THE PLANNING, IMPLEMENTATION AND MONITORING OF ZESCO's PREPAYMENT METERING PROJECT IN LUSAKA PROVINCE: LESSONS LEARNT

By

Nayunda A. Wamunyima

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DECLARATION

I, Nayunda A. Wamunyima, do hereby declare that this dissertation represents my own work and that all work of other persons has been duly acknowledged; and that it has never been previously submitted for a degree, diploma or other qualifications at this University or indeed any other for similar purposes.

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CERTIFICATE OF APPROVAL

This dissertation of Nayunda A. Wamunyima has been approved as partial fulfilment of the requirement for the award of the Degree of Master of Arts in Public Administration by the University of Zambia.

Name	Signature	Date
Professor J. C Moomba	_____	_____
Dr L. C. W Kaela	_____	_____
Dr C. M. C Bwalya	_____	_____

ABSTRACT

The study was conducted to examine the planning, implementation and monitoring of the ZESCO Prepayment Metering Project in Lusaka Province. This was done in order to establish whether the management of project management processes hindered or helped in ensuring that the project fulfilled the requirements for which it was initiated. The study was also conducted in order to establish whether the project achieved key technical objectives of time, budget and quality as well as meeting the needs of key stakeholders.

The main objective of this study was to examine the planning, implementation and monitoring of ZESCO's Prepayment Metering Project and identify lessons learnt. The specific objectives included: to examine the planning of ZESCO's Prepayment Metering Project and identify lessons learnt; to examine the implementation of ZESCO's Prepayment Metering Project and identify lessons learnt; to examine the monitoring of ZESCO's Prepayment Metering Project and identify lessons learnt, and; to establish whether lessons learnt helped improve the planning, implementation and monitoring of phases II, and IV of the project.

The sample size for this study was 211 respondents. These included; 1 project manager, 10 project staff and 200 ZESCO customers from each of the residential areas covered by the three phases of the project. Both primary and secondary methods of data collection were used. This involved the use of questionnaires, semi-structured interview guides and review of relevant project and other documents. Quantitative data was analysed using the Statistical Package for Social Sciences and Microsoft Excel computer software packages. Qualitative data was analysed through content analysis.

The study findings indicate that 2 out of the 5 project objectives were achieved. According to the findings, there was a decline in non-technical losses from 30 percent in 2003 before the project was implemented to 20 percent in March 2007. However, although ZESCO had recorded a reduction in non-technical losses, the findings indicated that this particular objective was yet to be met.

The findings further indicated that lessons were learnt during the planning, implementation and monitoring of the project. Among the lessons learnt included the need for management support and involvement if the project was to succeed. The findings also show that some of the lessons learnt were applied while others were not. The study concluded that the project was not completed according to schedule, budget and quality due to changes in project scope and the problems encountered among other reasons. Finally, the study recommends that further research should be conducted to establish why organisations are not willing to learn and document lessons learnt from projects.

DEDICATION

This dissertation is dedicated to my late elder brother, Vincent W. Wamunyima.

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LIST OF ABBREVIATIONS AND ACRONYMS

ATM	Automated Teller Machine
BIS	Business Information System
CBI	Circuit Breakers Industries
CMS	Customer Management System
EVG	Extended Vending Gateway
ERB	Energy Regulation Board
FGD	Focus Group Discussion
IEC	International Electro Technical Commission
IMS	Incident Management System
IT	Information Technology
KPI	Key Performance Indicators
LCD	Liquid Crystal Display
MMD	Movement for Multiparty Democracy
MPOS	Mobile Point of Sale
PMI	Project Management Institute
PTS	Proprietary Transfer Specifications
SMS	System Master Station
SPSS	Statistical Package for Social Sciences
STS	Standard Transfer Specifications

STSA	Standard Transfer Specification Association
UNDP	United Nations Development Programme
VHF	Very High Frequency
ZESCO	Zambia Electricity Supply Corporation

CHAPTER ONE
INTRODUCTION

1.1. Background

The liberalization of the Zambian economy in the early 1990s, following the coming into power of the Movement for Multiparty Democracy (MMD), resulted in the Government of the Republic of Zambia removing subsidies from the electricity supply industry. This decision was contained in a Memorandum to ZESCO by the Ministry of Finance in August, 1992. Following this decision, electricity tariffs that were sub-economical in the past have regularly been adjusted upwards. As a consequence, between 1992 and 2003, the price of electricity had increased in real terms from 0.05 to 3.0 cents (US) per kilowatt-hour, representing an increase of about 6000 percent. The increment was necessary in order to generate revenue to maintain existing infrastructure and to provide quality electricity to customers (Chisanga, 2006).

However, the upward adjustment of electricity tariffs during this period did not result in a proportionate increase in ZESCO revenue. This was due to the fact that most electricity customers, who included residential, commercial, industrial and government institutions failed to meet their obligations. This meant that ZESCO incurred huge losses due to failure by its customers to settle bills. With arrears averaging 10 months of billing, and the rate of debt recovery standing at 80 percent of the monthly billing, the ZESCO debt by its customers was on the increase continuously (Ibid).

In this regard, several efforts aimed at reducing customer debt were put in place by ZESCO. Among them, the power cut programme. This initiative was aimed at encouraging customers to settle their outstanding bills. However, the programme was hampered by ZESCO's lack of capacity to disconnect defaulters in good time. Moreover, customers in low-cost, high density areas had accumulated huge bills that were beyond their capacity to settle within the shortest possible time (Chisanga, 2006).

As a result, ZESCO was owed a total of K 300, 000, 000, mostly by quasi government institutions which owed 50 percent of the total debt. The other 50 percent was owed by residential, commercial and industrial customers. In a bid to recover the debt and make it easier for customers to pay for electricity, ZESCO had to introduce new innovations so as to compel customers to settle their outstanding bills and improve its revenue base. For this reason, ZESCO introduced the Prepayment Metering System. The Prepayment Metering System was introduced in 2002 to help reduce the amount of debt owed by customers and increase the revenue base of the Corporation (ZESCO, 2005).

The Pilot Prepayment Metering Project was started in December 2002 in Lusaka's Emmasdale Township. A lot of ground work was done before ZESCO embarked on the pilot project. This involved exposing the ZESCO Metering Engineers to the prepayment metering technology by visiting various suppliers and utilities with experience in prepayment metering both in the region and overseas. The utilities toured included ESKOM of South Africa, EDM of Mozambique, Ethikweni Municipality of South Africa and Cape Town Municipality in South Africa. The tour was extended to China and India. In addition, a lot of experts and consultants were invited to conduct presentations to ZESCO Management and staff in the area of prepayment metering (ZESCO, 2012).

During the pilot project, 1000 single phase key pad prepayment meters, 3 vending machines and 1 System Master Station (SMS) were acquired. A number of modems were also acquired to facilitate communication between the vending machines and the SMS. The pilot project in Emmasdale was implemented by ZESCO in order to establish whether the system was cost effective and would help address problems such as theft of electricity and revenue collection difficulties experienced when using the Conventional Credit Metering System (Matale and Mubemba, 2005).

The Prepayment Pilot Project was considered to be a success since it resulted in the effective management of the customer debt, and a drop in the average monthly energy consumption per household by 20 percent from 750kwh with

the Conventional Credit Metering System to 600kwh in the area. In addition, the debt in the area reduced tremendously from 450 thousand kwacha to 300 thousand kwacha within one month of implementing the pilot project. The debt was factored in as a proportion of the tariff that the customers were expected to pay. It was expected that the debt was going to be completely reduced within a period of four years (ZESCO, 2005).

Since the pilot project was successful, ZESCO decided to implement the project in other parts of Lusaka. The installation of prepaid meters in Lusaka was done in three phases. The phase I installation of prepaid meters started on the 27th March 2006 in Emmasdale area where the pilot was carried out earlier in 2002/3. Under this project phase, ZESCO procured 23,094 single prepayment meters, thirteen (13) Vending machines and two SMSs. At the close of the project in December 2006, a total of 22, 055 prepaid meters were installed in 27 townships in Lusaka. The project phase was officially completed in December 2006 and this paved way for phase II of the project (ZESCO, 2012).

With the successful completion of phase I, the phase II prepaid meter installation project commenced on 16th of April, 2008. ZESCO procured a further 65,005 single phase prepaid meters and 114 three phase prepaid meters for Phase II project. At the time of project completion in 2009, phase II of the project had covered most of the townships in Lusaka and a total of 86, 200 prepaid meters had been installed. The customer base was 128,420 which meant that about 67 percent of customers in Lusaka were on prepaid system in 2009. The phase I and II prepayment projects had covered about twenty-seven (27) townships of Lusaka.

To that effect, ZESCO embarked on phase IV of the Prepayment Metering Project in order to meet one of the Key Performance Indicators (KPI) agreed upon with Energy Regulation Board (ERB) of metering all ZESCO customers by 31st March 2013. The customer base for Lusaka in 2010 was 141,931. The target for phase IV were new connections, customers that were left out in phase I and II and the customers in areas such as Chilanga, Kafue, Kafue

Gorge, Chisamba, Chongwe, Siavonga and Chirundu. Phase IV started on 12th May 2010 with an initial 70,000 meters procured with more meters procured later as the project progressed.

At the close of the project on 31st August, 2012, a total of 101,800 prepaid meters had been installed under phase IV of the project. The wide geographical coverage of Lusaka with the prepayment system and the attainment of 89 percent meter installations triggered the closure of the project. The phase IV Prepayment Metering Project was aimed at, among other things; to reduce the huge customer debt profile and revenue collection challenges that ZESCO faced. It also aimed at reducing the number of unmetered customers, as well as increasing the customer data base (ZESCO, 2012).

1.2. Statement of the Problem

Effective project planning, implementation and monitoring ensure that the project would meet not only key technical objectives (budget, time and quality) but also the needs of stakeholders. It also ensures that the project fulfills the requirements for which it was initiated. On the other hand, ineffective and inefficient project planning, implementation and monitoring would lead to project failure. Further, the essence of learning lessons in project management is to establish learning points for future project improvement. It is argued that learning lessons when planning for and implementing long term and ongoing projects is vital for project success and ensuring that the project is completed on time, within budget and acceptable standards (quality).

It was, therefore, assumed that lessons were learnt during the planning, implementation and monitoring of ZESCO's Prepayment Metering Project. It was, further assumed that such lessons led to improved planning, implementation and, monitoring of the Phase II and IV of the project. However, it was not known whether lessons were learnt, and if they were, whether they helped improve the planning, implementation and monitoring of Phase II and IV of the project.

1.3. Research Objectives

1.3.1 General Objective

To examine the planning, implementation and monitoring of ZESCO's Prepayment Metering Project and identify lessons learnt.

1.3.2 Specific Objectives

(i) To examine the planning of ZESCO's Prepayment Metering Project and identify lessons learnt.

(ii) To examine the implementation of ZESCO's Prepayment Metering Project and identify lessons learnt.

(iii) To examine the monitoring of ZESCO's Prepayment Metering Project and identify lessons learnt, and:

(iv) To establish whether lessons learnt helped improve the planning, implementation and monitoring of Phases II, and IV of Project.

1.4 Research Questions

The following research questions guided the development of the research tools used in this research.

- How was the planning of ZESCO's Prepayment Metering Project done and what lessons were learnt?
- How was the implementation of ZESCO's Prepayment Metering Project done and what lessons were learnt?
- How was the monitoring of ZESCO's Prepayment Metering Project done and what lessons were learnt? And,
- Did these lessons help improve the planning, implementation and monitoring of Phase II and IV of the project?

1.5 Significance of the Study

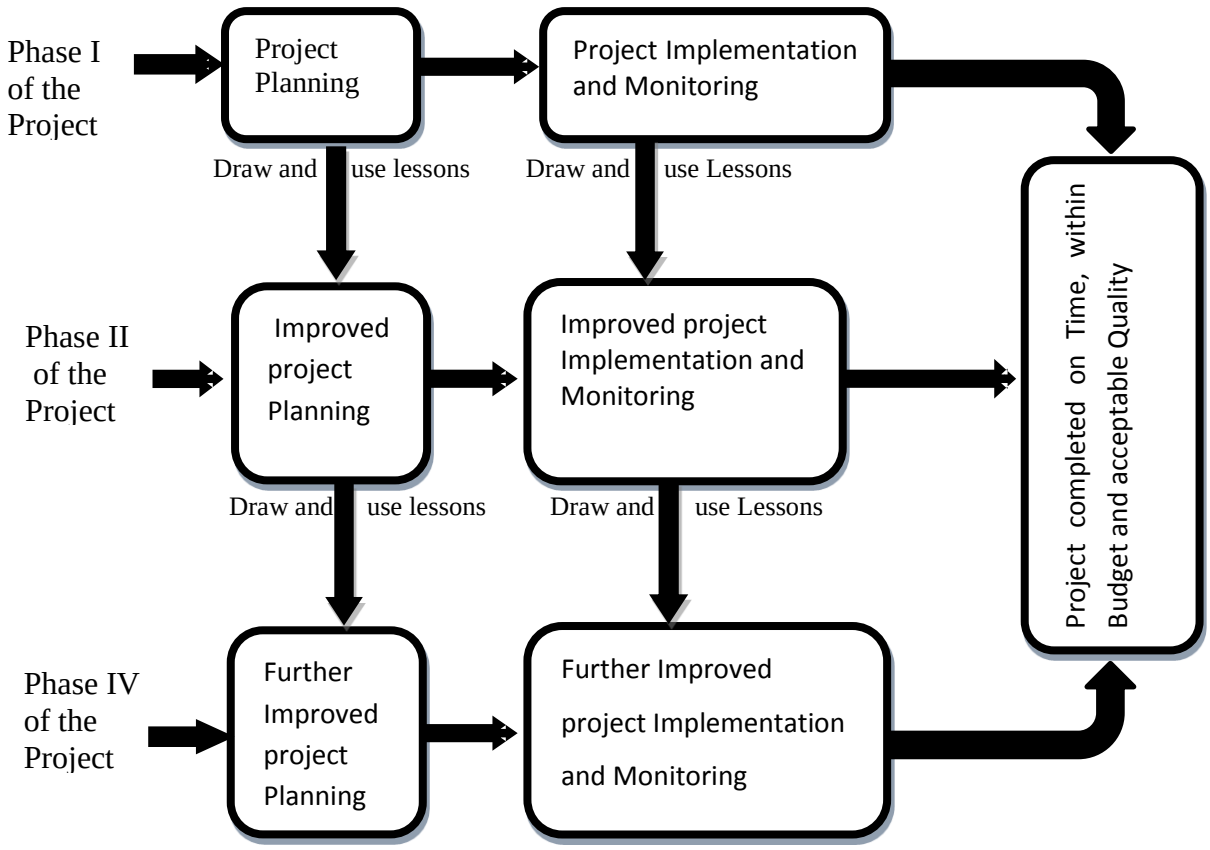
The information generated by this study may be useful to stake holders such as ZESCO management, the Energy Regulation Board and Academics. ZESCO management may use the information to assess whether or not the Prepayment Metering Project achieved its objectives. The Energy Regulation Board, as a regulatory body, may find the information useful in its quest to develop better regulatory frameworks that better satisfy the needs of the stakeholders in the

energy sector. Finally, scholars may find the information useful in building knowledge, especially in the energy sector that is so critical to Zambia's development.

1.6 Conceptual Framework

This study used a conceptual framework of lessons learned as depicted in the diagram below. The conceptual framework focuses on the following variables; (a) project planning, (b) project implementation, and (c) project monitoring. These variables were chosen because they are key in project management and necessary for drawing lessons.

Figure 1.1 Conceptual Framework of Project Planning, Implementation, Monitoring and Use of Lessons Learnt



1.6.1 Project Planning

In the context of this study, project planning refers to a project management activity that includes; identification of the problem, estimating the size of the project in terms of the technical scope and resources required to complete the

project, producing a schedule, identifying and assessing risks and negotiating for the commitment of all stakeholders (UNDP, 2009). Project planning is necessary in order to provide an overview of the entire project for all parties involved. Specifically, project planning seeks to identify the followings: The problem to be tackled, amount of work required to complete the project, minimum project completion time, major project deliverables, project objectives, barriers in project implementation, and ways to overcome identified barriers.

1.6.2 Project Implementation

In this study, project implementation was taken to mean the process of converting project inputs into project outputs. It is the process of putting into action the activities of the project. That is, putting into practice what was proposed in the project implementation plan. In other words, project implementation refers to the process of transforming the project proposal into the actual project. For Turner (1992), project implementation involves two aspects: project activation and project operation. Project activation refers to making arrangements to have the project start. It involves coordination and allocation of resources to make the project operational. On the other hand, project operation is the practical management of the project. Here, project inputs are transformed into outputs in order to achieve project objectives.

1.6.3 Project Monitoring

For purposes of this study, monitoring refers to the continuous process of assessing the status of project implementation in relation to the approved work plan, quality and budget. The overall purpose of monitoring is to ensure effectively managed results and outputs through measurement and assessment of performance. Monitoring helps to improve performance and achieve results. According to UNDP (2009), regular project monitoring enables the project manager and his team to identify actual or potential project risks, as early as possible in order to facilitate timely adjustments in project implementation. UNDP (2009) asserts that project monitoring should encompass the following;

(a) Focus on results and follow-ups: It looks for “what is going well” and “what is not progressing,” toward the intended results;

(b) Regular communication by the project coordinator or manager: The project coordinator or manager should be dedicated to assessing progress, looking at the big picture and analysing problem areas. They should ensure continuous documentation of the achievements and challenges, as they occur and avoid having to try to remember the events some time later (UNDP, 2009);

(c) Regular analysis of reports: The project coordinator or manager should review project related reports, including financial reports, by the implementing staff to serve as a basis for their analysis (Ibid);

(d) Use of participatory monitoring mechanisms to ensure commitment, ownership, follow -up, and feedback on performance: These include outcome groups, stakeholder meetings, steering committees, and focus group interviews (Op cit);

(e) Ways to objectively assess progress and performance based on clear criteria and indicators stated in the logical framework matrix of the project document: The project team should agree on a performance measurement system by developing indicators and baselines (UNDP, 2009);

(f) Active generation of lessons learned, ensuring learning through monitoring tools, adapting strategies accordingly and avoiding repeating mistakes from the past (Ibid).

1.7 Literature Review

This section contains reviewed literature that was relevant to this study. Literature reviewed show that, there have been studies done to assess the effectiveness, efficiency and benefits of prepayment systems in sectors such as water and electricity. However, since this is new technology, not much has been done in terms of research in the area of prepaid electricity metering system. In this study, both local and international studies were reviewed.

