2	11.6	12.6	23.7	13.0
Overall Mean	**3.5**							

Source: Researcher's Survey Data, 2025

Table 4.8 Public Challenges of Government Smart Meter Implementation

Public Challenges		1	2	3	4	5	6	7
The initial installation cost of smart meters is a financial burden for many households.	Freq	28	22	37	29	21	57	21
	%	13.0	10.2	17.2	13.5	9.8	26.5	9.8
There is a lack of proper technical support and maintenance for smart meter users.	Freq	34	23	33	31	19	45	30
	%	15.8	10.7	15.3	14.4	8.8	20.9	14.0
Some users may find smart meters difficult to operate and understand.	Freq	32	30	16	33	29	52	23
	%	14.9	14.0	7.4	15.3	13.5	24.2	10.7
Power outages and technical failures may affect the reliability of smart meter readings.	Freq	27	24	36	26	28	50	24
	%	12.6	11.2	16.7	12.1	13.0	23.3	11.2
There are concerns regarding data privacy and security with smart meter usage.	Freq	26	32	33	19	28	52	25
	%	12.1	14.9	15.3	8.8	13.0	24.2	11.6
The government needs to improve public engagement and support to ensure a smooth transition to smart meters.	Freq	27	17	26	31	26	57	31
	%	12.6	7.9	12.1	14.4	12.1	26.5	14.4
Smart meters require internet or communication networks, which may not be reliable in all areas.	Freq	25	24	29	26	26	60	25
	%	11.6	11.2	13.5	12.1	12.1	27.9	11.6
There is a risk of technical errors in smart meter readings, leading to incorrect billing.	Freq	26	29	25	18	32	57	28
	%	12.1	13.5	11.6	8.4	14.9	26.5	13.0
The lack of public awareness and education about smart meters may slow down their adoption.	Freq	26	25	32	24	21	52	35
	%	12.1	11.6	14.9	11.2	9.8	24.2	16.3
Some residents may be resistant to the change from traditional meters to smart meters due to distrust or lack of familiarity.	Freq	25	30	23	34	35	53	15
	%	11.6	14.0	10.7	15.8	16.3	24.7	7.0
Low-income households may struggle with the cost of transitioning to smart meters without financial assistance.	Freq	34	28	22	25	27	51	28
	%	15.8	13.0	10.2	11.6	12.6	23.7	13.0
There is a need for a clear policy framework to address consumer rights and dispute resolution related to smart meter issues.	Freq	26	24	34	26	30	46	29
	%	12.1	11.2	15.8	12.1	14.0	21.4	13.5
Overall Mean	**3.49**							

Source: Researcher's Survey Data, 2025

Table 4.8 shows public challenges of government smart meter implementation. According to the result of the Table 4.8, the highest level 54.41% of respondents agreed that there is a risk of technical errors in smart meter readings, leading to incorrect billing. In addition, the lowest level 43.72% of respondents agreed with lack of proper technical support and maintenance for smart meter users. According to the overall average mean 3.5 results, smart meter users were generally unable to accurately decide on all statements. Therefore, it is assumed that smart meter users have challenges towards smart meter implementation.

4.4 Tests for the Assumption of Regression Analysis

To determine the required assumption from multiple linear regression models for international public opportunities, the following procedures are used.

4.4.1 Reliability Test: Public Opportunities

Test Cronbach's Alpha reliability test method is used to measure the internal consistency of variables and an accurate representation of the data. The instruments were tested for reliability by using Cronbach's Alpha reliability test. The reliability coefficient is above the recommended value of 0.7, the instruments can be considered sufficiently reliable.

The reliability test in this study was conducted by measuring the correlation between the response statements in the indication group. The indicator group that measures a variable has a good composite reliability if it has a composite reliability is greater than 0.7. In other words, the statement item can be said to be reliable if it has composite reliability is greater than 0.7.

In this study, 42 items in 6 factors were included in the questionnaire. The results of reliability test are presented in Table (4.7).

Table 4.9 Results of Reliability Test for Variables

Sr. No	Variables	No. of items	Cronbach's Alpha
1	Public Awareness	8	0.621
2	Trust in implementation of smart meter	9	0.631
3	Convenience and Usability	11	0.714
4	Public Opportunities	11	0.679
5	Public Challenges	12	0.694