Tewari and Tushaar (2002) conducted a study entitled, “An assessment of South African prepaid electricity experiment, lessons learned, and their policy implications for developing countries”. The study results indicated that prepaid electricity had a number of benefits to both consumers and the utility

company (Eskom).The results showed that these benefits accrue in various forms and contribute to efficient functioning of electricity production, distribution and revenue generation function. The benefits to the utility company included: improved customer service, since it eliminated billing delay and no account posting or additional billing system was required. Furthermore, prepaid electricity was also useful in recovering bad debt. For example, in Eastern Cape, every time a customer bought a prepaid card, they paid 15 percent towards debt redemption and, thus, Eskom had no more such complaints. Finally, the study discovered that prepayment system helped in improving the revenue management system of Eskom.

On the part of customers, Tewari and Tushaar (2002) also discovered that customers using prepaid electricity enjoyed a number of benefits as well. These included, having a better understanding of how much energy was being consumed. This enabled the customers to cut on the unnecessary use of electricity by turning off lights, geysers, and other electricity-based instruments not in use. In addition, control over electricity usage meant that the customers were now able to manage their budgets better. The customer no longer had to pay for disconnection/ reconnection and there was no more waiting for reconnection.

However, the study also noted that there were disadvantages of using the prepaid metering system to both the customer and Eskom. According to the figures collected by Tewari and Tushaar (2002) from the utility company (Eskom), the cost of maintenance of prepayment meters was not going down; instead, it was going up due to some unanticipated circumstances that cropped up, such as meter failure. It was also observed that prepayment could not handle large size current at that stage; therefore, it was not a panacea to the problems experienced under the credit (post-paid) payment system. In addition, the customers also considered prepayment to be an instrument of control by the power utility company (Eskom) and the government. This view was highly prevalent in highly politicised communities such as Soweto, in Johannesburg.

Tewari and Tushaar (2002), therefore, concluded that prepaid electricity was not necessarily cheaper than conventionally billed electricity and that it is not necessarily a well-received innovation in all segments of the South African society. They further concluded that the experiment benefited large masses of small and dispersed consumers.

The lesson drawn from this study was that it was always necessary to include the methodology used in the report, as this would enable other researchers to replicate the study in future, if they so wished. The weakness of the study was that the methodology used when conducting the study was not contained in the report. Therefore, it may be difficult to replicate the study and also raises questions of how valid and reliable the results are. In addition, the sample size used in the study was not indicated in the report.

Nevertheless, this study was of interest to the current study because it highlighted the experiences of both the power utility company and the customers with the prepayment metering system. Tewari and Tushaar's study also attempted to assess whether the project met the needs of stakeholders. However, Tewari and Tushaar's study did not focus on whether technical and project objectives were achieved. The study did not further examine the project management process, leaving a gap which this study attempted to fill.

Kumwenda (2006) also conducted a study looking at "pre-paid water metering; social experiences and lessons learned from Klipheuwel pilot project in South Africa". Self-administered questionnaires were employed to collect data from a total of 138 respondents in the area where the pilot project was implemented. In addition, the researcher used data collection methods such as observation and Focus Group Discussions (FGD) to collect data from the study area. The participants in both FGD and Self-administered questionnaires were purposively selected since the target was the project beneficiaries.

The findings revealed that the majority of the water users preferred using pre-paid water meters rather than conventional meters. The results also indicated that, most households (66.7 percent) in Klipheuwel considered using a pre-paid water meter "very important", while 25.9 percent felt it was "just

important". Thus, 92.6 percent of the 81 water users were certain that using pre-paid water meter was "important" to them. According to the results, only 1.2 percent ranked using pre-paid meters to be "moderately important", while 1.2 percent ranked it to be of "little importance".

In addition, the FGD revealed that water users in Klipheuwel had a positive attitude towards pre-paid water meters. This was because pre-paid water meters allowed water users to understand better the amount of water that they used each month. In addition, the prepaid meters promoted water-wise use so that consumption remained within the free basic water limit. Kumwenda (2006) noted that pre-paid water meters also empowered the water users to budget and manage their water usage. The results, therefore, showed that most respondents in Klipheuwel had a positive attitude towards using pre-paid water meters.

The lesson drawn from this study was that the use of both quantitative and qualitative instruments to collect data is good because it allows for triangulation. In this regard, results from the data collection instruments could be compared. The advantage of quantitative data is that it ensures that the researcher focuses on explaining relationships that are relevant. It also strengthens the findings when its findings are comparable with those of qualitative results. In other words; the qualitative findings provide an explanation to the theory behind the patterns emerging within the quantitative data.

However, it is important to note that this study was not conducted in the area of interest to the current study, that is, prepaid electricity. Therefore, the results from such a study may not be applicable to the electricity sub-sector. Further, the study was conduct in a different environment and focused on assessing the experiences of the water utility company and its customers with the prepaid water meters. It should also be noted that the study did not attempt to examine the project management process that produced the project output, which is the focus of the current study. There was, therefore, need for this study to be conducted.

Lisanne (2012) conducted a study focusing on pre-paid water in Namibia. The study was titled: “The impact of Prepaid Household Water Meters on the inhabitants and the Municipality of Otjiwarongo”. The study targeted the beneficiaries of the project and some employees from the Municipality. A total of one hundred (100) respondents were interviewed using a questionnaire. Other methods used in collecting data from senior officials and community leaders included; semi-structured interviews (18) and observation.

Lisanne (2012) discovered that, after the installation of pre-paid water meters, less water was consumed by the customers but the amount of money received by the water utility company from water remained the same. The reason for this was that, despite water prices being on the increase, including basic costs, people were using less water than before the introduction of pre-paid water meters.

Lisanne (2012) further observed that the amount of money received remained relatively the same despite a reduction in the amount of water consumed because the price of water was increased. However, he also discovered that pre-paid water meters helped the municipality to recover debt. People had to pay a certain amount as debt payoff to the municipality every month. If they had not done this, a part of the money they use to buy water credits went to debt payoff.

The lesson learnt from Lisanne’s work was that semi-structured interviews were very helpful when collecting information from people in strategic positions such as top-level management. However, it must be mentioned here that, this study was not conducted in the field of interest (prepaid electricity) and, therefore, the findings may not be applicable to the field, but provide useful insights to the current study. There was, therefore, need to conduct a study that focused on prepayment electricity system in Zambia. Further, the fact that Lisanne’s study focused on the users and water utility company’s experiences with the project output and not an examination of the actual project management processes, justified the need for another study.

Alam and Shahriar (2012) conducted a study whose title was: “Electricity Billing System at Residential Level in Sylhet City; is Pre-paid System

perceived as a Better Option by the Subscriber?" The study was conducted in Bangladesh and the study population comprised fifty (50) pre-paid subscribers and fifty (50) post-paid subscribers. To select respondents from the population of study, Alam and Shahriar (2012) used convenient sampling. For quantitative data, questionnaires were used. In addition, Focus Group Discussions and the review of other documents such as journals, articles, and periodical for qualitative data were conducted.

The results of the study indicated that the level of convenience felt by the respondents had a heavier distribution on the positive side on an aggregate level. For instance, 42 percent of the respondents felt convenience and 7 percent felt extreme inconvenienced in this regard. On the other hand, a mere 8 percent felt inconvenienced and only 3 percent felt extremely inconvenienced in this regard.

In addition, Alam and Shahriar (2012) discovered that the respondents' overall satisfaction level with their billing system had a highly positive distribution. In this regard, 77 percent of the respondents felt satisfied, and only 9 percent felt dissatisfied. The lesson drawn from Alam and Shahriar's work was that the mixed method approach of data collection is desirable in the sense that it enables the researcher to maximise the benefits, as well as minimise the limitations of both methods. The weakness of the study was that the results were not clearly presented. Therefore, it was difficult to know which percentages were for pre-paid subscribers and which ones were for the post-paid subscribers. In addition, Alam and Shahriar (2012) used non probability sampling (purposive sampling) to select respondents which does not allow for generalisations of findings.

However, Alam and Shahriar's study was of interest to the current study because it highlighted the experiences of both post-paid and prepaid electricity customers in Bangladesh. It is also important to note that the current study also assesses ZESCO customers' experiences with the prepayment metering system, albeit with emphasis on the quality of prepaid meters and prepayment metering system. However, Alam and Shahriar's study did not examine the

planning, implementation and monitoring of the project, leaving a knowledge gap which the current study attempted to fill.

Nafale (2004) carried out a survey on "the attitudes of prepaid electricity customers in Soweto, South Africa". A total of 800 households in four suburbs of Soweto were asked whether "a prepaid meter was the best way of providing electricity for their household". According to the findings, 47 percent agreed with the statement and 42 percent disagreed. The findings further indicated that 42 percent of households with income of under R800 per month felt that a prepaid meter was the best way of providing electricity, whereas 57 percent disagreed with the statement. On the other hand, in households with income over R800 per month, 70 percent responded positively to the question about prepaid meters and only 30 percent responded negatively.

When Nafale (2004), asked the surveyed households what the advantages of prepaid meters were, the most common answers were focused on the ability to control (limit) the household's energy budget and avoiding owing money for electricity. However, slightly more than a third of the respondents saw no advantages in prepaid meters. They mentioned disadvantages such as the inability to buy prepaid cards, the enforced limiting of use of electrical appliances and the fact that units, when purchased, were used up very quickly. It was difficult to draw lessons from this study because the methodology that was used in the study was not indicated in the final report. Therefore, this was considered to be a major weakness of this study.

Notwithstanding the above weakness, the study shade light on the attitude of prepaid electricity consumers in South Africa with regard to whether or not the prepaid electricity meters were the best way of providing electricity. On the other hand, it should be noted that the study focused on assessing the attitudes of prepaid customers and, did not examine the planning, implementation and monitoring of the project. Therefore, there was need to conduct another study.

McKenzie (2012) conducted a study entitled" Pre-Payment Meters and Energy Efficiency in Indigenous Household'' in Australia. In this study, he wanted to address issues concerning pre-payment meters, functionality and reliability. He also wanted to assess power card use, access and convenience, household

arrangements for sharing the cost of electricity, household energy consumption, energy efficiency awareness and activities. McKenzie (2012) further wanted to assess Commonwealth government equity and hardship programmes, feedback options and tools for tracking household energy consumption as well as demographic details of participants.

Data collection for the study included a two staged approach; literature review of the relevant industry and academic sources, and interviews with indigenous people using pre-payment meters in town camps. A total of 12 households were interviewed in town camps in Alice Spring. This represented a total of 25 respondents.

Semi-structured interview questions that focused on residents' lived experience of prepayment meters and associated issues were developed. McKenzie (2012) chose the semi-structured interviews in order to accommodate various cultural protocols and language differences. In addition, he used a questionnaire/discussion guide to elicit information on a range of issues surrounding household electricity consumption, conservation and pre-payment.

The recruitment of respondents focused on the availability of willing volunteers who would represent the diversity of indigenous people living in town camps in Alice Springs. All respondents were given a copy of the Information Sheet and also signed the informed consent document. The interviewees were advised that the information provided would not be attributed to named individuals and no one would be identifiable in the report. With the consent of participants, interview responses were recorded on paper by the researcher.

McKenzie (2012) discovered that most of the respondents felt satisfied with the pre-payment meters and power cards, and preferred them over alternative billing methods. On the other hand, the results indicated that there were some problems. These included; difficulties accessing power cards, high weekly costs, frequent disconnections and limited awareness of rebate programmes available as well as poor understanding of energy efficiency concepts or ability to make changes to manage household energy consumption.

The results further showed that the respondents were using pre-payment meters to pay for their electricity, and had never participated in a post-paid system or received a power bill, except two. Furthermore, all the respondents reported that they had 'self-disconnected' or run out of power at their homes in the last month at the time the study was conducted. The frequency of reported self-disconnection was high, with half of the respondents (50 percent) reported that the disconnection occurred one or more times per week and the other half (50 percent) reported that the disconnection occurred at least once per month. The respondents were then asked about the duration of power outages due to self-disconnection. The findings indicated that 58 percent of the respondents reported that the outages lasted several hours, while 33 percent reported the duration of around one day.

Finally, McKenzie (2012) discovered that, despite the high rate of self-disconnections, all the respondents clearly expressed satisfaction with the pre-payment meter method of paying for electricity. Moreover, those who had used other payment methods (conventional power bills) had also stated their preference for pre-payment meters. Reliability of the meters themselves was also high, with residents reporting no problems with the operation of the meters.

McKenzie (2012) concluded that almost all indigenous households in town camps and remote communities had pre-payment meters for their electricity use. He stated that since the pre-payment meters were only read by utilities once or twice a year, there was little flow of information on consumption patterns for residents. He further stated that there were many concerns raised over equity issues surrounding prepayment meter use. There were also very high rates of electricity disconnections in terms of both frequency and duration reported. With the nature of pre-payment meters, there was little capacity to track these disconnections. Consequently, this was a problem that was yet to be addressed by government or utilities.

The lessons learnt from this study was that, it is always important to consider ethical issues when conducting research among minority groups. However, it must be mentioned that McKenzie (2012) did not indicate whether interviews

and Focus Group Discussions were conducted with the same group (12 households) or a different one. Moreover, the validity and reliability of the conclusions drawn, later on the generalisations are highly questionable since non probability sampling method (convenient sampling) was used in the study. This is because this method of sampling is not free from personal bias and prejudice by the researcher.

Mackenzie's study was of help to the current study since it addressed issues to do with prepaid meters, access and convenience, household energy consumption and sharing of the cost of electricity. However, Mackenzie's study did not examine the project management processes that resulted into the project output, leaving a gap which the current study attempted to fill.

Furthermore, Chisanga (2006) conducted a study aimed at evaluating the prepayment metering system in Lusaka's Emmasdale area and found that prepaid metering had a number of benefits to both the power utility company and to the customers. A survey of various ZESCO officers and 200 simple randomly selected residential customers from a population of 913 customers on the Prepayment Metering System in Emmasdale was conducted. Secondary data was also obtained from various sources such as magazines, pamphlets, books, journals, the internet and other published and unpublished documents. Both structured and open-ended questionnaires were administered to various ZESCO employees and the 200 customers in Emmasdale area.

Chisanga (2006) discovered that, with the introduction of the Prepayment Metering System in Emmasdale area, ZESCO had minimised the incidence of debt. He also found that ZESCO was able to collect about K10, 700 from debt every month. This was attributed to a debt recovery system that allowed customers to pay 40 percent of every outstanding bill whenever they bought electricity. As a result, the outstanding amount in terms of bills that stood at K100, 140 as at November, 2003 was reduced to K28, 000 after implementing the pilot project in Emmasdale area. In terms of revenue collection, Chisanga (2006) found that there was an increase in the amount of revenue collected by ZESCO under Prepaid Metering System in comparison with Conventional Credit Metering System. The reason for this was, under the prepaid metering

system, the customer pays for electricity before they actually consume it; therefore, whatever was billed was also sold. Consequently, there were no arrears resulting from non-payment for electricity, as was the case with conventional metering system.

Furthermore, the findings indicated that prepayment metering system had many benefits for the customer. For example, it was found that prepayment metering system had made it easier for customers to pay for electricity bills. The findings showed that 97 percent of the customers interviewed agreed that paying their electricity bills had been made easier. Other benefits highlighted in the findings include; prepaid metering system making it easier for customer to buy ZESCO electricity tokens and monitor the consumption thereof.

However, Chisanga (2006) also discovered that prepaid metering system had a number of problems to both ZESCO and customers. On the part of ZESCO, there was lack of the necessary expertise within ZESCO to repair the faulty meters. Furthermore, the introduction of Prepayment Metering System also deprived ZESCO of the necessary financial resources to invest in other areas such as power generation and transmission. This was because, in comparison with conventional credit meters, prepayment meters cost more. Moreover, customers complained that they were unable to buy prepaid electricity units on weekends and public holidays.

The lesson learnt from this study was that secondary data can be a very good source of information that can be used to complement primary data sources. Chisanga's study was important to the current study due to the fact that it aimed at evaluating the Prepayment Metering Pilot project in Lusaka with particular focus on the benefits of the project to ZESCO and customers.

Notwithstanding the findings by Chisanga (2006), it is important to note that his study did not examine the planning, implementation and monitoring of the Prepayment Metering Project, thereby leaving a gap. Therefore, this study sought to fill the gap left by examining the planning, implementation and monitoring of ZESCO's Prepayment Metering Project in Lusaka. The study further sought to fill the gap by attempting to establish lessons learnt and

determining whether these lessens helped improve the planning, implementation and monitoring of subsequent phases of the project.

In summary, international and local studies have been reviewed. These studies focused on prepaid metering systems in both the electricity and water sectors and their benefits to utility companies and the customers. The lessons drawn from these studies included, among others; Focus Group Discussion being an appropriate method of data collection when one seeks to get insightful information on a given topic from the community. Finally, the other lesson was that a mixed method approach of data collection was desirable in that it enables the researcher to maximize the benefits, as well as minimise the limitations of both methods. Lastly, it should be noted that all the studies reviewed were focusing on the output of the respective projects and did not examine the project management processes, which was the focus of this study. There was, therefore, need to conduct a study to examine the planning, implementation and monitoring of the Prepayment Metering Project and establish lessons learnt.

1.8 Research Methodology

1.8.1 Study Design

This research employed the Case Study method to collect data directly from the respondents using qualitative and quantitative methods. A case study design was employed because it allows for exploration and analysis of phenomenon (project) as well as a deeper and through study of the same.

1.8.2 Sampling Design

In this research, purposive sampling was employed to select the respondents. The method involved objectively selecting the respondents to be interviewed by the researcher in order to represent, as accurately as possible, the characteristics of the population of interest (project manager and implementers). The decision to use purposive sampling was made due to the fact that the research was only targeting respondents who had knowledge of the project. Furthermore, the study employed Systematic Sampling to select 200 ZESCO customers with prepaid electricity meters in Lusaka. This involved the selection of every 10th household from each of the residential

areas (Chelston, Chilenge and Chilanga townships) covered by the Phase I, II and IV of the Prepayment Metering Project, respectively. The interval at which the houses were selected was 10, after the first one had been randomly selected. A total of 211 respondents were interviewed in this research. These included; one (1) project manager, 10 project team members and 200 ZESCO customers with prepaid electricity meters.

1.8.3 Data Collection

Both primary and secondary methods of data collection were used. This involved the use of questionnaires, semi-structured interview guides and review of relevant project and other documents. In this regard, findings from both primary and secondary sources can be compared.

1.8.4 Primary Data

Primary data was collected using questionnaires and in-depth interviews. In-depth interviews were conducted by the researcher with the project manager and project team members. The format of these interviews was semi-structured, in order to allow the researcher to ask standardized questions to the respondents, as well as to explore areas of interest which arose during the interviews. In addition, semi-structured questionnaires were administered by the researcher to 200 (Chelston 60, Chilenge 60 and Chilanga 80) sampled ZESCO customers.

1.8.5 Secondary Data

Secondary data was collected through Desk Research. The data was obtained from both published and unpublished project documents such as; project closure document, project implementation plan, project completion reports, project progress review reports, and other relevant documents.

1.8.6 Data Analysis

Quantitative data was analysed using the Statistical Package for Social Sciences (SPSS)-version 16 and Microsoft Excel computer Software packages. The two packages were employed to analyse the data because of their usefulness in the generation of statistical responses, coupled with their ability to produce accurate computations and present information in different forms such as bar charts, graphs and tables.

After editing the completed questionnaires, the raw data was then coded and edited. The edited and coded raw data was then entered into the computer and processed. SPSS was used to analyse the data and to establish patterns and associations within the quantitative data. The processed information was then presented in form of graphs and bar charts. Qualitative data from the key informants and project documents was analysed manually. In other words, content analysis was used to analyse qualitative data.

1.9 Problems Encountered During Research

There was 3 months delay in getting permission to conduct the research from ZESCO. In addition, a few project staff were not available because they were either promoted, transferred to other regions, or retired. This made it difficult for the researcher to interview all the full-time ZESCO staff that were involved in the project. Moreover, there was an almost six month delay by the Graduate Studies Committee of the School of Humanities and Social Sciences to approve the research proposal. This delayed data collection and the application to ZESCO management to conduct research by more than six months.

1.10 Structure of the Dissertation

Chapter One: This chapter contains background information, research objectives, study significance, conceptual framework, literature review and research methodology.

Chapter Two: The chapter presents information on the legal status of ZESCO and its management structure as well as the Prepayment Metering System in ZESCO.

Chapter Three: The chapter provides information on the reasons for introducing the Prepayment Metering Project, project objectives, project management structure, materials for project management and planning, management support to the project, project scope management, problems encountered during project planning, lessons learnt and their application to phases II and IV of the project.

Chapter Four: This chapter examines the performance of the project in relation to; training of project staff, materials for project implementation, project budget management, project quality management, project time management, factors that affected project implementation and lessons learnt as well as their application to phases II and IV of the project.

Chapter Five: The chapter discusses materials for project monitoring, mechanisms for project monitoring, project risk management, communication during project monitoring and lessons learnt as well as application, documentation and distribution of lessons learnt.

Chapter Six: This chapter presents a summary of conclusions.

CHAPTER TWO

ZESCO MANAGEMENT STRUCTURE AND PROFILE

2.1 Introduction

This chapter provides the context within which the research was conducted. The chapter also gives the context within which the Prepayment Metering Project was undertaken. The focus of the chapter is on: Legal status of ZESCO and its management structure, and, a brief explanation of the prepayment metering system in ZESCO.

2.2 Legal Status of ZESCO

ZESCO Limited is a Parastatal company incorporated under the Companies Act, cap 388 of the Laws of Zambia as a company limited by shares. Therefore, the Corporation is supposed to declare profit. ZESCO was established in 1970 after an Act of Parliament was passed in 1969. It is wholly owned by the Government of the Republic of Zambia through the ministry of Energy, Environment and Water Development and the Ministry of Finance (ZESCO, 2008).

However, ZESCO operates as an autonomous entity that is monitored by the Government, through the Board of Directors to ensure that performance benchmarks are met. This relationship was previously defined in the Performance Contract that was signed between the Government and ZESCO in 1996. The contract defined the commercialization issues and other operational benchmarks for ZESCO over the contract period of three years. Currently, there is a new contract between ZESCO and Government that defines the management of the Corporation following an amendment of the ZESCO Articles of Association (ZESCO, 2009).

The ZESCO Articles of Association is an embodiment of the objectives for which the Corporation was established. The Corporation is mandated to, among other things, perform the following functions: To generate, acquire, transmit, transport and convert electricity; acquire, operate, control and manage undertakings for the generation of supply of electricity; to act as a

public undertaking as defined by and for all purposes of the Electricity Act and of every statutory modification or re-enactment thereof for the time being in force; and to supply electricity to any such undertaking as aforesaid or to any other person, Corporation, Authority, Board or Government (Sampa, 2003).

2.3 ZESCO Management Structure

ZESCO limited is governed by a Board of Directors which is appointed by the Government with wide consultations and participation of the private sector. It has its headquarters in Lusaka, Zambia and offices spread in every district of the country. The principle activity of the company is to generate, transmit, distribute and supply electricity to local and international market. In 2008, ZESCO had an installed hydro-based generation capacity of 1788.3 MW. The main generation stations being; Kafue Gorge Power Station, Kariba North Bank Power Station, Victoria Falls Power Station and a number of mini-hydro power plants as well as diesel power plants situated in different parts of the country (ZESCO, 2009).

The ZESCO Articles of Association specify the composition, appointment, term and removal of Board members. The Board members have to be appointed from the following institutions: Zambia National Farmers' Union; Zambia Institute of Chartered Accountants; Engineering Institute of Zambia, Law Association of Zambia; Zambia Association of Chambers of Commerce and Industry; Permanent Secretary in the ministry of Finance; and the Permanent Secretary in the Ministry of Energy, Environment and Water Development. Each of the institutions listed above submit nominees to the Minister of Energy, Environment and Water Development who takes them through the government vetting process and thereafter announces the names of Board members to the public. The Board members are mandated to appoint a Chairperson from among them but may not elect either of the two permanent sectaries as a Chairperson (Kbaki, 2009).

The ZESCO Board of Directors is supported by three (3) committees: Technical Committee chaired by the Engineering representative; Finance Committee chaired by the Chartered Accountant representative; and the

Customer Service Committee whose chairperson is selected by the Board members and it deals with customer service issues and general administration. The ZESCO Board of Directors is also supported by a Management Executive Board headed by the Managing Director who is assisted by seven Directors (ZESCO, 2009). Each of the seven directors is tasked with the responsibility of running the following directorates:

2.3.1 Corporate Affairs and Business Development Directorate

The directorate of corporate affairs and business development perform the following key functions; public relations, pricing of electricity and the development and management of the Corporation's strategic goals and objectives (ZESCO, 2008).

2.3.2 Finance Directorate

This directorate is responsible for the management of optimal working capital cash flows including sourcing of financing opportunities to guarantee ZESCO's viability. The directorate is also responsible for accounting services and control, monitoring of expenditure and observance of budgets. The finance directorate also carries out periodic asset re-evaluation and is responsible for credit collection (Chisanga, 2006).

2.3.3 Generation Directorate

The generation directorate is charged with the responsibility of operating and maintaining all existing hydro, mini-hydro and diesel power plants in the country. These include, among others; Kafue Gorge, Victoria Falls, Kariba North and Musonda falls power stations (ZESCO, 2009).

2.3.4 Transmission Directorate

The directorate of transmission on the other hand is responsible for the bulk transmission of high voltage power from the power stations to the load areas through the use of high voltage transmission lines (Ibid).

2.3.5 Legal Directorate

The Legal Directorate is responsible for guaranteeing Corporate Governance of the Corporation. That is, good management style based on transparency, accountability, and ethical conduct. The directorate is also responsible for the

administration of the company's obligations under the Companies Act, Cap 388 of the Laws of Zambia, drafting of contracts, negotiations and signing of the same. The directorate is further responsible for processing claims against defaulters and debtors, acquiring or disposing of property and registration of mortgages, conveyance of property and defends the Corporation in Court against law suits. Finally, the directorate provides legal advice and opinion to management and the Board of Directors (ZESCO, 2009).

2.3.6 Distribution, Supply and Customer Service

This directorate is responsible for the operation and maintenance of the distribution system throughout the country to ensure supply availability to the customers. In addition, the directorate is also responsible for system development and business growth by carrying out electrification projects to connect new customers. The directorate further acts as an interface between the Corporation and its customers. Specifically, the directorate performs the following functions; receiving fault reports from customers, complaints and query handling and handling of special and/ or urgent customer requests. The directorate of distribution, supply and customer service also houses the operations and maintenance division (Chisanga, 2006).

2.3.6.1 Operations and Maintenance Division

The operations and maintenance division is divided into four divisions, and these include: Lusaka division, Northern division, Copperbelt division and Southern division. Each of the four divisions is further sub-divided into four regions (Chisanga, 2006).

2.4 The Prepayment Metering System in ZESCO

In its simplicity, a Prepayment Metering System operates on (3) three levels: At the lowest level are the meters that are installed at the customers' homes or premises. The pre-paid meter display provides information to the customer on the voltage, current, consumption and available credit. The next level is the Vending Stations which are placed at ZESCO offices (ZESCO customer service centres) or at appointed vending agents (third party vendors). Third party vendors include but are not limited to supermarkets, service stations and retail outlets, some of whom ensure that customers have 24 hour access to

electricity tokens. The third party vendors have signed a formal contract with ZESCO for the provision of the service. The credit is purchased upfront by the vendor who makes his/her money via 2 percent commission on each purchase made (ZESCO, 2010).

At the top level is the System Master Station (SMS) or master client which is necessary to ensure a common database for reporting as well as providing for total management, administration, financial and engineering control of the system. The communication between the vending stations and the meters is in form of a token which is used to top up the credit. On the other hand, the System Master Station (SMS), also known as the servers communicates to various vending stations (vending clients) via modem or other data link. Information on the consumers' tariff changes and consumption is communicated to the vending station and detailed customer sales are communicated back to the SMS (ZESCO, 2006).

The prepayment metering system has many of benefits to both ZESCO and the customer. Some of the benefits to ZESCO customers under this system include; the overvoltage features on the prepayment metering system protects customers' equipment from the effects of over and/or under voltage. The in house meter display provide other real-time information about how much power the customer is consuming and how much of their purchases are remaining before power is automatically disconnected. In addition, customers can choose when to buy power in amounts they can afford from as low K 10 after honouring their monthly tax obligations and other statutory charges. Thus, increasing the number of people who can have access to electricity in Zambia (ZESCO, 2012).

On the other hand, the prepayment metering system has both considerable financial and operational benefits to ZESCO. With credit meters, customers consume more power and rarely pay for the full amount billed in a particular month making them start building up debt slowly leading to the company collecting less revenue than the target (ZESCO, 2007).

However, under the prepayment metering system, customers consume less energy and since payment is made up front, ZESCO collects more revenue

than on credit metering system, with little or no effort at all compared to credit metering system that sometimes forced ZESCO to carryout massive disconnections in order to enhance revenue collection. In addition, the prepayment system has eliminated meter reading. Meter readers have been redeployed without increasing the wage bill in departments which could have made the company increase the wage bill by engaging additional staff (ZESCO, 2012).

CHAPTER THREE

THE PLANNING OF ZESCO's PREPAYMENT METERING PROJECT AND LESSONS LEARNT

3.1 Introduction

During the planning of the Prepayment Metering Project, a labour cost analysis on the modes of installation was carried out in order to determine a cheaper and flexible option of implementing the project. The options considered were: installation and commissioning by ZESCO under the supervision of the supplier; installation and commissioning by a contractor under the supervision of the supplier; and installation and commissioning by the supplier. After labour costs were computed for the three options, the first option was found to be ideal (ZESCO, 2006). It is against this background that this chapter examines the planning of the Prepayment Metering Project and discusses the lessons learnt during project planning. In examining the planning of the project, the following have been considered; reasons for introducing the Prepayment Metering Project, project objectives and project management structure. The chapter further examines the adequacy of materials for project planning, management support to the project (human and financial resources), project scope management and the problems encountered during project planning. The chapter also discusses the lessons learnt during project planning and their application to phases II and IV of the project. The last section of the chapter is a conclusion.

3.2 Reasons for Introducing the Prepayment Metering Project

A reliable and cost effective electricity service is critical to economic development. Therefore, in order for ZESCO to satisfy the electricity demands of its current customers and bring its services to new customers, it was essential for ZESCO to ensure that it earned enough revenue to cover its operations and maintenance costs and be able to invest in system rehabilitation and expansion (Mubemba *et al.*, 2005).

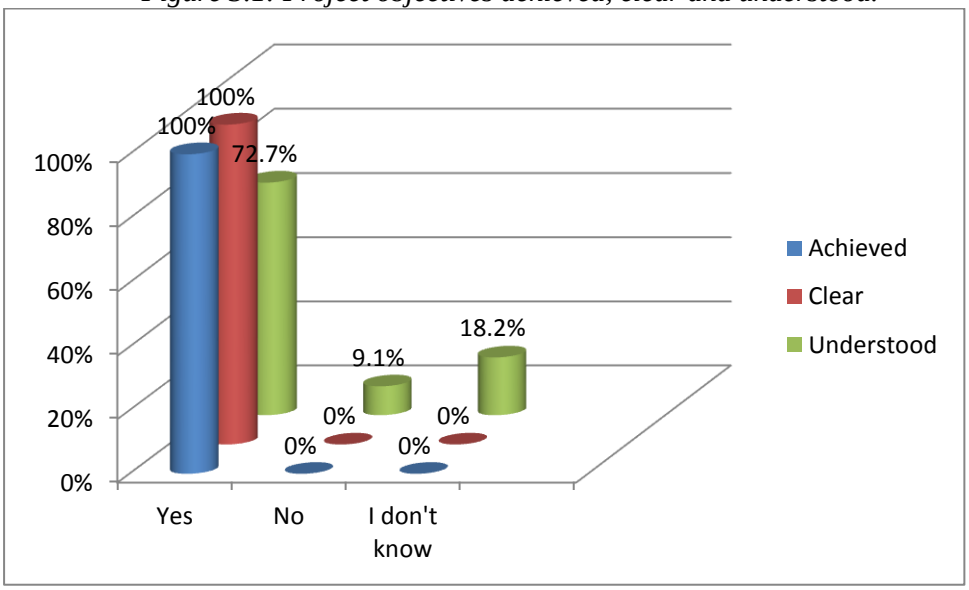
Projects are usually initiated because a business problem or opportunity exists. In the case of ZESCO, a business problem existed. According to the research

findings, the initiation of the Prepayment Metering Project was driven by a number of factors: Firstly, ZESCO had problems with the post-paid billing system, these included wrong customers billing, high transport and operational costs for meter reading and huge customer debt. Secondly, low revenue generated due to customers not settling their bills meant that ZESCO had to come up with innovative initiatives to improve revenue collection. Thirdly, the need to reduce non-technical or commercial losses that were associated with the post-paid billing system as well as ensuring that customers paid for what they used, all led to the need for the introduction of the Prepayment Metering Project by ZESCO (ZESCO, 2006). ZESCO, therefore, identified prepayment metering as one of the strategies necessary for the Corporation to operate efficiently and economically and overcome the problems mentioned above.

3.3 Project Objectives

To address the above mentioned problems, ZESCO introduced the Prepayment Metering Project whose objectives were to: reduce commercial or non-technical losses that occurred through post-paid billing system thereby improving ZESCO's financial status; improve energy accountability and energy balancing; ensure effective revenue collection and help reduce customer debt owed; meter (pre-paid meters) all unmetered customers and; to improve on customer relations (ZESCO, 2006).

Figure 3.1: Project objectives achieved, clear and understood.



Source: Primary data

There was, therefore, need to determine whether the above objectives were achieved, clear and understood by all stakeholders after the project was completed in Lusaka. Project staff were therefore asked whether the project objectives were achieved, clear and understood by all stakeholders. The findings indicate that 100 percent of project staff were of the view that the project objectives were achieved and clear to all project stakeholders. However, despite all project staff indicating that project objectives were achieved, project documents revealed that some of the objectives were achieved while others were not.

In addition, 72.7 percent of project staff also indicated that the objectives were understood and 9.1 percent stated that the objectives were not understood. The findings further show that 18.2 percent did not know whether the objectives were understood by all project stakeholders (see figure 3.1).

In this regard, PMI (2004) argues that project objectives must be clear, concise and comprehensible. They must be known and understood by all project stakeholders. It is further argued that project objectives must be in line with the corporate objectives of the implementing organisation. This ensures that those associated with the project know and understand the objectives, where they fit in, and how the project objectives contribute to the corporate vision of the organisation.

According to the findings, ZESCO had identified prepayment metering as key strategy to reducing non-technical or commercial losses. ZESCO electricity system losses are made up of technical and non-technical losses. Through the project, ZESCO, therefore, decided to embark on a focussed approach to reduce non-technical losses. The technical losses are dependent on the design and operation of the power distribution system while non-technical losses are attributed to several controllable causes. Therefore, the need to reduce non-technical losses was very high on the commercial performance agenda of ZESCO. The findings show that non-technical losses have in the past been as high as 30 percent of the total power generated, representing a huge loss in revenue to ZESCO (ZESCO, 2006).

The research findings indicate that there was a decline in non-technical losses from 30 percent in 2003 before the project was implemented to 20 percent in March 2007. However, although ZESCO had recorded a reduction in non-technical losses as a consequence of implementing the Prepayment Metering Project, available data suggest that this particular objective was yet to be met. This is because the project had targeted to reduce non-technical losses to 13 percent (ZESCO, 2011). However, no time frame was given within which the target was to be met.

With regard to improving energy accountability and energy balancing, the research findings indicate the Prepayment Metering Project had enabled ZESCO to account for the power that customers use. This is because the incidences of electricity theft had reduced as the pre-paid meter has anti-tamper feature and the prepayment system enables ZESCO to track customers' purchase patterns as well as generating reports for customers that are using electricity but are not buying (ZESCO, 2010). The findings suggest that this particular project objective was achieved.

The Prepayment Metering Project also aimed at improving revenue collection for ZESCO. The research findings show that the implementation of the project had helped ZESCO improve its revenue collection. A comparison of revenue flows in Lusaka division for the months of May, June, and July 2007 showed that, under credit metering system, ZESCO only collected 33.3 percent of the total billing while under prepayment metering system, it managed to collect 100 percent of the total sales since customers pay up front before consuming the power (ZESCO, 2007). Therefore, the findings seem to suggest that the project objective aimed at improving revenue collection was achieved.

Moreover, Chisanga (2006) and Tewari and Tushaar (2002) also found that the prepayment metering system had helped the power utilities companies increase the amount of revenue collected. This was because, under the prepayment metering system, customers paid for electricity before they actually consumed it; therefore, whatever was billed was also sold.

However, the findings are different from those by Lisanne (2012). According to Lisanne (2012), after the installation of prepaid water meters, the revenue

collection for the utility company (Otjiwarongo municipality) remained the same. This was attributed to the fact that customers were using less water after the introduction of the prepaid water meters.

In addition, the Prepayment Metering Project was aimed at reducing customer debt owed to ZESCO. The findings indicate that ZESCO faced a huge customer debt profile before the implementation of the project. However, after the implementation of the project, available data indicate that out of the total debt amounting to 3.8 million kwacha in Lusaka Division, 2 million kwacha had been recovered through the prepayment metering system as of December, 2006 (ZESCO, 2007).