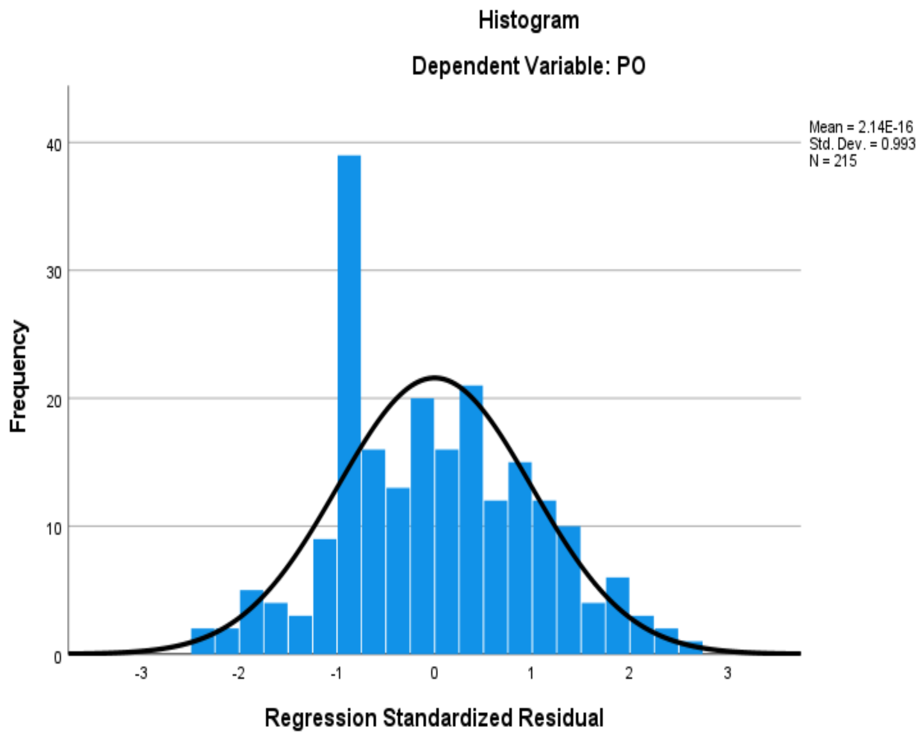
Source: Researcher's Survey Data, 2025

As presented in Table (4.9) examination of the reliability and accuracy of the measurement model found that the coefficient value (Cronbach's α) of each factor were in the range of 0.748 – 0.882, identifying that they met the internal consistency criteria. All of the reliability coefficients of questionnaire items are greater than the recommended value of 0.7, the instruments can be considered sufficiently reliable valid for the analysis. Based on the result of finding, it shows that most visitors are more reliability of Public Opportunities and Public Challenges variables in Dekkhina Thiri Township.

4.4.2 Normality Test: Public Opportunities

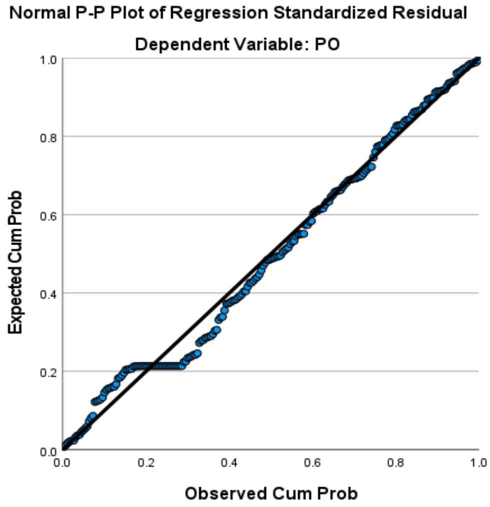
One of the basic assumption is that disturbance are normally distributed with zero mean and constant variance. To check whether the disturbances are normally distributed, histogram, and Normal P-P plot of the disturbances can be constructed. They are histogram of the standardized residual and Normal P-P plot of the standardized residual for public opportunities of Dekkhina Thiri Township. These plots are shown in figure (4.1) and figure (4.2).

Figure 4.1Histogram for Residuals



Source: Researcher's Survey Data, 2025

Figure 4.2 Normal P-P Plots for Residuals



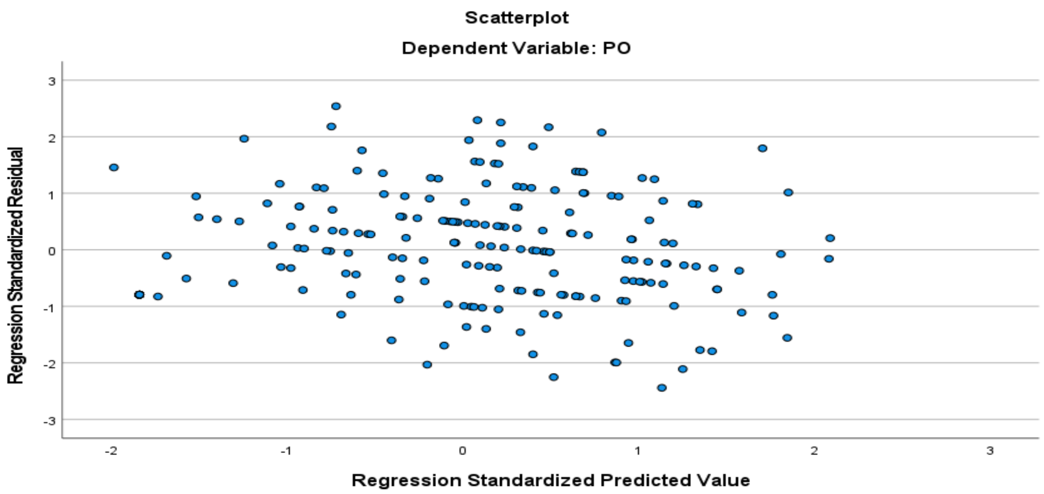
Source: Researcher's Survey Data, 2025

According to histogram and Normal P-P plot, it can be concluded that the normality assumption appears to be generally reasonable.