According to ZESCO, most customers who had prepaid meters installed in their homes had huge arrears in terms of debt, mainly due to careless use of electricity. Such customers faced constant withdraw of electricity supply (power cut) to their premises by ZESCO in order to compel them to settle their arrears. However, with prepayment metering system and the application of mandatory 40 percent token percentage debt recovery plan for those who were not able to settle their arrears in full at the time of the transition from credit to prepaid metering, ZESCO had managed to recover 52. 6 percent of the debt owed (ZESCO. 2008).

It was, however, difficult to ascertain whether this particular objective was achieved because no specific targets and time frame were set. It was difficult to determine whether ZESCO had recovered all the debt because available data only indicated that 52.6 percent of the debt was recovered as of 2008 (Ibid). It can, however, be assumed that the debt had significantly reduced considering the time passed since the project was completed in Lusaka.

Moreover, Chisanga (2006) also found that the prepayment metering system had minimised the incidence of customer debt to ZESCO. According to Chisanga (2006), ZESCO was able to collect about K10, 000 from debt every month after implementing the Prepayment Metering Project in Lusaka's Emmasdale township.

Similar findings were also made in a study conducted by Tewari and Tushaar (2002). They discovered that prepayment metering system was useful in recovering bad debt from the customers. In their study, customers paid 15 percent towards debt payment and, thus, the utility company (Eskom) had no complaint of huge customer debt after the implementation of the project.

Finally, the Prepayment Metering Project was aimed at metering all unmetered customers (those on credit metering system) and improving customer relations. The research findings indicate that at the close of phase IV of the project in Lusaka in August 2012, 89 percent of ZESCO customers had prepaid meters in their homes (ZESCO, 2012). This implies that this particular objective was not achieved at the close of the project.

However, the findings also indicate that 11 percent of ZESCO customers in Lusaka still had no prepaid meters in their homes at the close of phase IV of the project in 2012. Nevertheless, ZESCO had planned to continue with the installations of pre-paid meters in Lusaka under the Distribution, Supply and Customer Service Directorate to complete the remaining 11 percent, which mainly, involved patching up and new connections (Ibid).

Furthermore, the research findings also showed that there had been an improvement in customer relations as a result of implementing the Prepayment Metering Project. This is so because the prepayment metering system had brought to end customer complaints over billing, with the exception of load shedding (power cuts). In addition, the introduction of the prepayment metering system had eliminated disconnection and reconnection fees which ZESCO used to charge defaulting customers. Coupled with reduced visits to customers' premises, all these had helped in improving customer relations (ZESCO, 2012). It was, however, difficult to determine whether this particular project objective was achieved because there was no timeframe and targets set.

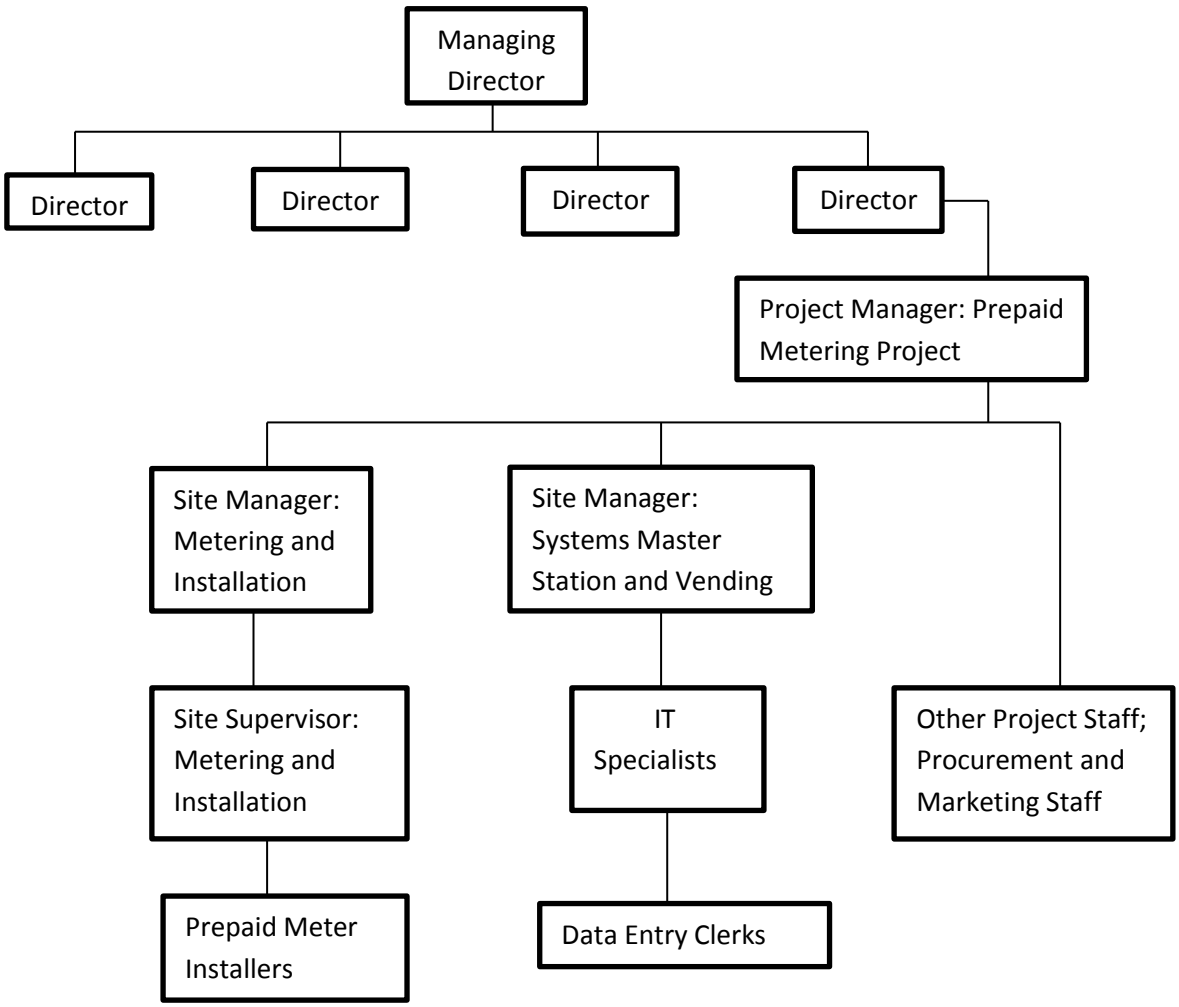
3.4 Project Management Structure

A project management structure is an organizational structure that facilitates the coordination and implementation of project activities. Its main function is to create an environment that fosters interactions among project staff with minimum amount of disruptions, overlap and conflict. Each project has its

unique characteristics and, when designing project management structures, managers should consider the organizational environment, the organizational culture within which the project will operate and the level of authority the project manager is given (Maylor, 2000).

A project management structure can take on various forms, and, with regard to the Prepayment Metering Project, a matrix project management structure was adopted. The project was managed in-house by ZESCO staff. The overall responsibility and accountability for the project lie with the Director of Distribution, Supply and Customer Service (ZESCO, 2006).

Figure 3.2: Prepayment Metering Project Management Structure



Source: ZESCO, 2006

However, the project manager was the Senior Manager, Electro Technical Services. The project manager was assisted by the following, Meter

Installation Site Manager who was responsible for the operation and maintenance of the ZESCO metering systems. The Meter Installation Site Manager was reporting to the project manager. The Meter Installation Site Manager supervised a team of (5) five Site Supervisors who were responsible for the coordination of the pre-paid meter installation work in the field. Each of the Site Supervisor was tasked with the responsibility of supervising a team of (16) sixteen electricians who were responsible for actual meter installations (ZESCO, 2006).

Furthermore, the project manager was assisted by the System Master Station and Vending Installation Site Manager. The System Master Station and Vending Installation Site Manager was reporting to the project manager and was assisted by (5) five Information Technology (IT) specialists or technicians. In addition, a procurement specialist was attached to the project to ensure that all project materials are purchased, cleared and received on time. Further, the project manager was assisted by ZESCO marketing staff that were responsible for carrying out marketing campaigns for the Prepayment Metering Project (ZESCO, 2006). Figure 3.2 illustrates the project management structure used to implement the ZESCO Prepayment Metering Project.

The matrix project management structure allows functional departments to focus on their specific technical competences and also allows projects to be staffed with specialists from throughout the organisation. Therefore, in theory, there is no disruption to normal organisational operations (Maylor, 2000). For example, a specialist in a given department may report to a departmental supervisor but be temporarily assigned to a project that needs their expertise.

The main advantage of the matrix structure is the efficient allocation of all resources, especially scarce specialty skills that cannot be fully utilised by only one project. Therefore, staff that may not be utilised full-time on a project may be fully leveraged by working on multiple projects. The matrix structure is also the most flexible when dealing with rapidly changing organisational needs and priorities (Knudson, 1991).

Further, the matrix structure allows project members to share information more readily across the departmental boundaries as well as allowing for specialisation that can increase depth of knowledge and allow for professional development and career progression to be managed. In a matrix structure, it is easier for departmental heads to loan their employees to other managers without making the change permanent. It is, therefore, easier to accomplish work objectives in an environment where tasks loads are shifting rapidly between departments (Newell, 2005).

On the other hand, the main disadvantage of the matrix structure is that the reporting relationships are complex and can therefore have negative implications on the project. In a matrix structure, some people might report to the departmental heads for whom little work is being done, while actually working for one or more project managers. For this reason, it becomes more important for staff to develop strong time management skills to ensure that they fully meet the work expectations of multiple managers (Knudson, 1991).

The matrix structure also requires communication and cooperation between multiple departmental heads and project managers since they are all competing for the same resources. It is further argued that, the matrix structure may also put some difficulty on project managers because they must work closely with other managers and staff in order to complete the project. The departmental heads may have different goals, objectives, and priorities than the project managers, and these would have to be addressed in order to get the job done (Maylor, 2000).

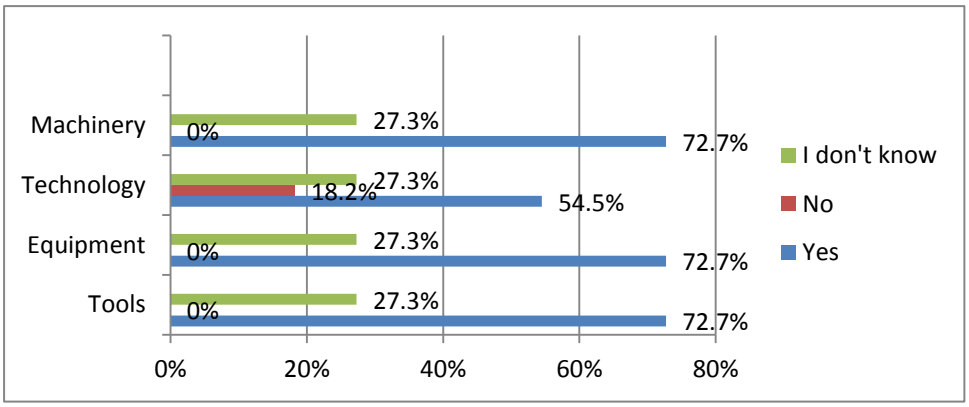
3.5 Materials for Project Planning

Effective project planning is critical for successful project implementation. Therefore, the availability of adequate materials, equipment and technology such as computers and other project management tools like micro-soft project will ensure that the project planning process is done successfully. For this reason, prepayment project staff were asked whether there were enough materials for project planning in all the three phases (see figure 3.3).

The findings indicate that 72.7 percent of project staff indicated that machinery, equipment and tools, respectively were adequate during project

planning. Further, 54.5 percent also indicated that technology was adequate during project planning. On the other hand, only 27.3 percent indicated that technology was not adequate for effective and efficient project planning. However, 27.3 percent indicated that they did not know whether machinery, technology, equipment and tools were adequate because they were not involved in project planning. The findings suggest that there were adequate materials for project planning with the exception of technology which was considered inadequate by 27.3% of respondents (project staff).

Figure 3.3: Adequacy of project planning materials



Source: Primary data

However, it should be stated that involvement of project staff in planning the project is critical to ensuring staff motivation and commitment to achieving project objectives. Staff involvement in project planning also ensures that project staff identifies themselves with the project goals and objectives, consequently, leading to successful project implementation (Maylor, 2000). Conversely, not involving staff in project planning might lead to low motivation and commitment among project staff, consequently, leading to project failure.

3.6 Management Support to the Project

Management support to the project would make all the difference between project success and failure. Adequate management support would ensure that the project is successful. While, on the other hand, inadequate management support or lack of it will certainly lead to project failure. Management support to the project can be in numerous ways; however, in the context of this research, the main focus was on human resources and financial support to the project.

3.6.1 Human Resources

Competent, skilled and adequate staff is critical for project success. Therefore, the research attempted to examine ZESCO management's support in terms of ensuring that adequate human resources were made available to the project. Prepayment Metering Project staff were therefore asked to rate management support to the project in this regard. The responses showed that 100 percent of the project staff were of the view that the project received adequate support from management in terms of human resources.

The research findings indicate that ZESCO had hired staff on a one year contract basis to implement the Prepayment Metering Project in Lusaka. At the beginning, the project had eighty (80) staff comprising of both technicians and electricians handling field installations and twenty (20) data entry clerks, all under one year contracts. However, an additional thirty five (35) more contract staff consisting of electricians, cleaners, data entry clerks and drivers were brought into the project. The total number of project staff was hundred and twenty six (126), out of which, one hundred and one (101) were contract employees whilst twenty five (25) were permanent ZESCO employees (ZESCO, 2006).

However, the finding indicate that, by the time the project reached phase IV, there was only 64 project staff out of the initial 126 when the project started. Among the reasons for a significant reduction in project staff were transfers and resignations. For instance, ten technicians, one engineer (prepaid metering), one IT engineer (vending and systems master station) and two data entry clerks were transferred to the Copperbelt to begin working on phase III of the project in Ndola. In addition, one project staff resigned in 2010 (ZESCO, 2012). As a result, phase IV of the project was not completed on time due to, among other reasons, reduced staff numbers. According to the Progress Review Report, phase IV of the project needed a minimum of 16 more staff if it was to be completed on time (ZESCO, 2011). This was contrary to the responses from project staff who stated that management support to the project in terms of making human resources available to the project was adequate.

3.6.2 Finance

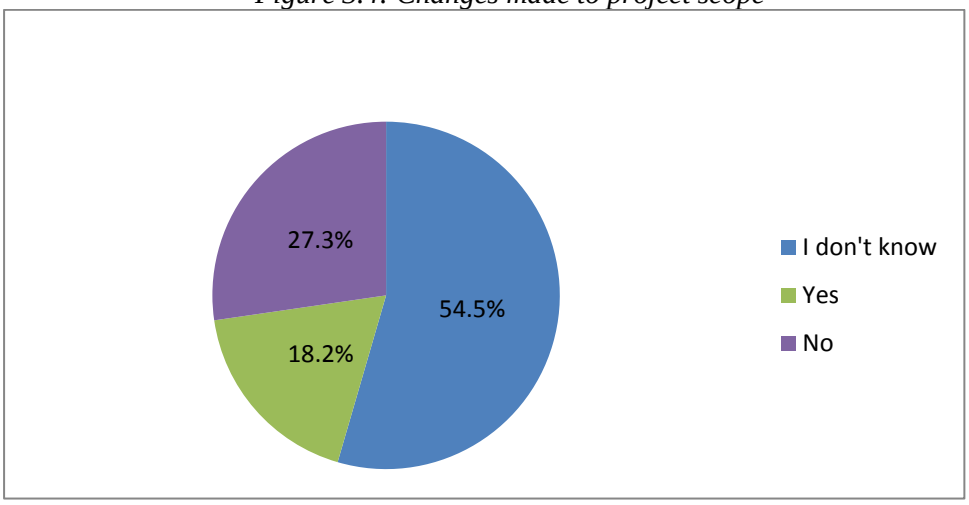
The availability of adequate financial resources to the project ensures that all the required project materials are purchased and made available to the project. On the other hand, inadequate financial resources would inevitably lead to project failure due to inadequate resources. To finance phases I, II and IV of the Prepayment Metering Project, ZESCO secured a loan amounting to U$ 3.7 million from the Development Bank of Southern Africa (ZESCO, 2006). Prepayment Metering Project staff were therefore asked whether the project received adequate financial support from ZESCO management. The findings indicate that 100 percent of project staff stated that the project received adequate financial support from ZESCO management. The findings also suggest that at no time in the course of implementing the project was financial constraint a problem. This could mean that management support to the project in terms of financial resources available was adequate.

3.7 Project Scope Management

Project scope management is a subset of project management that includes the processes required to ensure that the project includes all of the work required, and only the work required, to complete the project successfully. It consists of scope initiation, scope planning, scope definition, scope verification, and scope change control (Wyscocki, 2004). Changes to project scope would inevitably have an impact on the cost, quality and project completion time.

Project staff were asked whether there were changes made to project scope. As indicated in figure 3.4, 18.2 percent of the project staff indicated that there were changes made to project scope. Further, 27.3 percent of project staff indicated that no changes were made to the project scope. On the other hand, 54.5 percent of project staff indicated that they did not know whether there were changes made to project scope (see figure 3.4). This suggests that few project staff were involved in project planning. As stated above, involvement of all staff in project planning is critical to project success as it ensures their commitment to the project.

Figure 3.4: Changes made to project scope



Source: Primary data

Despite 27.3 percent of project staff interviewed indicating that there were no changes made to project scope, project documents revealed that the project scope kept on changing throughout the project. For example, in phase I, the supplier carried out a capacity building and training of ZESCO staff. The first 1,000 meters were installed under the supervision of the supplier of the meters- Circuit Breakers Industries (CBI) of South Africa. In phase I, the project scope included the installation of 23, 094 single phase prepayment meters, 13 vending machines and two Systems Master Stations (ZESCO, 2006).

Similarly, for phase II, CONLOG Solutions for Utilities carried out training of ZESCO staff before full installations commenced. A few installations were done under the supervision of the supplier. However, unlike in phase I where the meters were installed at the distribution board, the new way of installing prepayment meters required that the service cable (back to back installation) from the pole went directly into the meter, which minimised the possibilities of bypasses (ZESCO, 2010).

In addition, more changes to the project scope were made in phase II due to high prepaid meter failure. The change to project scope in phase II included the creation of prepayment faults teams to deal with fault meters. This was aimed at addressing customer complaints through the entire chain of the ZESCO's Incident Management System (IMS). The other change to project

scope in phase II was the establishment of the state of the art Modular Repair Workshop. The Repair Workshop was meant to fix recovered prepaid meters from the field (ZESCO, 2010).