4.4.3 Testing for Homoscedasticity of Disturbances: Public Opportunities

Another basic assumption of multiple regression models is homoscedasticity. In the presence of heteroscedasticity the regression coefficients become more efficient. Heteroscedasticity can often be detected by plotting the estimated Y values against the disturbances. If any pattern is displayed, heteroscedasticity is likely present. Figure (4.3) represents the predicted public opportunities on X axis and the residual for public opportunities on Y axis.

Figure 4.3 Residual Patterns for Heteroscedasticity



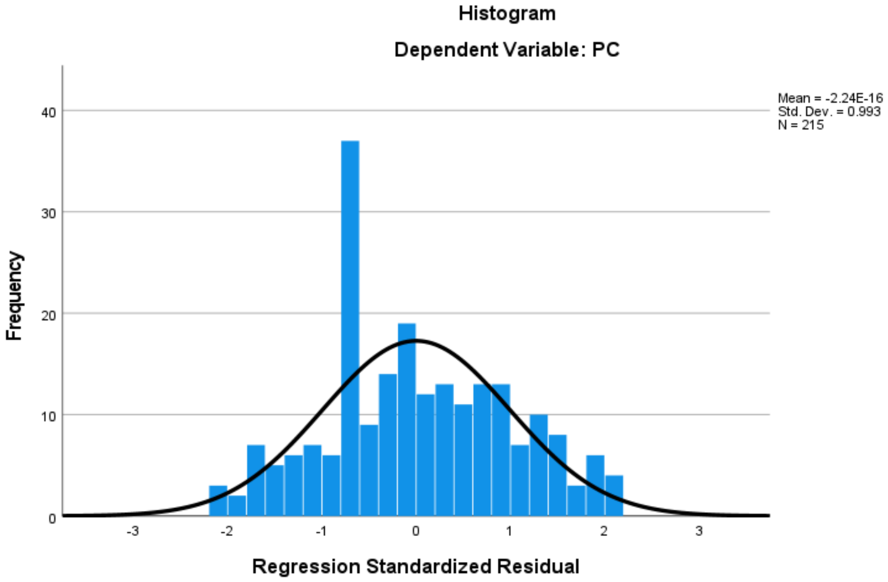
Source: Researcher's Survey Data, 2025

The figure shows that heteroscedasticity appears to be present.

4.4.4 Normality Test: Public Opportunities

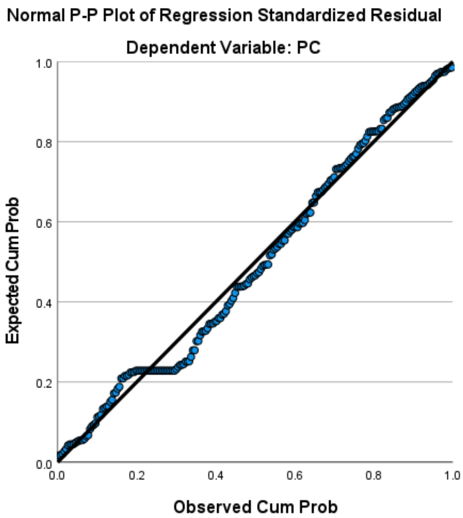
One of the basic assumption is that disturbance are normally distributed with zero mean and constant variance. To check whether the disturbances are normally distributed, histogram, and Normal P-P plot of the disturbances can be constructed. They are histogram of the standardized residual and Normal P-P plot of the standardized residual for public opportunities of Dekkhina Thiri Township. These plots are shown in figure (4.4) and figure (4.5).