On the other hand, installations in phase IV were done by ZESCO without any supervision from the supplier. However, in phase IV, more changes to the project scope were made. The changes included an upgrade of the Meter Management System from ECLIPE (prepaid server hardware) to the 3E ENTERPRISE EDITION which came with the Extended Vending Gateway (EVG). The EVG provided for more vending options that included the Mobile Point of Sale (MPOS), the cell phone vending, Automated Teller Machine (ATM) vending and Internet vending (ZESCO, 2012). In addition, one of the project staff argued that further changes were made to the project scope by including more townships to be metered than initially planned. The changes to project scope had a negative impact on project schedule, and, consequently increased the project cost.

3.8 Problems Encountered During Project Planning

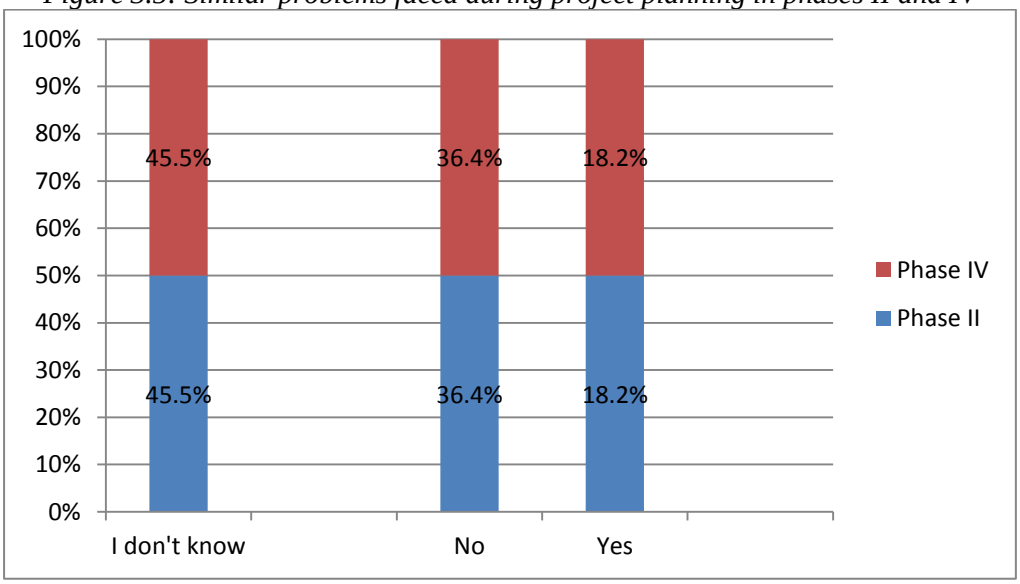
According to project staff interviewed, the planning of the Prepayment Metering Project faced a number of problems including; lack of acceptance of the prepayment technology by customers and other stakeholders such as; ERB, Government and Consumer Protection and Competition Commission as well as inconsistent supply of the required project materials because of cumbersome procurement procedures within ZESCO. This was particularly the case with phase I and IV of the project.

Further, project staff indicated that, the planning for the project was made difficult by the fact that it had no procurement officer in the first phase. This was despite the fact that the project management structure made provisions for a procurement specialist to be attached to the project. In addition, during the planning of the Prepayment Metering Project, there was a lot of resistance from some staff within ZESCO who feared that they were going to lose their jobs as a result of introducing new technology.

According to project staff interviewed, in order to overcome resistance from ZESCO staff, management assured all the staff concerned that they were not

going to lose their jobs and that the project had a many benefits for them and the Corporation in general. To overcome the problem of resistance to the technology by customers and other stake holders, the project marketing team conducted awareness campaigns to educate concerned stakeholders on the benefits of the technology to them and to ZESCO.

Figure 3.5: Similar problems faced during project planning in phases II and IV



Source: Primary data

Project staff were asked whether they faced similar problems during project planning in phase II and IV. As shown in figure 3.5, 45.5 percent stated that they did not know while 36.4 percent indicated that they did not face similar problems during project planning in phase II and IV. Conversely, 18.2 percent of project staff indicated that they faced similar problems during project planning in phase II and IV. Again, there was a high percentage (45.5) of project staff indicating that they did not know whether the project faced similar problems during project planning in phase II and IV. As stated before, this may suggest that very few project staff were involved in project planning. The findings however indicate that inconsistent supply of project materials was one of the problems that project staff faced in all the three phases of the project.

3.9 Lessons Learnt during Project Planning, Phase I and II

Learning lessons in project management is vital for successful completion of phased and future projects. Therefore, this section discusses lessons learnt

during the planning of the Prepayment Metering Project. According to project staff interviewed, among the lessons learnt during the planning of the Prepayment Metering Project was the need to mobilise adequate project materials well in advance to avoid material shortages in the subsequent phases of the project. It was also learnt that there was need to engage project team members and stakeholders regularly to share ideas and resolve issues during project planning. This was because doing so would instil a sense of ownership of the project on the part of project stakeholders as well as assured stakeholder commitment to the project.

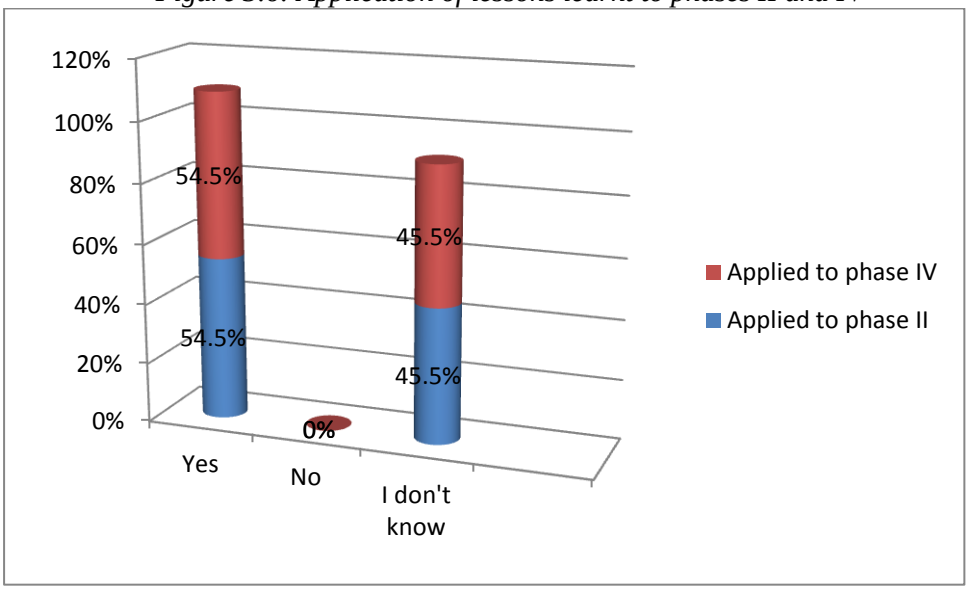
In addition, project staff indicated that the other lesson learnt was that involvement of relevant stakeholders at an early stage during project planning was critical to successful project implementation. They also stated that the other lesson learnt was the need to give prior notice to customers before installing meters in their houses. This was meant to avoid the risks of rejection and resistance associated with lack of prior notices to customers. It was also learnt that when the project is well planned, it is easier to implement and likely to finish within the planned schedule. The other lesson learnt was that there was need to provide more vehicles to subsequent phases of the project.

Moreover, project staff stated that, among the lessons learnt during project planning was that each meter installation exercise was unique and had its own challenges and there was therefore need to allow pre-paid meter installers greater latitude during meter installation. It was also learnt that project staff needed to be motivated by paying for over time and moving those that were on contract to permanent and pensionable employment if the project was to be completed on time and within acceptable and approved quality. This was mainly due to the realisation that project staff's (especially those on contract) welfare was not well taken care of. This was because recognition and reward systems were missing throughout the project. It is argued that, in the absence of a well-motivated and commitment staff, the project may fail to meet its objectives (Knudson, 1991). And, finally, it was also learnt that there was need to emphasise and encourage team spirit if the project was to be completed within the planned time frame.

3.9.1 Application of lessons learnt to phases II and IV of the project

The reason for learning lessons in project management is to help improve subsequent phases of the same project or future projects. Therefore, project staff were asked further lessons learnt were applied to phases II and IV of the Prepayment Metering Project. As indicated in figure 3.6, 45.5 percent of those interviewed indicated that lessons learnt were applied to phase II and IV respectively. On the other hand, 45.5 percent stated that they did not know if the lessons learnt were applied to phase II and IV of the project (see figure 3.6).

Figure 3.6: Application of lessons learnt to phases II and IV



Source: Primary data

However, the findings suggest that lessons learnt, especially those relating to the need for project materials to be made available before implementing phases II and IV were never applied. Project completion reports show that delays in delivering project materials were prevalent in all the three phases of the project. For example, on 20th November 2009, ZESCO signed a contract with one of the suppliers for the supply and delivery of prepaid meter for phase II of the project (ZESCO, 2010). However, there were delays in meter delivery by the supplier and the project could not commence as planned.

In addition, on 2nd June 2011, ZESCO signed another contract with the same supplier for the supply and delivery of various meters, vending systems and test equipment for phase IV of the project. However, as before, the supplier

delayed in delivering the project materials. Due to these delays, by September 2011, the project ran out of prepaid meters and other materials and phase IV of the project had to be partially suspended. To prevent project failure due noncompliance by the supplier, ZESCO signed another contract on the 27th of February 2012 with a different supplier for the supply and delivery of prepaid meters (ZESCO, 2012).

Furthermore, the findings indicate that lessons learnt in relation to the need to increase the numbers of vehicles and motivate project staff were also never applied to subsequent phases, especially phase IV. According to ZESCO (2012), phase IV had only six (6) vehicles against the required nine (9). Further, the findings suggest that motivation of project staff in terms of paying for over time and job security was never considered. All these seem to suggest that lessons learnt when planning for phase I of the project were not applied when planning for phase II and IV because if they were, such delays and other issues that affected project planning in phases II and IV might have been avoided or minimised.

On the other hand, the findings also suggest that some of the lessons learnt when planning for phase I were applied to phase II and IV of the project. These include; the need to give prior notices to customers before commencing installation and the need to allow pre-paid meter installers greater latitude during meter installation. Consequently, the findings suggest that there was very little improvement during project planning in phase II and IV, partly, due to non-application of lessons learnt in phase I.

3.10 Conclusion

This chapter examined the planning of the Prepayment Metering Project and discussed lessons learnt. In examining the planning of the Prepayment Metering Project, the chapter focused on the reasons for introducing the Prepayment Metering Project. It has been established in this chapter that ZESCO experienced problems under the postpaid metering system; these included huge customer debt, low revenue generation and high commercial losses among others.

It has been highlighted in this chapter, that, to overcome the above problems, ZESCO introduced the Prepayment Metering Project whose objectives were, among others, to reduce commercial losses and the huge customer debt owed to ZESCO. The chapter also stated that some of the project objectives were achieved while others were not. Among the project objectives that were achieved include, improved revenue generation and energy accountability and energy balancing. The findings also indicate that project objectives aimed at reducing customer debt and commercial losses were yet to be achieved.

The chapter also examined the adequacy of materials needed for effective and efficient project planning. The findings show that 72.7 percent of project staff indicated that machinery, equipment and tools, respectively, were adequate during project planning. The findings also show that 27.3 percent thought that technology was not adequate during project planning. The chapter also discussed management support to the project in terms of human resources and finance. The findings show that, generally, management support in this regard was adequate.

The chapter further discussed project scope management. According to the findings, 18.2 percent of the respondents indicated that there were changes to project scope while 27.3 percent said there were no changes. Further, project documents also indicated that project scope changed and ultimately affected project budget and completion dates. The chapter also discussed problems faced during project planning and these included lack of acceptance of the technology by stakeholders and limited support from the procurement officer. The findings show that 36.4 percent indicated that the project did not face similar problems while 18.2 percent said it faced similar problems in phase II and IV of the project.

Finally, the chapter discussed lessons learnt during project planning. According to the findings, there were a number of lesson learnt during project planning. Among them, the need to engage project staff regularly to share ideas and resolve issues during project planning. It was also learnt that involvement of key stakeholders at an early stage was critical to project success. The findings also show that 45.5 percent indicated that the lessons

learnt were applied to phase II and IV of the project while 45.5 percent said they did not know.

However, the findings further show that some of the lessons were applied while others were not. As a result, there was very little improvement to project planning in phase II and IV, mainly due to non-application of some lessons learnt from the previous phases of the project. It has been argued in this chapter that lessons learnt are expected to help improve subsequent phases of similar project or future projects.

CHAPTER FOUR

THE IMPLEMENTATION OF ZESCO'S PREPAYMENT METERING PROJECT AND LESSONS LEARNT

4.1 Introduction

In examining the implementation of the Prepayment Metering Project, this chapter focuses on the following aspects of project implementation: Project staff and training, materials for project implementation, project cost management, project quality management; customers and ZESCO's perspective. The chapter also focuses on project time management and examines problems faced during project implementation. The chapter further discusses lessons learnt during project implementation and their application to phases II and IV of the project. The last section of this chapter is a conclusion.

4.2 Project Staff

According to ZESCO, the total number of project staff was one hundred and twenty six (126), out of which, one hundred and one (101) were contract employees whilst twenty five (25) were permanent ZESCO employees. The project team composed of the following; 1 engineer, 25 technicians, 76 electricians, 17 data entry clerks, 6 drivers and 1 cleaner (ZESCO, 2006).

4.2.1 Training of Project Staff

Training is designed to enhance the competencies and skills of the project team. If the project team lack necessary management or technical skills, such skills can be developed as part of the project work (Marlin, 2008). In this regard, project staff were asked whether they received any training before the project commenced. According to the findings, all the project staff interviewed indicated that they received training before the project commenced. The training received varied depending on the level of staff involvement in the project. The project manager and the project site managers received short training in project management, meter installation and management cycle. In addition, as part of the training process, ZESCO management organised familiarisation tours for the project manager and the site managers to utilities

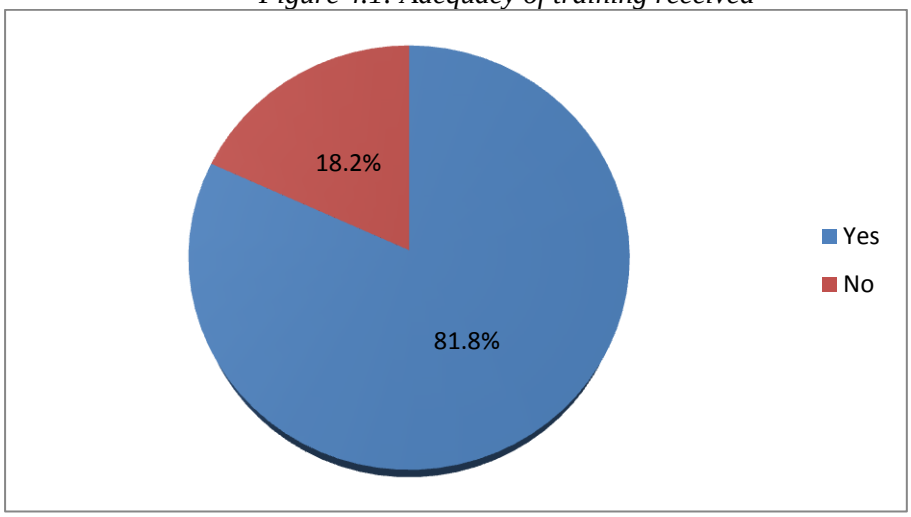
that had already implemented the prepayment metering technology (ZESCO, 2006).

On the other hand, on site presentations to the project team by various suppliers of the technology were also conducted. The type of training received by project staff (electricians and technicians) was a workshop format within ZESCO. The topics covered in the training of such staff included; introducing the electricians to the prepayment metering system, vending system, prepayment metering technology, familiarisation to project tools and materials and risk assessment. The training for electricians also focused on meter operations, meter installation, software and repair. On the other hand, project technicians received training in meter installation; database application and management, prepayment management system and prepayment metering processes and meter types. For those that joined the project while it was running, job on training was conducted (ZESCO, 2006).

However, one project staff who received this kind of training (job on training) was of the view that little time was allocated to training those who joined the project later; hence, they were not adequately prepared for the actual work. They further indicated that the equipment and tools used in implementing the project were not introduced to them and this affected their capacity to effectively execute their responsibilities during project implementation.

Project staff were asked whether the training they received before the project commenced was adequate. As indicated in figure 4.1, 81.8 percent of project staff interviewed indicated that the training they received was adequate while 18.2 percent stated that the training received was not adequate. Those who said the training received was not adequate argued that the training did not cover all aspects required for successful project implementation. The respondents argued that the training received did not address the issue of customer relations. According to them, this was a key issue that needed serious attention. This is because good customer relations was key to project success, especially in phase I and II when there was resistance to the project from customers.

Figure 4.1: Adequacy of training received

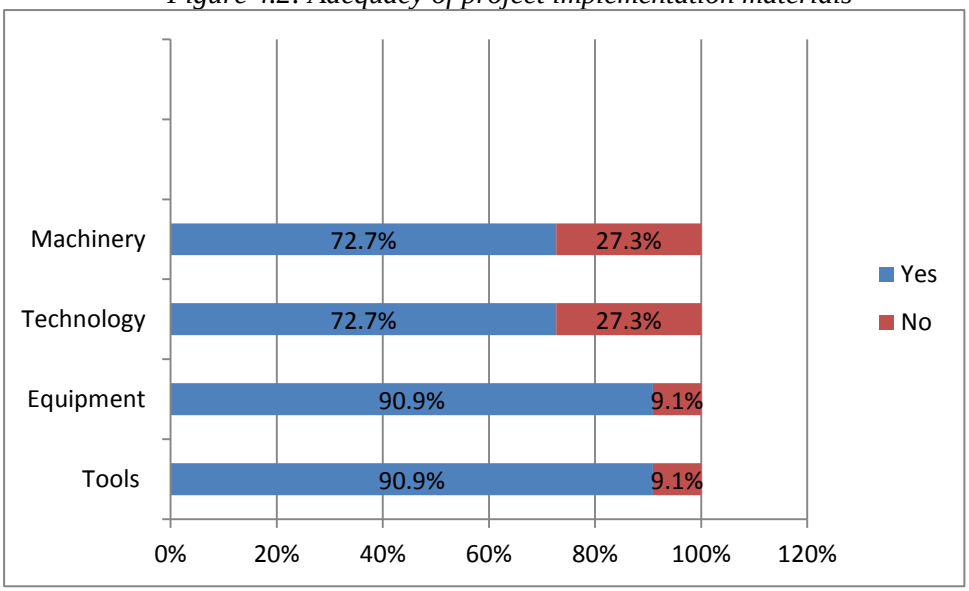


Source: Primary data

4.3 Materials for Project Implementation

Materials for implementing the Prepayment Metering Project included but not limited to prepaid meters, motor vehicles, tools, equipment and other materials. Project staff were therefore asked if the project received adequate materials during project implementation (see figure 4.2).

Figure 4.2: Adequacy of project implementation materials



Source: Primary data

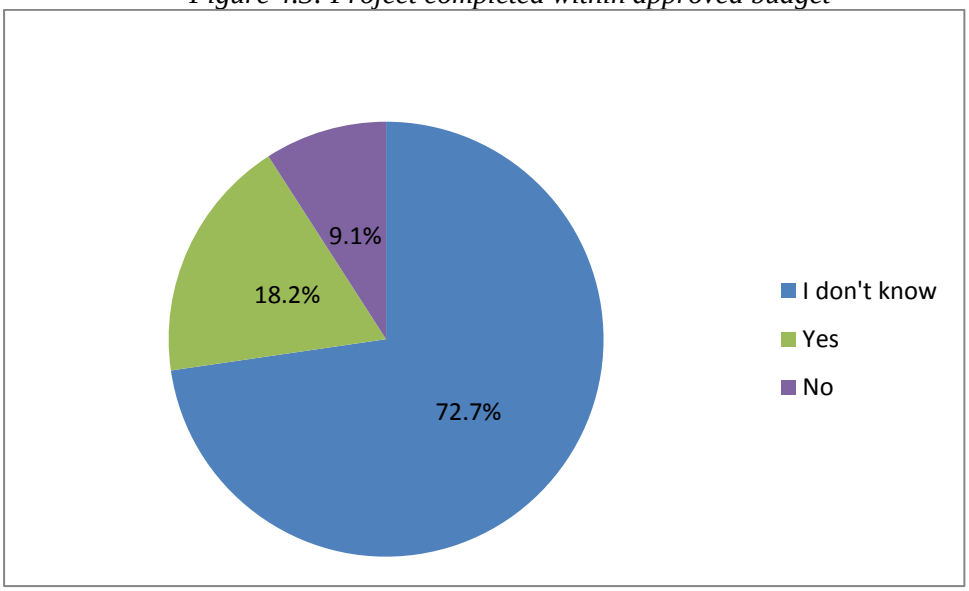
The findings indicate that 72.7 percent of project staff indicated that machinery and technology were adequate during project implementation. Further, 90.9 percent of project staff indicated that equipment and tools

respectively, were adequate during project implementation. On the other hand, only 27.3 percent of project staff indicated that machinery and technology, and 9.1 percent equipment and tools respectively, were inadequate during project implementation. However, despite the majority of project staff indicating that materials for project implementation were adequate, project documents indicated that project equipment, machinery and tools such as vehicles, step ladders, continuity tester and crimping tools were not adequate, especially in phase IV of the project. Consequently, this resulted in the project not being completed according to schedule.

4.5 Project Cost Management

In examining the implementation of the Prepayment Metering Project, project cost management was taken into account. A project may be considered successful if it was completed within the approved budget. Project cost management is a subset of project management that includes the processes required to ensure that the project is completed within the approved budget. Project cost management consists of resource planning, cost estimating, cost budgeting, and cost control (Wyscocki, 2004).

Figure 4.3: Project completed within approved budget



Source: Primary data

As indicated in figure 4.3, 18.2 percent of project staff interviewed stated that the project was completed within budget while 9.1 percent indicated that the project was not completed within budget. The majority of project staff, 72.7

percent indicated that they did not know whether the project was completed within budget. This could be attributed to the fact that the majority of project staff were not involved in project planning and monitoring. Moreover, this may also suggest that information regarding how the project was performing in relation to the budget was not adequately distributed among project staff.

Despite 18.2 percent of project staff interviewed indicating that the project was completed within budget. Project Completion Reports indicated that the project was not completed within the approved budget because there was an increase in project cost as a result of changes to project scope. Furthermore, delays in completing the project resulted in increased project cost in terms of cost of materials and labour. In addition, more project staff were employed to speed up the implementation of the project in phase II and IV of the project (ZESCO, 2012). Consequently, there was an increase in project cost due to the increase in the number of project staff, changes to project scope and completion time.

4.6 Project Quality Management

In examining the implementation of the Prepayment Metering Project, project quality management was also taken into account. Project quality management refers to a subset of project management that includes the processes required to ensure the project will satisfy the needs for which it was undertaken. It consists of quality planning, quality assurance, and quality control (Wyscocki, 2004).

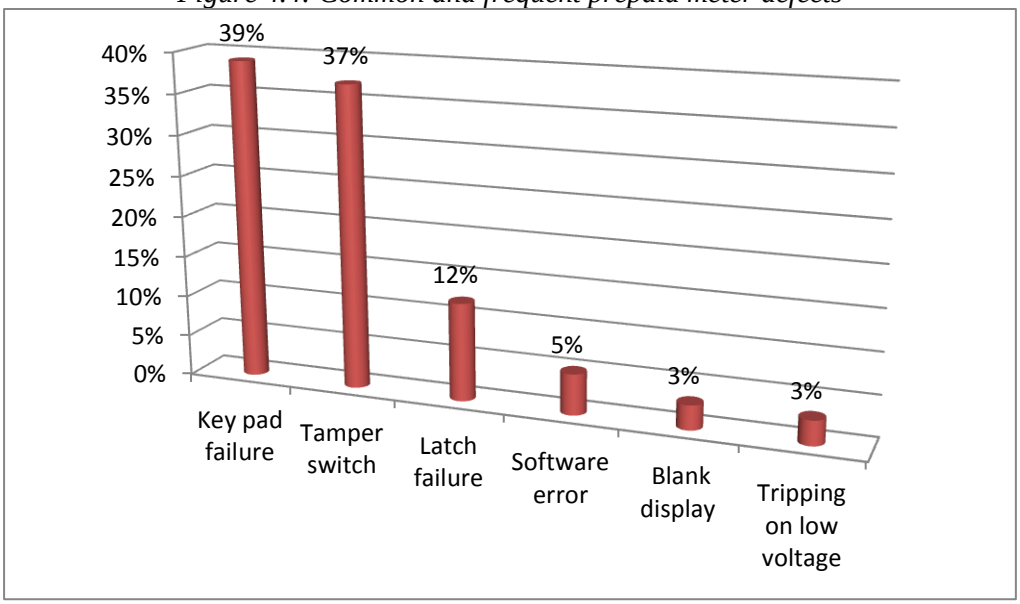
The findings indicate that, for purposes of quality assurance, the drafting of technical specifications for the prepaid meters, System Master Stations and Vending Stations were done and preference was given to the technology which complies with the Standard Transfer Specifications (STS) rather than the Proprietary Transfer Specification (PTS). STS is a standard that has been developed by the Southern African Region. The standard has now been adopted and has become an International Electro technical Commission (IEC) standard. The STS standard ensures that there is inter-operability between system components and open communication protocols from different manufacturers who are members of the Standard Transfer Specification

Association (STSA). This allows different prepaid meters from different suppliers to be interchanged (ZESCO, 2007).

4.6.1 Project Quality; ZESCO's Perspective

According to project documents, prepaid meters delivered on the project recorded some defects. A total of 4,978 prepaid meters installed in customers' houses were found to be faulty, representing 12.2 percent of the total number installed. Of these, 4,500 returned after working for some times, while, 498 returned with factory defects. The common and frequent defects were: key pad failure (39 percent), tamper switch (37 percent), latch failure (12 percent), software error (5 percent), blank display (3 percent) and tripping on low voltage (3 percent) (see figure 4.4). In addition, Tewari and Tushaar (2002) and Chisanga (2006) also discovered that meter failure was high under prepayment metering system compared to post-paid metering system.

Figure 4.4: Common and frequent prepaid meter defects

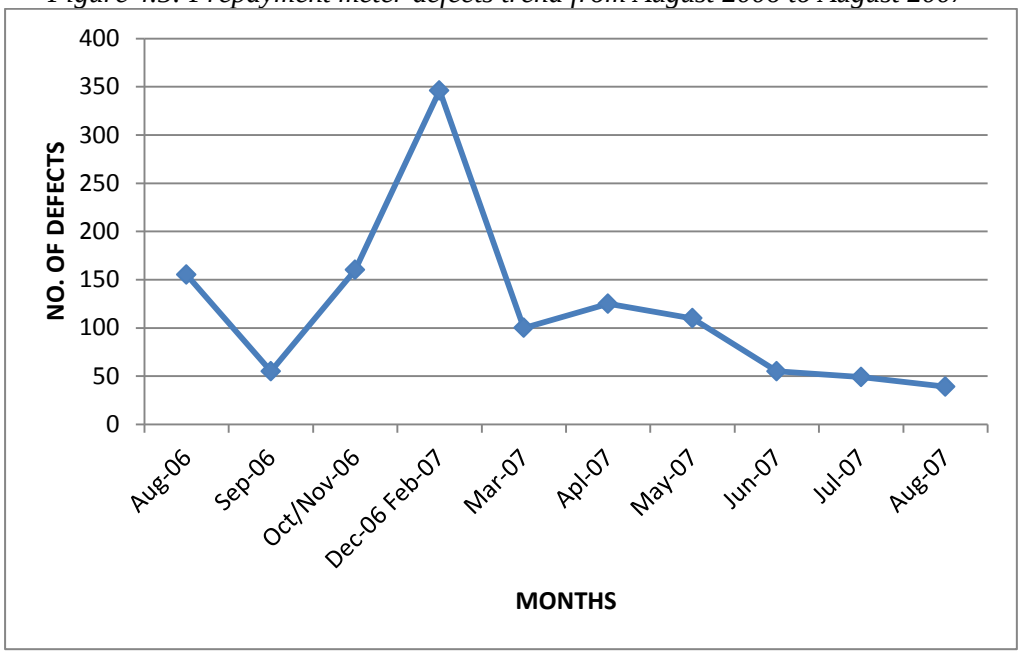


Source: Primary data

In order to ensure quality control and address the problem of meter defects, ZESCO established prepayment faults teams in phase one of the project. The prepayment faults teams operated 24 hours in an effort to monitor and follow closely customers' complaints through the entire chain of ZESCO's Incident Management System (IMS). The creation of the prepayment faults teams resulted in reduced cases of prepaid meter defects. Figure 4.5 shows the trend of prepaid meter defects from August, 2006 to August, 2007. The findings

indicate that before the creation of the prepayment faults teams in 2006, there were relatively high incidences of meter defects. However, the findings also show that there was a significant reduction in the prepaid meter defects trend between March and August, 2007 after the creation of the prepayment faults teams (see figure 4.5). The findings contradict those of Chisanga (2006) who found that ZESCO lacked the expertise to repair faulty prepaid meters.

Figure 4.5: Prepayment meter defects trend from August 2006 to August 2007



Source: ZESCO, 2007

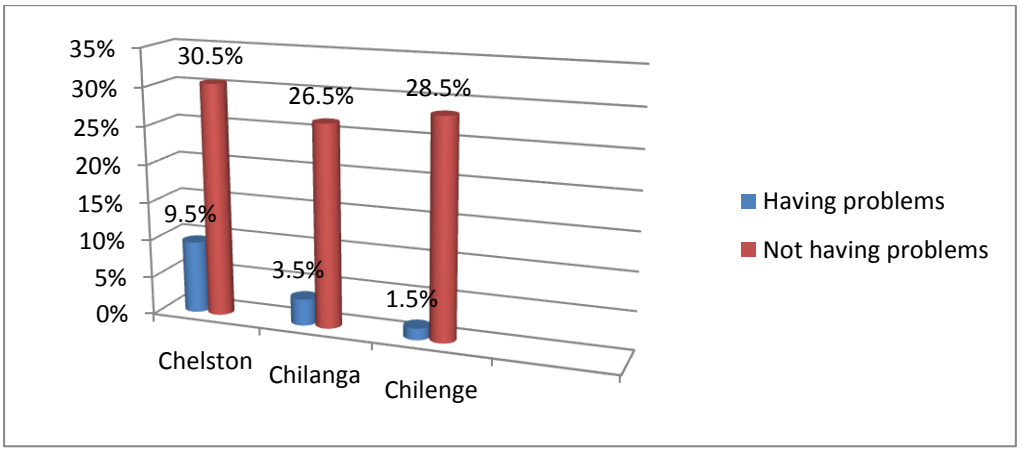
The creation of prepayment faults teams was meant to ensure project quality control and was aimed at ensuring that the prepaid meters installed in customers' premises met the required standard. Therefore, in order to ensure that the meters were of high quality, physical inspections were carried out to check for name plate details and any physical damage arising from transportation. The prepaid meters received from suppliers were further subjected to a test on the test benches. Once the prepaid meters passed the test, they were assigned a six digit ZESCO meter number on a bar code label. The meter numbers were then entered into the electronic store of the BIS/CMS system and then stored in the physical stores. The meters, once in stores were considered ready to be drawn for installation at customer premises (ZESCO, 2006).

Examining the project quality management was also extended to other components of the prepayment metering system described in chapter two. The research findings indicate that the Systems Master Stations had been working normally from the time of their installation when the project started. However, the findings also indicate that the Vending System located at ZESCO Head Office had experienced systems failure for a period of one month in April 2012. This was attributed to congestion on the Business Information System (BIS) platform which runs other BIS applications apart from the Eclipse system. The problem was resolved through modification of the batching process (ZESCO, 2012).

4.6.2 Project Quality; ZESCO Customers' Perspective

ZESCO customers' views on the quality of project output (prepaid metering system) were obtained from each of the three sampled townships from the three project phases. The customers were asked whether they were having any problems with the prepayment metering system. As shown in figure 4.6 an aggregate of 14.5 percent indicated that they were having problems with the prepayment metering system. Specifically, 9.5 percent (Chelston), 3.5 percent (Chilanga) and 1.5 percent (Chilenge), respectively, indicated that they were having problems with the prepayment metering system.

Figure 4.6: Problems with the prepayment metering system



Source: Primary data

The findings indicate that Chelston, covered under phase I of the project had the highest percentage of customers who indicated that they were having problems with the prepayment metering system. Further, the findings also

show that Chilenge, covered under phase II of the project had the least percentage of customers indicating that they were having problems with the prepayment metering system, while, Chilanga (covered under phase IV) had the second highest. Therefore, the findings suggest that there was some improvement in the quality of prepaid meters and the prepayment metering system in general in phases II and IV of the project.

The problems experienced by ZESCO customers on the prepayment metering system included, among others, lack of network at the nearest vending stations. In addition, some customers reported isolated cases of vending stations running out of electricity tokens. In both cases, customers had to go to other vending stations, sometimes covering long distances to buy the electricity units.

Moreover, some customers alleged that statutory charges such as TV levy were charged more than once in a month. They further indicated that the price of electricity tokens was not standardised as different vending stations sold the units at different price. The findings also indicate that some customers' prepaid meters tripped due to high or low voltage, because of this, they did not have power for prolonged periods often times.

Lastly, some of the ZESCO customers interviewed indicated that the other problem they were having with the prepayment metering system was the inability to buy electricity tokens when they needed it, especially at night. This was because not all vending stations operated on a 24 hour basis. Nevertheless, such customers were not aware of other vending options that were available to them. These include; Mobile Point of Sale, cell phone vending, Automated Teller Machine vending as well as internet vending which could have allowed them buy electricity units any time of the day.

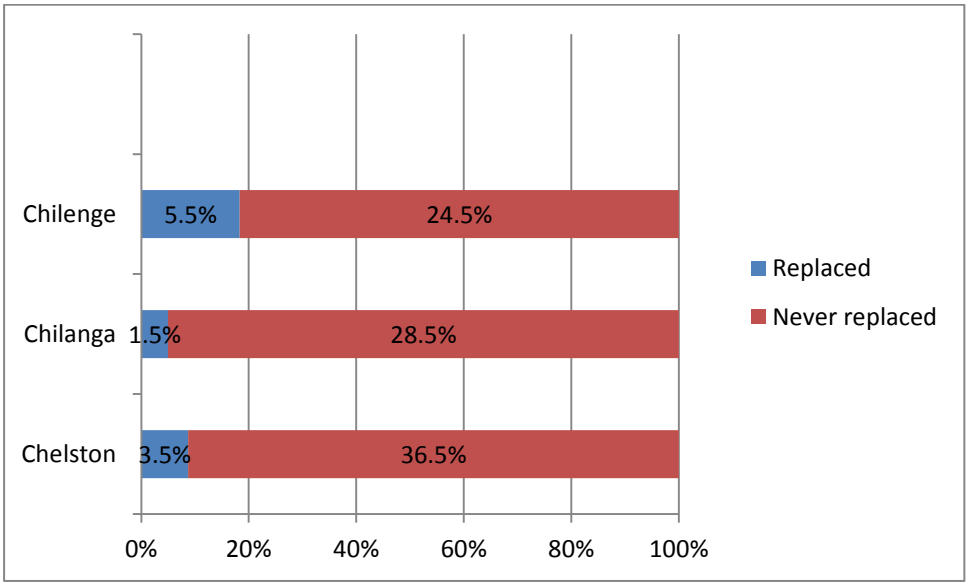
On the other hand, the majority (85.5 percent aggregate) indicted that they were not having any problems with the prepayment metering system. These comprised; 30.5 percent (Chelston), 26.5 percent (Chilanga) and 28.5 percent (Chilenge) respectively (see figure 4.6).

Nafale (2004) and Chisanga (2006) also found that the inability to buy electricity units due to lack of network was common among customers on prepayment metering system. In addition, Mckenzie (2012) also found that customers on the prepayment metering system had run out of electricity units in the last month at the time the study was conducted. He also found that the frequency of reported "self-disconnection" was high, with half of the respondents (50 percent) reported that the disconnection occurred at least once per month.

4.6.2.1 Quality of Surveyed prepaid meters

Prepaid ZESCO customers were asked to assess the quality of prepaid meters installed in their homes. According to the research findings, 91.5 percent indicated that they were happy with the quality of prepaid electricity meters in their homes. On the other hand, 8.5 percent stated that they were not happy with the quality of prepaid meters in their homes. Those who were not happy with the quality of prepaid meters installed in their homes indicated key pad failure, blank LCD display, tripping on low or high voltage to prepaid meter completely stopping working as the reasons.

Figure 4.7: Replaced prepaid meters



Source: Primary data

Further, ZESCO customers who were not happy with the quality of prepaid meters installed in their homes were asked whether they had replaced them before. As indicated in figure 4.7, 36.5 percent (Chelston), 28.5 percent

(Chilanga) and 24.5 percent (Chilenge), respectively, stated that they had "never" replaced the prepaid meter in their homes. This represents an aggregate total of 89.5 percent.