Figure 4.4 Histogram for Residuals



Source: Researcher's Survey Data, 2025

Figure 4.5 Normal P-P Plots for Residuals



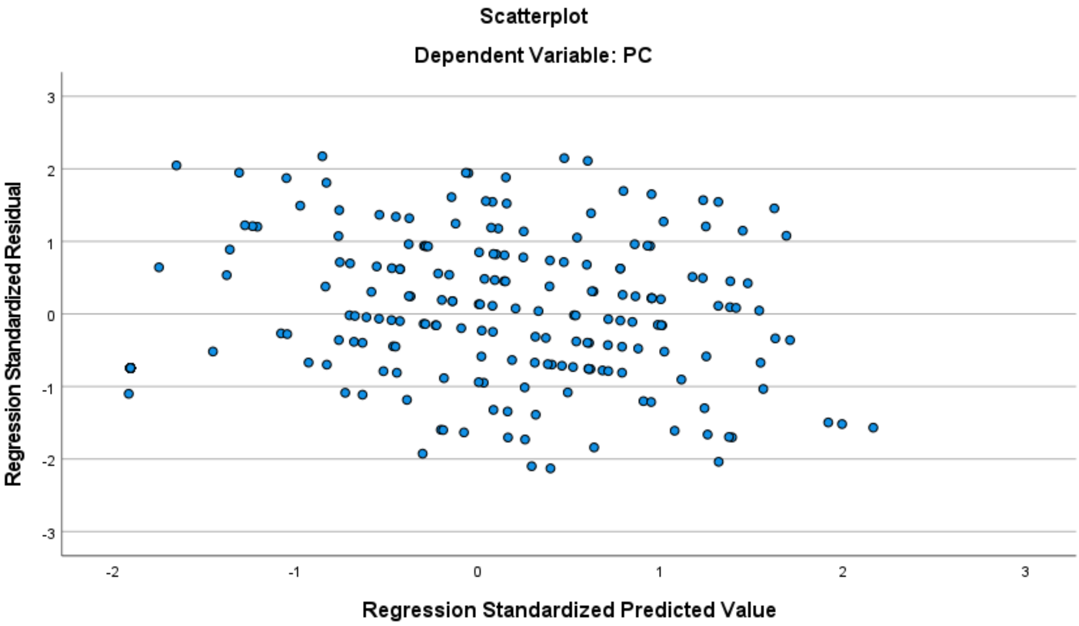
Source: Researcher's Survey Data, 2025

According to histogram and Normal P-P plot, it can be concluded that the normality assumption appears to be generally reasonable.

4.4.5 Testing for Homoscedasticity of Disturbances: Public Challenges

Another basic assumption of multiple regression models is homoscedasticity. In the presence of heteroscedasticity the regression coefficients become more efficient. Heteroscedasticity can often be detected by plotting the estimated Y values against the disturbances. If any pattern is displayed, heteroscedasticity is likely present. Figure (4.6) represents the predicted public challenges on X axis and the residual for public challenges on Y axis.

Figure 4.6 Residual Patterns for Heteroscedasticity



Source: Researcher's Survey Data, 2025

The figure shows that heteroscedasticity appears to be present.

4.4.6 Multicollinearity Test: Public Opportunities and Public Challenges

Multicollinearity arises when one of the independent variables is linearly related to one or more of the other independent variables. Such a situation violates one of the assumptions for multiple regressions. Specifically, multicollinearity occurs if there is a high correlation between two independent variables.

To detect multicollinearity, the variance inflation factor (VIF) is used. It is measure the degree of multicollinearity contributed by independent variable. In the multiple regression models, the VIF for public awareness, trust in implementation of smart meter and convenience and usability are 1.280, 1.250 and 1.209 respectively.

The VIF values for all variables are below 2, then it is concluded that multicollinearity is not serious problem in the multiple regression model for public opportunities and public challenges.

Table 4.10 Multicollinearity Test: Public Opportunities and Public Challenges

Sr. No	Factors	VIF
1	Public Awareness	1.280
2	Trust in implementation of smart meter	1.250
3	Convenience and Usability	1.209

Source: Researcher's Survey Data, 2025

4.5 Multiple Regression Model for Government Smart Meter Implementation

Multiple regression analysis was applied to investigate of public opportunities. The multiple regression models for the public opportunities were used as dependent variable and Public Awareness; Trust in Implementation of Smart Meter, Convenience and Usability were used as independent variables.

Table 4.11 Multiple Regression Analysis between Public Awareness, Trust in Implementation of Smart Meter, Convenience and Usability and Public Opportunities

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.581	0.277		5.703	0.000
Public Awareness	0.097	0.064	0.098	1.514	0.131
Trust in Implementation of Smart Meter	0.311***	0.065	0.310	4.823	0.000
Convenience and Usability	0.130**	0.060	0.136	2.155	0.032
R-Square	0.187				
Adjusted R-Square	0.177				
F-Value	18.816				

Source: Researcher's Survey Data, 2025

***denotes significant at 1%level, ** denotes significant at 5%level,* denotes significant at 10%level.

The analysis between public awareness, trust in implementation of smart meter, convenience and usability and public opportunities are used in a multiple regression analysis. The multiple regression procedure is employed because it provided the most accurate interpretation of the independent variables. The three independent variables are expressed in terms of the standardized factor scores (beta coefficients). The significant factors that remained in the regression equation are shown in order of importance based on the beta coefficients. The dependent variable, public opportunities, was measured on a seven-point Likert scale in the Dekkhina Thiri Township.

The estimated equation for Public Opportunities:

$Y_i = \beta_0 + \beta_1 X_i + \beta_2 X_i + \beta_3 X_i + \varepsilon_i$

$Y_i = 1.581 + 0.097X_1 + 0.311X_2 + 0.130X_3$ -------------------------- 1

Where,

Y_i = Public Opportunities

β_0 = Constant

X_1 = Public Awareness

X_2 = Trust in Implementation of Smart Meter

X_3 = Convenience and Usability

β_1, β_2, β_3 = regression coefficients

The equation 1 shows that, public opportunities of smart meter implementation are expected to increase by 1.892 units; if trust in implementation of smart meter increases by 1unit and other variables are constant. If convenience and usability is increased by 1 unit and help other variables are constant opportunities of smart meter implementation is increased by 1.711 units.