However, 3.5 percent (Chelston), 1.5 percent (Chilanga) and 5.5 percent (Chilenge), respectively, stated that they had replaced the prepaid meter in their homes due to faults such as; key pad failure, blank LCD display, tripping on low or high voltage to prepaid meters completely stopping working. Of those who had to replace the prepaid meters, 10 percent replaced the meters once while 0.5 percent replaced the meters twice.

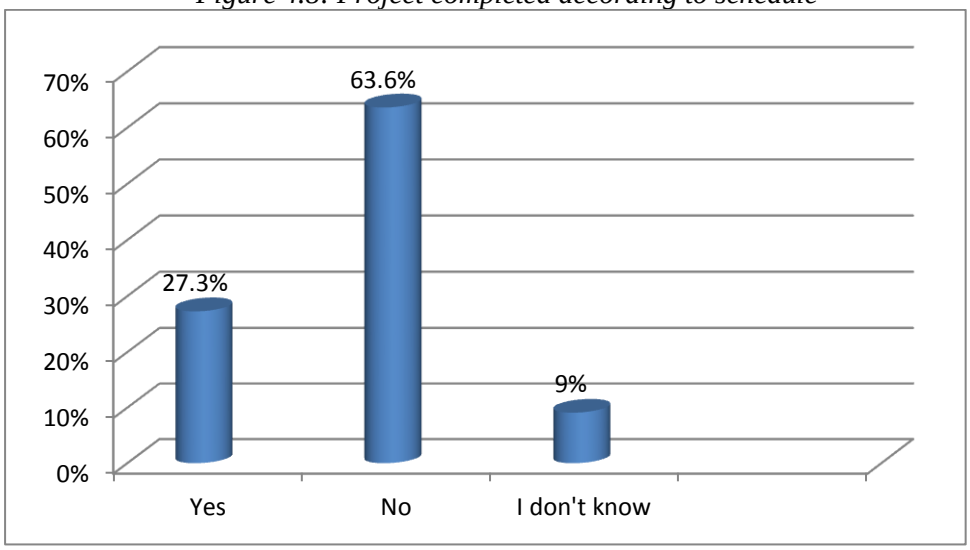
The findings suggest that, as the project progressed from phase I to IV, the quality of meters improved. For example, Chelston (3.5%) and Chilenge (5.5%) which were covered under phase I and II respectively, had the highest percentage of customers indicating that they had replaced the prepaid meters in their homes due to various faults. On the other hand, Chilanga (1.5%), covered under phase IV, had the least percentage of customers stating that they had replaced prepaid meters in their homes.

However, Mckenzie (2012) found that the reliability of the prepaid meters was very high with customers reporting no problems with the operations of the prepayment metering system and meters. In addition, Mckenzie (2012) also discovered that most of the respondents felt satisfied with the prepayment metering system. In addition, Alam and Shahriar (2012) discovered that most respondents were satisfied with the prepayment metering system, with 77 percent of the respondents indicating that they were satisfied and only 9 percent who felt dissatisfied.

4.7 Project Time Management

For a project to be considered successfully completed, it has to not only achieve its objectives, but also be completed within the planned time frame. Project time management is a subset of project management that includes processes required to ensure timely completion of the project. It consists of activity definition, activity sequencing, activity duration estimating, schedule development and schedule control (Wyscocki, 2004).

Figure 4.8: Project completed according to schedule



Source: Primary data

Project staff were asked whether the project was completed according to schedule. As indicated in figure 4.8, 63.6 percent of project staff indicated that the project was not completed on schedule. Conversely, 27.3 percent stated that the project was completed on schedule while 9 percent said they did not know whether the project was completed on time or not.

Project completion report also revealed that none of the three project phases were completed within the planned schedule. For example, phase I of the project was planned to be completed within 3 months after the meters were supplied. However, following the re-tending of the prepayment metering system (vending machines and SMS), the project lost close to nine months. The re-tendering of the metering system was necessited by the failure of the bidders to comply with the ZESCO required technical specifications (ZESCO, 2007).

In addition, phase II of the project was planned to be completed in twelve months after the meters were supplied. However, there were delays in completion arising from delays in the delivery of meters by suppliers. For phase IV, they were further delays in the delivery of project materials by the supplier; therefore, the project was extended. The contract for the supply of the project materials for phase IV was signed on November 20, 2009. However, project materials were only delivered in August, 2011, resulting in

the entire project in Lusaka division not being completed on time (ZESCO, 2012).

Further, the findings indicate that there were both internal and external factors behind the delays in delivering project materials, especially in the first phase of the project. Internally, the lack of the project procurement officer prolonged the procurement process since there was no one to deal specifically with material acquisition for the project (ZESCO, 2007). Although, according to the project management structure, there was a procurement officer that was attached to the project. However, project staff indicated that one of the major reasons for project delay was the lack of a project procurement officer to help with the procurement of project materials. Externally, there were delays by suppliers to deliver the materials after signing the contract with ZESCO (ZESCO, 2012).

Furthermore, through the interviews conducted with the project staff, it was revealed that, among the reasons for the project not being completed on time was the realisation on the part of the project management team that the meter installers required further training. In addition, the research findings indicate that the delay in completing the project was due to the poor quality of meters. This resulted in increased installation time, per meter, per day so as to allow more time for the faulty meters to be repaired.

4.9 Problems faced during Project Implementation

This section focuses on examining the problems that affected the implementation of the Prepayment Metering Project. According to the findings, the following are the major factors which affected implementation of the Prepayment Metering Project: The implementation of the Prepayment Metering Project was characterised by inadequate transport in all the three phases of the project. The findings show that there was a limited number of vehicles that were allocated to phases I and IV of the project. For example, in phase IV, there were only six (6) vehicles available to the project team against the required number of nine (9) vehicles (ZESCO, 2012). This resulted in the project not being completed on time.

The other factor that affected the implementation of the project, especially phase IV, was the lack of prepaid meters between September 2011 and February 2012. This was mainly due to the failure by suppliers to deliver the project materials on schedule and the cumbersome procurement process; as a result, project time lines were always not as planned. The findings further indicate that phase II of the project was initially planned to be completed within twelve months after the meters were supplied. However, because of the time margins that were involved between the deliveries of the consignments, the project phase was not completed on time. This affected the project triangle and hence the completion dates (ZESCO, 2012).

In addition, the findings also indicated that there were inadequate materials for implementing phase IV of the project. Phases I and II had most of the project materials and equipment that were required for the project. These included, among others; vehicles, tools, safety attires for installers, prepaid meters, capable and other materials. However, phase IV of the project had limited supply of such. This reduced the prepaid meter installation numbers and led to further delays in completing the project (ZESCO, 2012). Project staff further indicated that, in some cases, meter installers were sharing equipment such as chisels and ladders in the later stages of the project.

Moreover, the findings also indicate that there were serious staff shortages in phase IV of the project. Phase IV had 64 prepaid meter installers leaving a deficit of 16 installers. The deficit was a result of transfers and resignations by project staff. On the operational level, there was a very high rate of meter failure that led to high number of customer complaints on the meters and the prepayment metering system (ZESCO, 2012).

Project staff further stated that the implementation of the Prepayment Metering Project was affected by customer resistance to the introduction of Prepayment Metering Project. Among the reasons for resistance was the lack of information about the project and the failure by the project team to give prior notices to customers. Project staff also indicated that rains affected the implementation of the project. This was because the meter installers were working with live wires; therefore, they had to abandon their work whenever it

rained as doing so was dangerous. Consequently, the meter installers' daily targets could not be met under such circumstances and the project could not be completed according to the schedule.

In addition, project staff also indicated that load shedding (power cuts) was the other factor that affected project implementation in all the project phases. They stated that meter installation was difficult when there was no electricity in areas where the installations were being done. This was because it was not possible for them to know whether instilled meters were faulty or not. In cases where the meters were found to be faulty after power was restored, clients had to call the installers to replace or repair the faulty meters. As a result, more time was lost since the installers had to do the same work again.

Project staff further revealed that the long distances they had to cover and the time taken to locate customers that were still unmetered greatly affected project implementation in phase IV. This was mainly attributed by project staff to limited number of vehicles allocated to phase IV of the project and the need to identify customers that were left out in the previous phases of the project.

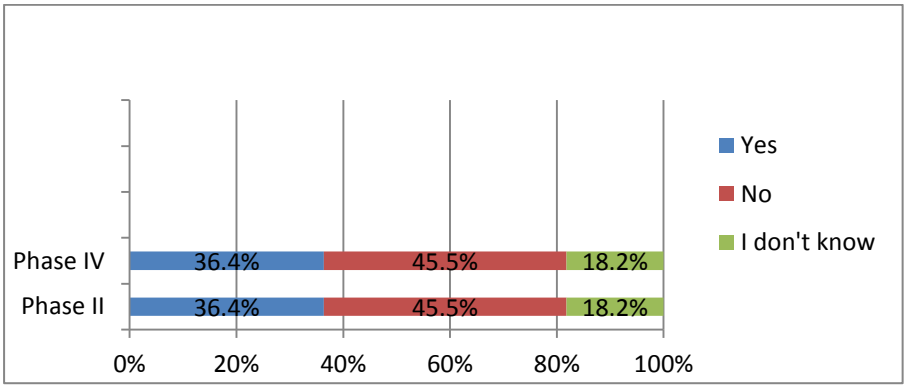
Lastly, project staff indicated that there were delays in migrating customers from Customer Management System (post-paid metering system) to 3E Eclipse Edition (prepayment metering system). The delay was caused by inaccurate or absence of customer data. For this reason, the migration of customers from one system to the other could not be done in cases where customer data was either inaccurate or absent. The delay in migrating customers as a result of inaccurate or absent customer data further contributed to the project not being completed on schedule.

4.9.1 Resolution of problems faced during Project Implementation

Project staff were asked whether they faced similar problems during project implementation in phase II and IV. As shown in figure 4.9, 36.4 percent of project staff indicated that they faced similar problems in phase II and IV respectively. On the other hand, 45.5 percent of project staff interviewed said that they did not face similar problems during project implementation in phase II and IV respectively. Only 18.2 said that they did not know whether the

project faced similar problems during project implementation in phase II and IV.

Figure 4.9: Similar problems faced during project implementation in phases II and IV



Source: Primary data

The findings further indicate that some of the problems the project faced in phase I and II were resolved while others were not. For example, in order to overcome resistance from customers, project staff indicated that ZESCO decided to intensify public sensitisations campaigns through TVs, Radios and brochures to educate customers on the benefits of the prepayment metering system to them. Moreover, project staff also stated that prior notices were issued to such customers to avoid further delays. However, as a way of ensuring that pre-paid meters were installed in the premises of those customers who still resisted even after being sensitised, project staff stated that ZESCO resorted to disconnecting them so as to compel them to migrate to the pre-paid metering system.

Moreover, to resolve the problem of delays in migrating customers from the "Customer Management System" to "3E Eclipse Enterprise Edition", project staff indicated that a decision was made to increase the initial free units from 50 to 100. This was meant to allow for more time to correct inaccurate or capture absent customer data. Project staff also indicated that the other solution was to enhance the interface between the two systems in order to improve communication and data sharing.

In addition, to address the issue of limited number of vehicles allocated to phases I and IV of the project, project staff stated that more vehicles were purchased. Moreover, project staff further indicated that more staff were

employed in order to increase staff levels and speed up the prepaid meter installation process.

Furthermore, project staff indicated that, to speed up the delivery of project materials from the suppliers, ZESCO held discussions with suppliers to urge them to speed up. However, the findings suggest that such efforts did not result in quick delivery of project materials. This problem was therefore not resolved. Moreover, the findings further suggest that no effort was made to address cumbersome procurement procedures that also contributed to delays in procuring project materials.

In addition, with regard to the problem of power cuts, the findings indicate that nothing was done to resolve the problem and, that, it continued throughout the project. However, this problem could have easily been resolved had the departments that were responsible for project implementation and power cuts, respectively, worked out a plan to avoid load shading the areas where installations were taking place.

4.10 Lessons Learnt during Project Implementation, Phases I and II

The findings indicate that a lot of lessons were learnt during the implementation of the Prepayment Metering Project. To begin with, project staff stated that the project team had realised that suppliers wanted to take advantage of the project team and management's ignorance about the quality of meters by supplying poor quality meters. The lesson learnt therefore was that there was need for the project team, especially the project manager and meter installers to have knowledge of the meter specification and other details.

Furthermore, project staff indicated that the other lesson learnt was that the project management team needed to have regular review meetings with team members in order to share experiences and resolve outstanding issues. With regard to project procurement, the project team learnt that there was need to have several suppliers to avoid delays, especially in cases where one does not deliver on schedule. It was further learnt that there was also need for procedures and processes, especially those relating to procurement and reporting to be clear and properly followed. According to project staff,

procurement and reporting procedures were neither clear nor followed properly in phase I and II of the project.

Project staff further stated that the other lesson learnt was that, for the project to be implemented effectively and efficiently, all the required materials needed to be in place before implementation to avoid unnecessary stoppages caused by lack of materials. Project staff indicated that shortage of meters and other materials meant that the pre-paid meter installations stalled. Therefore, project staff stated that measures were put in place in subsequent phases, including phases II and IV to avoid shortage of project materials. However, the findings suggest that these measures did not result in project materials being delivered on time.

In addition, project staff interviewed indicated that it was learnt during project implementation that there was need to improve on the accuracy of customer data that was being collected from the field. They stated that, in the absence of accurate customer data, the pre-paid meter installation could not be done. This resulted in prepaid meter installers not meeting their daily targets. This was because customer data capturing preceded meter installation. Therefore, the former had to be done correctly and accurately for the later to be done successfully.

According to project staff, it was also learnt that management support and involvement through regular briefing was necessary if the project was to succeed. In addition, project staff indicated that, the need to give prior notice to customers before meter installation began so as to eliminate customers' resistance and the risk of not finding customers at home was one of the lessons learnt.

Project staff further indicated that the other lesson learnt was that stakeholder management was crucial to project success. They said that this was important because it would ensure stakeholder support and commitment to the project, without which, the project would fail. In the same vein, they indicated that the other lesson learnt was the need to closely work with the suppliers so as to quickly resolve cases of meter malfunctioning in order to avoid delays. The project staff interviewed asserted that, due to the close relationship that

ZESCO had with suppliers, meters that were discovered to be faulty in the field were quickly fixed with very little effect on project schedule and cost.

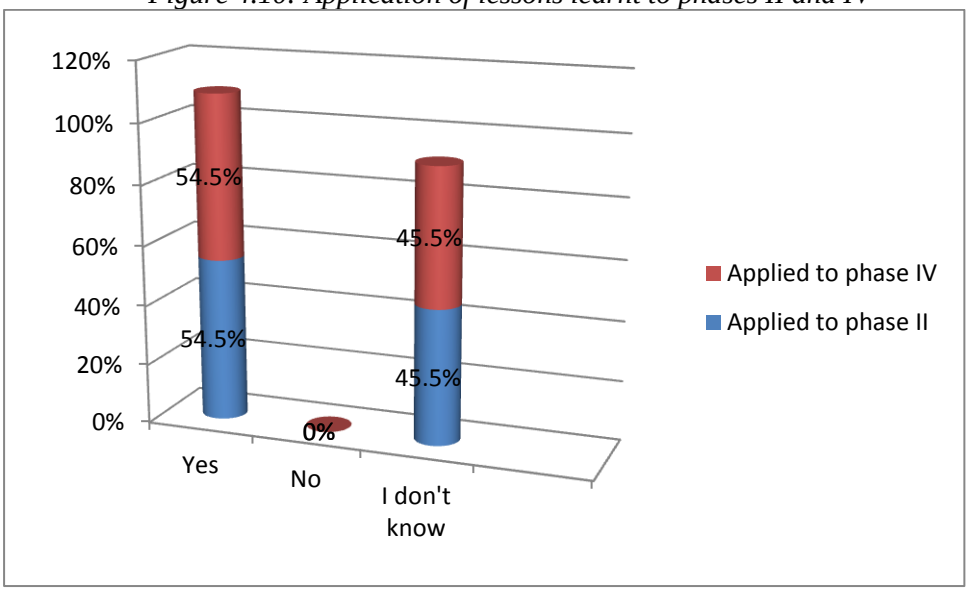
Lastly, project staff indicated that, the lesson learnt was that, for the Prepayment Metering Project to succeed, all players in the project should be involved in the planning of subsequent phases of the project. According to project staff, some of the players in the project were only involved when there was a crisis. Further, project staff stated that the other lesson learnt was that there was need to improve the interface between the Customer Management System and 3E Eclipse Edition. This was aimed at ensuring proper transition from post-paid to prepaid metering systems.

4.10.1 Application of lessons learnt to phases II and IV

Lessons learnt in previous phases of the project are supposed to benefit subsequent phases of phased or future projects. Project staff were therefore asked whether lessons learnt were applied to phases II and IV of the project. As indicated in figure 4.10, 54.5 percent of project staff stated that lessons learnt were applied to phases II and IV, respectively. On the other hand, 45.5 percent indicated that they did not know whether lessons learnt were applied to phases II and IV of the project.

Although 54.5 percent of project staff interviewed indicated that lessons learnt were applied to phases II and IV respectively, the findings suggest that some of them were not. The findings show that the lesson to do with the need to have several suppliers so as to avoid delays in cases where a given supplier does not deliver according to the schedule was not applied. According to the findings, a single supplier was engaged in each project phase (ZESCO, 2006 and 2009). It is only in phase IV where another supplier was engaged after the previous supplier delayed to deliver project materials on time (ZESCO, 2012).

Figure 4.10: Application of lessons learnt to phases II and IV



Source: Primary data

Furthermore, the lesson to do with the need to involve relevant stakeholders throughout the project management cycle did not seem to have been applied to phases II and IV of the project. Consequently, the lack of stakeholder involvement tended to affect their commitment and support to the project. This could have been one of the reasons why there was little improvement to project implementation in phases II and IV. In addition, delays in delivering project materials by the suppliers in all project phases meant that phases II and IV, just like phase I, were never completed according to schedule (ZESCO, 2006, 2009 and 2012).

However, the findings also suggest that there was an improvement in the accuracy of customer data that was collected, quality of prepaid meters, and customer relations in phases II and IV. This could be attributed to the fact that the respective lessons learnt were applied to phases II and IV of the project. It can, therefore, be argued that non application of some of the lessons learnt could be among the reasons for the little improvement in project implementation in phases II and IV of the project.