In the regression analysis, Results show that F value is 18.816 that is significantly at p= 0.000(<0.01) suggesting that independent variables are significantly. R2 is 0.187 and adjusted R2 is 0.177. This model explains that the variation of public opportunities of smart meter implementation is predicted by public awareness; trust in implementation of smart meter and convenience and usability as the value of adjusted R^2 is around 17.7%. It had been found that trust in implementation of smart meter is statistically significance at 1% level and convenience and usability is statistically significant at 5%level. The regression coefficient between trust in implementation of smart meter and public opportunities is 0.311(t= 4.823, p= 0.000). The regression coefficient between convenience and usability and public opportunities is 0.130(t=2.155, p=0.032). This shows that there is a direct relationship between public opportunities and implementation of smart meter, convenience and usability. Further, public awareness is not significant because public have not knowledge related to the implementation of smart meter.

Table 4.12 Multiple Regression Analysis between Public Awareness, Trust in Implementation of Smart Meter, Convenience and Usability and Public Challenges

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.661	0.289		5.753	0.000
Public Awareness	0.126**	0.067	0.126	1.891	0.060
Trust in implementation of smart meter	0.216***	0.067	0.212	3.219	0.001
Convenience and Usability	0.165***	0.063	0.169	2.620	0.009
R-Square	0.150				
Adjusted R-Square	0.139				
F-Value	14.449				

Source: Researcher's Survey Data, 2025

***denotes significant at 1%level, ** denotes significant at 5%level,* denotes significant at 10%level.

The analysis between public awareness, trust in implementation of smart meter, convenience and usability and public challenges levels of satisfaction, the three orthogonal factors are used in a multiple regression analysis. The multiple regression procedure is employed because it provided the most accurate interpretation of the independent variables. The three independent variables are expressed in terms of the standardized factor scores (beta coefficients). The significant factors that remained in the regression equation are shown in order of importance based on the beta coefficients. The dependent variable, public challenges were measured on a seven - point likert scale in the Dekkhina Thiri Township.

The estimated equation for Public Challenges:

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 X_i + \beta_3 X_i + \varepsilon_i$$

$$Y_i = 1.661 + 0.126X_1 + 0.216X_2 + 0.165X_3 \quad \text{---------------------------} \ 2$$

Where,

Y_i = Public Challenges

β_0 = Constant

X_1 = Public Awareness

X_2 = Trust in Implementation of Smart Meter

X_3 = Convenience and Usability

β_1, β_2, β_3 = regression coefficients

The equation 2 shows that, challenges of smart meter implementation are expected to increase by 1.787 units; if public awareness increases by 1unit and other variables are constant. If trust in implementation of Smart Meter is increased by 1 unit and help other variables are constant challenges of smart meter implementation is increased by 1.877 units. The challenges of smart meter implementation are increased by 1.826 units; if convenience and usability is increased by 1unit and other variables are constant.

In the regression analysis, Results show that F value is 14.449that is significantly at p= 0.000(<0.01) suggesting that independent variables are significantly. R^2 is 0.150 and adjusted R^2 is 0.139. This model explains that the variation of challenges of smart meter implementation is predicted by public awareness; trust in implementation of smart meter and convenience and usability as the value of adjusted R^2 is around 13.9%. It had been found that public awareness is statistically significance at 5%, trust in implementation of smart meter is statistically significance at 1% level and convenience and usability is statistically significant at 1%level. The regression coefficient between public awareness and challenges of smart meter implementation is 0.126(t= 1.891, p= 0.060). The regression coefficient between trust in implementation of smart meter and challenges of smart meter implementation is 0.216(t= 3.219, p= 0.001). The regression coefficient between convenience and usability and challenges of smart meter implementation is 0.165(t=2.620, p=0.009). This shows that there is a direct relationship between challenges of smart meter implementation and public awareness, implementation of smart meter, convenience and usability. Therefore, public has challenges when government implemented the smart meter.

CHAPTER 5

CONCLUSION

The study on the implementation of Advanced Metering Infrastructure (AMI) in Dekkhina Thiri Township, Nay Pyi Taw, highlights a promising and transformative step in Myanmar’s journey toward modernizing its electricity infrastructure. The introduction of smart meters offers considerable benefits, including enhanced energy efficiency, accurate billing, and improved transparency in electricity management.

Public perception of the technology is generally favorable, particularly among individuals with higher education levels and digital literacy. These groups have shown strong appreciation for the convenience, real-time monitoring, and better control over electricity consumption that smart meters provide.

The government’s strategic decision to utilize domestically-produced AMI meters by Ever Meter Company has significantly strengthened public trust, ensuring data security and national control over sensitive energy data. This move has not only aligned with public concerns about privacy but also demonstrated the potential for local innovation in supporting national development goals.

Moreover, the research concludes that smart meter implementation in Dekkhina Thiri Township presents significant potential to improve electricity management and customer experience. However, the study underscores that these advantages can only be fully realized if critical challenges are addressed. Public trust in government management, awareness of system benefits, and perceptions of convenience were all found to be decisive factors shaping acceptance. While most respondents acknowledge the transformative role of smart meters in reducing energy losses and improving billing accuracy, skepticism about data privacy, installation costs, and technological reliability remains a barrier. Overall, the success of smart meter deployment will depend on a balanced approach that combines technical development with sustained public engagement and education.

Overall, the AMI implementation in Dekkhina Thiri Township sets a positive precedent for nationwide expansion. With sustained policy support, community engagement, and a focus on inclusivity, Myanmar stands to unlock the full potential of smart meter technology, paving the way for a smarter, more transparent, and citizen-centered energy future.

5.1 Findings and Discussions

The study revealed several encouraging findings regarding public interaction with smart meters in Dekkhina Thiri Township, highlighting the growing acceptance and recognition of the benefits associated with AMI technology. Respondents with higher levels of education, digital literacy, and income demonstrated greater awareness and appreciation for the system's features, particularly real-time monitoring, improved billing accuracy, and energy-saving capabilities. Public awareness about smart meters is generally limited, with many respondents unsure about their functions and benefits. Education level and income were significant predictors of awareness and positive attitudes.

It found that most of consumers utilized within 100 kWh and 300 kWh and also majority of consumer expensed monthly electricity costs between 100,001 Ks and 150,000 Ks. Many consumers adapted well to the Mebill mobile application, finding it convenient and effective for managing their electricity usage. Trust in implementation of smart meter institutions managing the AMI system was notably higher among older and more educated individuals, reflecting the positive impact of policy transparency and consistent service delivery. These groups expressed confidence in the government's efforts and acknowledged the value of transitioning toward more efficient and modern energy infrastructure.

While respondents agreed that smart meters could enhance billing transparency and reduce energy waste, they also expressed concerns about affordability and technical issues, particularly in areas with unstable internet connectivity. Trust in the government's ability to manage the system effectively was moderate, reflecting the need for clearer communication and reassurance about data security. Additionally, perceptions of usability varied, as some users faced difficulties due to limited digital literacy.

These results highlight that while smart meters offer clear opportunities for modernizing electricity management, the challenges of affordability, trust, and digital inclusion must be addressed to ensure widespread acceptance.

5.2 Suggestions and Recommendations

To strengthen the implementation of AMI smart meters in Dekkhina Thiri Township and across Myanmar, a proactive and inclusive approach is essential. Expanding public education and awareness programs through diverse communication channels such as television, radio, social media, and community meetings can significantly enhance understanding and acceptance.

Special focus should be placed on underrepresented and less-informed groups, including women, elderly residents, and low-income households. Practical workshops and hands-on training can empower users, especially those unfamiliar with digital tools, to confidently use the Mebill app, interpret their energy data, and manage their electricity consumption effectively. Establishing strong customer service systems, including hotlines and local support officers, will further improve user experience and build long-term trust in the system. Additionally, affordability remains a key factor in encouraging widespread adoption.

The government should consider offering subsidies, installment plans, or financial assistance to make smart meter installation accessible to all income levels. Strengthening transparency in billing processes and openly communicating data protection policies will also help reinforce public confidence in the initiative.

Partnering with local companies likes Ever Meter Company not only boosts national data sovereignty but also promotes innovation and system reliability. Demonstration projects in different neighborhoods can showcase real world benefits, encouraging broader community support.

To improve the effectiveness of smart meter implementation, the study recommends several actions. First, authorities should conduct extensive public awareness campaigns to educate citizens on how smart meters work and their potential benefits. Second, financial support or flexible payment options should be provided to reduce the burden of installation costs, especially for low-income households. Third, data protection measures must be strengthened and clearly communicated to build public trust in system security. Fourth, technical support and user training should be expanded, including community workshops and accessible help channels, to improve usability. Finally, infrastructure improvements are needed to ensure consistent connectivity and reliable meter performance, particularly in less-developed areas.

By integrating these recommendations, Myanmar can build a more equitable, secure, and efficient energy management system that is both technologically advanced and socially inclusive.

5.3 Needs for Further Study

While this study provides valuable insights into the public opportunities and challenges surrounding smart meter implementation in Dekkhina Thiri Township, expanding the scope of future research will further strengthen national strategies for AMI deployment. Broader studies across different regions of Myanmar are essential to capture geographic, cultural, and infrastructural variations that may influence public awareness, accessibility, and acceptance.

Future research should extend to other regions of Myanmar to capture geographic and cultural variations in perceptions and adoption of smart meters. Longitudinal studies are also needed to track changes in public awareness, trust, and satisfaction over time as the technology becomes more widespread. Further investigation into the technical performance of AMI systems under different conditions, as well as the effectiveness of government policies and incentive programs, will provide valuable insights to guide future implementations. Additionally, studies exploring user experiences among vulnerable or digitally excluded populations could help design more inclusive strategies.

Lastly, including the perspectives of non-users and communities awaiting smart meter deployment will ensure that future expansion plans are grounded in a holistic understanding of public needs. These future studies will be crucial in guiding Myanmar toward a smarter, more inclusive, and sustainable energy future.

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APPENDICES

A Study on Opportunities and Challenges of Smart Meter Implementation in Dekkhina Thiri Township, Nay Pyi Taw

Questionnaies

This paper is a study of public opportunities and challenges related to the government's implementation of smart meters in Nay Pyi Taw Dekkhina Thiri Township. I believe your answers are valuable to me and will definitely help me in my degree. This information will be kept confidential and will be used for research purposes only. Thank you very much for the answer.

Demographic and Socioeconomic Information

(1) **Age** ______________________________

(2) **Gender** Male ☐ Female ☐

(3) **Education Level:**

- High School ☐
- Bachelor's Degree ☐
- Master's Degree ☐
- Ph.D. ☐
- Other (please specify) ____________________

(4) **Employment Status:**

- Student ☐
- Unemployed ☐
- Business Owner ☐
- Private Employee ☐
- Government Employee ☐
- NGO ☐
- INGO ☐

Retired ____________

(5) **Household Income Level (Monthly):**

- Below 300,000 MMK ☐
- 300,000 - 500,000 MMK ☐
- 500,000 - 1,000,000 MMK ☐
- Above 1,000,000 MMK ☐
- Don't know ☐

(6) **How do you usually pay your electricity bill?**

- Direct to Counter ☐
- Through an agent ☐
- Online/mobile banking ☐
- Other ☐

(7) **Monthly Household Electricity Consumption units (approx.):**

- Below 100 kWh ☐
- 100 - 200 kWh ☐
- 200 - 300 kWh ☐
- Above 300 kWh ☐

(8) **On average, how much did your household pay for monthly use of electricity?**

- 500 – 50,000 MMK ☐
- 50,001 – 100,000 MMK ☐
- 100,001 – 150,000 MMK ☐
- 150,001 – 200,000 MMK ☐
- 200,001 – 300,000 MMK ☐
- Above 300,000 MMK ☐

(9) **How long have you lived in Dekkhina Thiri Township?**

____

(10) **How did you first learn about smart meters?**

- Government announcement ☐
- Neighbors/Relatives ☐
- Social media ☐
- Electricity bill statement ☐
- Media (TV, radio, etc.) ☐
- Other (please specify) ______________________

PART 1

Please tick (√) the point that best matches your opion regrading the points below.

1= Strongly Disagree, 2= Disagree, 3= Somewhat Disagree, 4= Undecided,

5= Somewhat Agree, 6= Agree, 7= Strongly Agree

No.	Public Awareness	1	2	3	4	5	6	7
1.1	I am aware of the government's initiative to implement smart meters in Dekkhina Thiri Township.							
1.2	I have received sufficient information about the benefits of smart meters from government authorities.							
1.3	The public has been adequately informed about how smart meters work and their impact on electricity consumption.							
1.4	I understand how smart meters can help improve electricity efficiency and reduce power wastage.							
1.5	The government has provided enough opportunities for public engagement and feedback regarding smart meter implementation.							
1.6	I am aware of the potential cost implications of using smart meters compared to traditional meters.							
1.7	I feel that more awareness campaigns and training sessions are needed to educate the public on using smart meters.							
1.8	The current level of public awareness about smart meters is sufficient for a smooth transition to the new system.							

PART 2

Please tick (√) the point that best matches your opion regrading the points below.

1= Strongly Disagree, 2= Disagree, 3= Somewhat Disagree, 4= Undecided,

5= Somewhat Agree, 6= Agree, 7= Strongly Agree

No.	**Trust** in Implementation of Smart Meter	1	2	3	4	5	6	7
2.1	I trust that the government has implemented smart meters with the best interests of the public in mind.							
2.2	I believe that the government is transparent in sharing information about the smart meter project.							
2.3	I have confidence in the government's ability to manage and maintain the smart meter system efficiently.							
2.4	I trust that the government will address public concerns and challenges related to smart meter implementation.							
2.5	I feel that the government has taken appropriate measures to ensure data privacy and security in smart meters.							
2.6	The government has been fair and accountable in the decision-making process regarding smart meter implementation.							
2.7	Do you think the government can improve the quality services by using online systems?							
2.8	Compared to conventional electricity meter, I have more or less confidence in the performance of the government,							
2.9	I am confident that the government provides enough information to the people.							

PART 3

Please tick (√) the point that best matches your opion regrading the points below.

1= Strongly Disagree, 2= Disagree, 3= Somewhat Disagree, 4= Undecided,

5= Somewhat Agree, 6= Agree, 7= Strongly Agree

No.	Convenience and Usability	1	2	3	4	5	6	7
3.1	Smart meters are easy to use and understand for daily electricity consumption monitoring.							
3.2	The installation process of smart meters is simple and does not cause major inconvenience.							
3.3	I find it convenient to track my electricity usage through the smart meter system.							
3.4	Smart meters provide real-time information that helps me manage my electricity consumption more effectively.							
3.5	The user interface and display of the smart meter are clear and easy to read.							
3.6	I am comfortable using the smart meter without needing frequent assistance from authorities.							
3.7	I believe that smart meters reduce the need for manual meter readings, making the system more convenient.							
3.8	The billing process has become more transparent and efficient with the implementation of smart meters.							
3.9	I find smart meters more reliable compared to traditional electricity meters.							
3.10	I have not experienced any major technical difficulties while using the smart meter.							
3.11	Overall, smart meters have improved my electricity usage experience and convenience.							

PART 4

Please tick (√) the point that best matches your opion regrading the points below.

1= Strongly Disagree, 2= Disagree, 3= Somewhat Disagree, 4= Undecided,

5= Somewhat Agree, 6= Agree, 7= Strongly Agree

No.	Public Opportunities	1	2	3	4	5	6	7
4.1	The implementation of smart meters provides an opportunity for more efficient electricity consumption.							
4.2	Smart meters can help reduce electricity costs by allowing better control over energy usage.							
4.3	The introduction of smart meters promotes technological advancements in the energy sector.							
4.4	Smart meters create opportunities for a more transparent and accurate billing system.							
4.5	The adoption of smart meters can lead to better energy management and sustainability.							
4.6	Smart meters encourage consumer awareness and responsibility in electricity usage.							
4.7	The use of smart meters can contribute to environmental benefits by reducing energy waste.							
4.8	The introduction of smart meters can lead to job opportunities in the energy and technology sector.							
4.9	Smart meters allow consumers to monitor their electricity consumption in real-time, leading to better financial planning.							
4.10	Smart meter implementation can strengthen the overall infrastructure of the electricity grid, reducing system failures.							
4.11	The introduction of smart meters can encourage the adoption of renewable energy sources in the future.							

PART 5

Please tick (√) the point that best matches your opion regrading the points below.

1= Strongly Disagree, 2= Disagree, 3= Somewhat Disagree, 4= Undecided,

5= Somewhat Agree, 6= Agree, 7= Strongly Agree

No.	Public Challenges	1	2	3	4	5	6	7
5.1	The initial installation cost of smart meters is a financial burden for many households.							
5. 2	There is a lack of proper technical support and maintenance for smart meter users.							
5.3	Some users may find smart meters difficult to operate and understand.							
5.4	Power outages and technical failures may affect the reliability of smart meter readings.							
5.5	There are concerns regarding data privacy and security with smart meter usage.							
5.6	The government needs to improve public engagement and support to ensure a smooth transition to smart meters.							
5.7	Smart meters require internet or communication networks, which may not be reliable in all areas.							
5.8	There is a risk of technical errors in smart meter readings, leading to incorrect billing.							
5.9	The lack of public awareness and education about smart meters may slow down their adoption.							
5.10	Some residents may be resistant to the change from traditional meters to smart meters due to distrust or lack of familiarity.							
5.11	Low-income households may struggle with the cost of transitioning to smart meters without financial assistance.							
5.12	There is a need for a clear policy framework to address consumer rights and dispute resolution related to smart meter issues.							

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.432[a]	.187	.177	1.31372
a. Predictors: (Constant), Q3CU, Q2G, PublicA				
b. Dependent Variable: PublicO				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	97.423	3	32.474	18.816	.000[b]
	Residual	424.561	246	1.726		
	Total	521.984	249			
a. Dependent Variable: PublicO						
b. Predictors: (Constant), Q3CU, Q2G, PublicA						

Coefficients[a]										
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.581	.277		5.703	.000	1.035	2.126		
	PublicA	.097	.064	.098	1.514	.131	-.029	.224	.781	1.280
	Q2G	.311	.065	.310	4.823	.000	.184	.438	.800	1.250
	Q3CU	.130	.060	.136	2.155	.032	.011	.249	.827	1.209
a. Dependent Variable: PublicO										

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.387[a]	.150	.139	1.36832
a. Predictors: (Constant), Q3CU, Q2G, PublicA				
b. Dependent Variable: PublicC				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	81.157	3	27.052	14.449	.000[b]
	Residual	460.587	246	1.872		
	Total	541.744	249			
a. Dependent Variable: PublicC						
b. Predictors: (Constant), Q3CU, Q2G, PublicA						

Coefficients[a]										
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.661	.289		5.753	.000	1.092	2.229		
	PublicA	.126	.067	.126	1.891	.060	-.005	.258	.781	1.280
	Q2G	.216	.067	.212	3.219	.001	.084	.349	.800	1.250
	Q3CU	.165	.063	.169	2.620	.009	.041	.289	.827	1.209
a. Dependent Variable: PublicC										