4.11 Conclusion

This chapter examined the implementation Prepayment Metering Project and discussed lessons learnt. The findings show that there was a total of 126 project staff and that they all received training. 81.8 percent of project staff

interviewed indicated that the training they received was adequate while 18.2 percent stated that the training was not adequate. The findings further show that generally, the majority of project staff indicated that project materials were adequate. However, project reports show that equipment and tools were not adequate, especially in phase IV of the project. In addition, project cost management was taken into account in examining the implementation of the project. The research findings show that the project was not completed within the approved budget due to increases in project cost and changes to project scope.

With regard to project quality, the findings show that the quality of prepaid meters supplied was relatively poor. This was because, in all the three phases of the project under consideration, there was a total of 4,978 prepaid meters installed in customers' houses that were found to be faulty. This represented 12. 2 percent of the total number of prepaid meters installed.

In addition, 14.5 percent of ZESCO customers interviewed indicated that they were having problems with the prepayment metering system. The problems included, among others, lack of network at the nearest vending stations and prepaid meters tripping on high or low voltage. The findings also show that 10.5 percent of surveyed ZESCO customers had replaced the prepaid meters in their homes due to poor quality. However, the findings also show that the majority, 89.5 percent indicated that they had never replaced the prepaid meters in their houses.

In addition, the findings show that the project was never completed on time. Some of the reasons why the project was never completed on time included; delays in delivering project materials and poor quality of meters. Moreover, the findings show that the project faced a number of problems during implementation. These included, among others, inadequate project materials, load shedding (power cuts) and customers' resistance to the project. The findings further show that these problems led to delays in completing the project on time. According to the findings, some of these problems were still prevalent in phases II and IV of the project.

The findings further show that there were lessons learnt during project implementation. Some of the lessons learnt include the need to have regular review meetings with team members in order to share experiences and resolve outstanding issues. It was further learnt that management support and involvement through regular briefing was necessary if the was to succeed. According to the findings, 54.5 percent of project staff stated that lessons learnt were applied to phases II and IV respectively. However, the findings also show that some of the lessons learnt were never applied to phases II and IV respectively. The findings suggest that non application of lessons learnt could be among the reasons why there was little improvement to project implementation in phases II and IV of the project.

CHAPTER FIVE

THE MONITORING OF ZESCO'S PREPAYMENT METERING PROJECT AND LESSONS LEARNT

5.1 Introduction

This chapter examines the monitoring of the Prepayment Metering Project. In doing so, the chapter focuses on the various aspects of project monitoring, these include: materials for project monitoring, mechanisms for project monitoring, project risk management and problems encountered during project monitoring. In addition, the chapter focuses on communication during project monitoring. Further, the chapter discusses lessons learnt, their application to phases II and IV of the project as well as documentation and distribution of lessons learnt to project stakeholders. The last section of the chapter is the conclusion

5.2 Materials for Project Monitoring

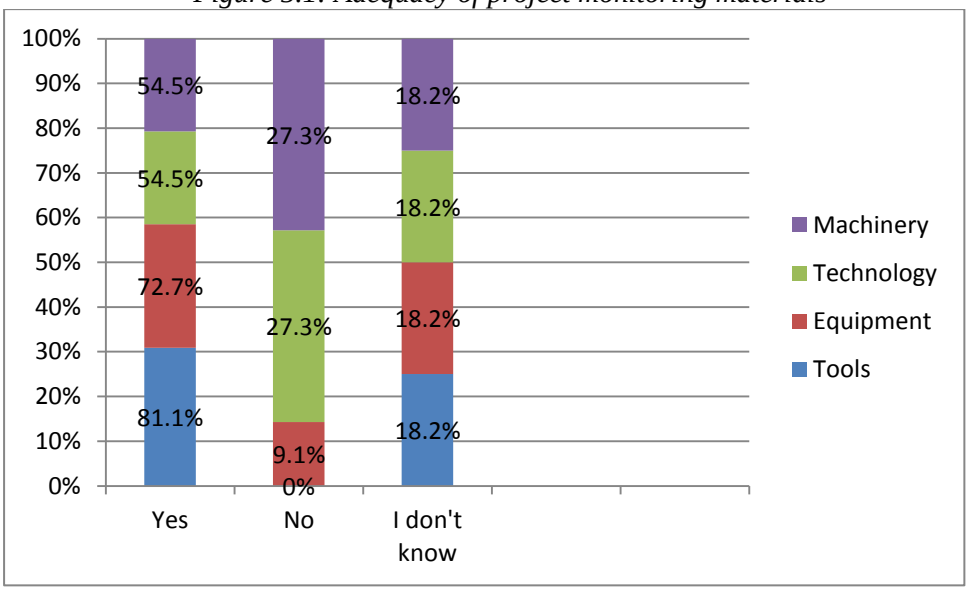
For project monitoring to be effective and efficient, adequate resources have to be allocated. For the Prepayment Metering Project, these resources included; human resources, vehicles and computers among others. However, resource constraints is one of the challenges faced by many a project manager.

Project staff were, therefore, asked whether these resources were adequate for effective and efficient project monitoring. As shown in figure 5.1, 54.5 percent of project staff indicated that machinery and technology were adequate. In addition, 72.7 percent and 81.1 percent of project staff were of the view that equipment and tools, respectively, were adequate during project monitoring.

On the other hand, 27.3 percent of project staff said that machinery and technology were not adequate during project monitoring. In addition, 9.1 percent of project staff interviewed indicated that equipment were not adequate during project monitoring. Only 18.2 percent of project staff said that they did not know whether; tools, technology, equipment and machinery were adequate for project monitoring, respectively. This was because they were not involved in monitoring the Prepayment Metering Project. Generally, the findings suggest that materials for monitoring the project were adequate. This

is because 54.5 percent (machinery and technology), 72.7 percent (equipment) and 81.1 percent (tools) of project staff indicated that materials for monitoring were adequate.

Figure 5.1: Adequacy of project monitoring materials



Source: Primary data

5.3 Mechanisms for Project Monitoring

The findings indicate that, to monitor the implementation of the Prepayment Metering Project, ZESCO initiated a program for inspection of installed prepaid meters. There were three types of inspections that were conducted namely; systematic inspections, random inspections and inspections arising from sensitivity analysis of the regional monthly consumption. These inspections were done using a check list. That is, before carrying out the inspections, a report on customer consumption of electricity units was generated from the metering system for each region. The report indicated the dates of installation of the prepaid meters and the cumulative consumption of units. Customers with low consumption figures but with longer periods of installations were targeted to check whether they had tampered with the meters (electricity fraud) (ZESCO, 2007).

On the other hand, sensitivity analysis was based on the 6 months average consumption per region. For each month, a deviation was calculated for each region, and, if the result was negative, an inspection was immediately

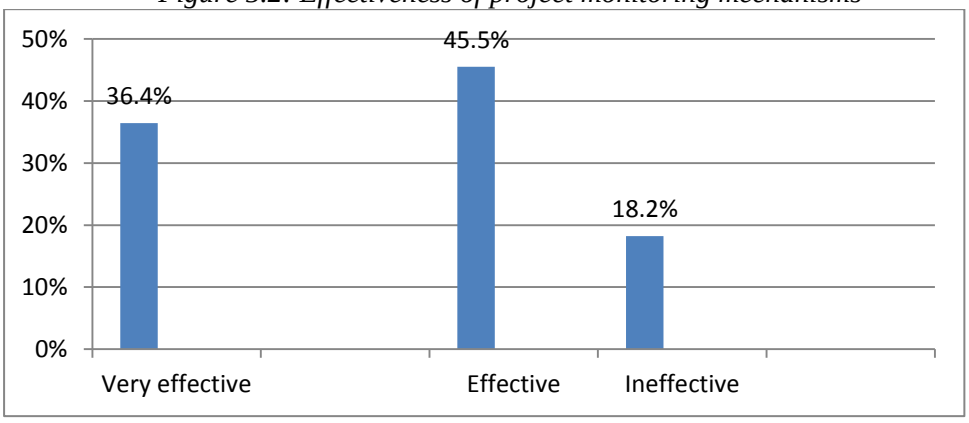
conducted in that particular region. Further, to ensure high quality of installed prepaid meters, a metering faults crew was established to monitor and follow closely the customer complaints through the entire chain of ZESCO's Incidence Management System (ZESCO, 2006).

In addition, project staff indicated that the monitoring of the prepaid metering project involved use of customer database (containing the total number of customers on both pre-paid and post-paid metering systems). This involved comparing the number of customers who were still on the post-paid metering system and those that had migrated to the prepayment metering system against set targets in a given month. This was aimed at measuring project performance against set targets by comparing actual performance against set targets. Checks were conducted weekly to see how many customers were still on post-paid metering system. Project staff stated that each pre-paid meter installer was given a daily target of prepaid meters to install. The figures were then entered in excel to compare targets against actual number of meters installed. Thereafter, weekly progress reports were produced and submitted to the project manager.

5.3.1 Effectiveness of Project Monitoring Mechanisms

Responses from the project staff interviewed indicated that 36.4 percent thought that the mechanisms for project monitoring were "very effective".

Figure 5.2: Effectiveness of project monitoring mechanisms



Source: Primary data

Further, 45.5 percent of project staff interviewed were of the view that the mechanisms for project monitoring were “effective”. Conversely, 18.2 percent indicated that the mechanisms for project monitoring were “ineffective” (see figure 5.2).

However, the mechanisms put in place to monitor the Prepayment Metering Project tended to focus more on monitoring risks to meter installation and theft of electricity. The findings suggest that more attention was paid to monitoring project quality and time schedule, with very little attention paid to monitoring other key areas of the project such as cost and scope. It should be pointed out that monitoring project cost and scope could alert the project team to any deviation in project cost and scope that may lead to increased cost and, consequently, project failure.

5.4 Project Risk Management

Project risk management is a systematic process of identifying, analysing and responding to project risks. It is a process of maximising the probability and consequences of positive events and minimising the probability and consequences of negative events on the project objectives. It includes processes of risk management planning, risk identification, risk analysis, risk response planning, and risk monitoring and control (Wyscocki, 2004).

5.4.1 Mechanisms for Risk Identification

Although 27 percent of project staff interviewed indicated that there were mechanisms put in place to identify risks, the findings indicate that there were no such mechanisms. Moreover, the findings indicate that there was no risk assessment plan or report as was the standard in project management. In addition, all the project staff interviewed understood the concept of risk in the context of risks faced by the project staff during the course of meter installation and not risks faced by the project.

However, when it was clarified that the risks referred to were those faced by the project, they indicated that no such mechanisms were put in place. According to PMI (2004) project risk refers to an uncertain event or condition

that, if it occurs, has a positive or negative effect on, at least, one project objective, such as time, cost, scope, or quality.

PMI (2004) further argues that a risk may have one or more causes and, if it occurs, one or more impacts. For example, a cause may be suppliers not delivering project materials on schedule or the personnel available or assigned may not be adequate for the project. If either of these uncertain events occurred, there may be an impact on the project cost, schedule, or quality. Risk conditions could include aspects of the project's or organisation's environment that would contribute to project risk. Risk conditions may include; poor project management practices, concurrent multiple projects or, as the case was with the Prepayment Metering Project, dependency on external project staff that cannot be controlled.

To prevent against project failure, there was need to put in place mechanisms to identify risks that the project was facing or likely to face. If the project was to be completed successfully, there was need to identify potential risks before they occurred. Therefore, mechanisms should have been put in place for identifying risks to the project.

5.4.2 Identified Risks and their Management

Despite the fact that no mechanisms were put in place to identify risks to the project. Project staff indicated that the project faced a number of risks. These include: meter bypasses, meter failures, vandalisms, meter tampering and meter installers being involved in fraud. The other risk faced by the project was that it was not easily accepted by the customers, especially in the initial stages. Lastly, the project faced the risk of failure by suppliers to deliver project materials on schedule.

Project staff stated that, to manage the identified risks to the project, the following measures were put in place: To minimise meter bypasses, changes were made to the way prepaid meters were being installed at the distribution board. The new way of installing prepaid meters required that the service cable (back to back installation) from the pole go directly into the meter. Furthermore, project staff indicated that, to curb vandalism, ZESCO involved

law enforcement officers and conducted sensitisation campaigns to educate customers on meter failure reporting system, repair and maintenance.

In addition, project staff indicated that, management of the identified project risks included; strict monitoring of the pre-paid meter installation process, timely distribution of materials and the meter installers to project sites. Lastly, project staff indicated that, to reduce the risk of the project being rejected by customers and other stakeholders, ZESCO conducted sensitisations campaigns to educate them on the benefits of the prepayment metering system to them. However, despite ZESCO introducing several interventions to manage project risks, the findings indicated that the risk of suppliers failing to deliver project materials on time was not eliminated (ZESCO, 2006, 2009 and 2012).

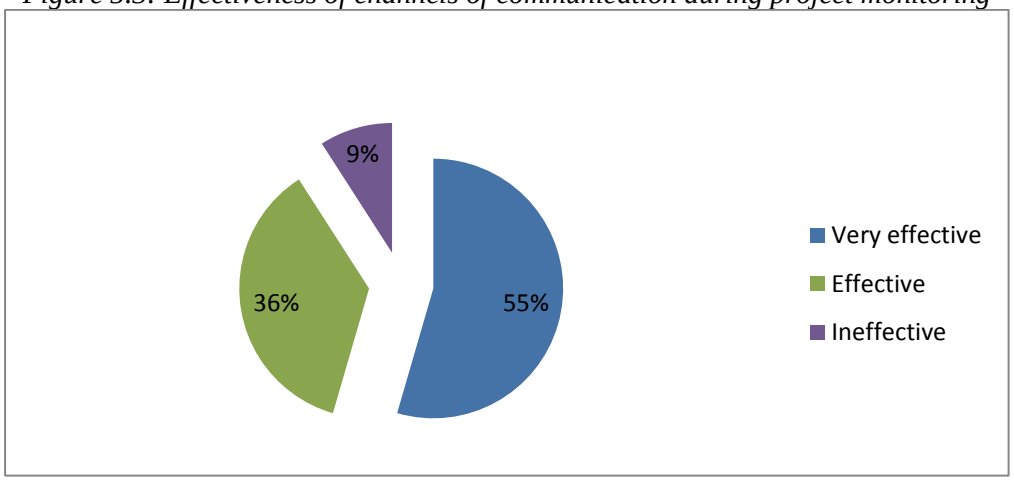
5.5 Communication during Project Monitoring

According to responses from project staff, during project monitoring, communication between personnel in the field and those at the SMS was through Very High Frequency (VHF) Radio communication. This was aimed at ensuring synchronism of customer information in the database. In addition, the project team communicated formally through weekly reports, monthly reports, emails and phone calls.

Project staff further stated that, the project manager, working with the site managers, was responsible for receiving progress reports from the field and analysing such reports against project baseline data. In addition, project staff indicated that, on a daily basis, pre-paid meter installers used to call their site supervisors who passed on the queries, where necessary, to the site manager or the project manager. Only when there were issues to be sorted out did the site supervisors communicate with the project manager. However, project staff also indicated that the main channel of communication was through monthly reports. Such reports were sent to project manager and other stakeholders.

Project staff were, therefore, asked to rate the effectiveness of channels of communication during project monitoring. The findings indicate that 54.5 percent rated the channels of communication as “very effective” and, 36.4 percent rated them as “effective”.

Figure 5.3: Effectiveness of channels of communication during project monitoring



Source: Primary data

Conversely, 9.1 percent rated the channels of communication as "ineffective". Those who rated the channels of communication during project monitoring as "ineffective" asserted that, it took on average, at least a day for them to receive feedback on issues they needed clarifications or had questions (see figure 5.3). Nevertheless, the findings generally suggest that channels of communication during project monitoring were effective. This is evident from 54.5 percent and 36 percent of project staff who stated that channels of communication were "very effective" and "effecive", respectively. On the other hand, only 9.1 percent stated that channels of communication were "ineffective".

5.4 Problems Encountered during Project Monitoring

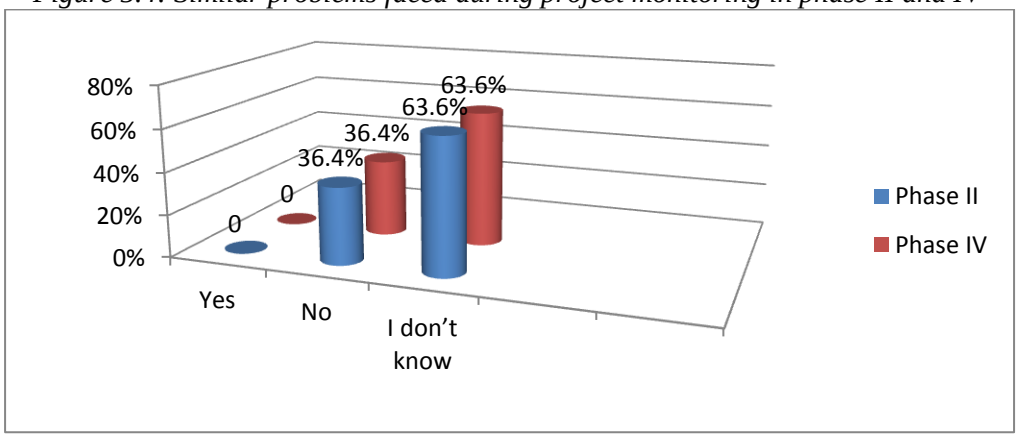
Project staff stated that the monitoring of the Prepayment Metering Project was not well coordinated, especially, at the beginning of the project. This was because the key result project development objectives were not well defined. This resulted in everyone demanding for various kinds of information from the project team. Therefore, to address this problem, key result project development objectives were developed and standardised.

Project staff further stated that the other problem faced during the monitoring of the project in all the three phases of the project was non-availability of customers during random and systematic inspections aimed at checking for meter by-passes and operations. This implied that, a second, in some cases, a third visit to the premises of such customers were required in order to accomplish a similar task.

Furthermore, according to project staff, poor quality of customer data from the meter installers in the field affected the monitoring of the project. This was due to the fact that important customer data such as; account number, customer name, phone number, physical address and meter number were either incorrect or missing in most cases. Therefore, to improve the quality of such data, a short training was conducted to enable prepaid meter installers collect accurate and correct customer data.

In this regard, project staff were, therefore, asked whether they faced similar problems during project monitoring in phases II and IV. As shown in figure 5.4, 36.4 percent of project staff interviewed indicated that they did not face similar problems during project monitoring in phases II and IV. However, findings suggest that similar problems were faced during project monitoring in phase II and IV. For example, some of the project staff interviewed indicated that lack of access to prepaid meters due to non-availability of customers was prevalent in all the three phases of the project in Lusaka.

Figure 5.4: Similar problems faced during project monitoring in phase II and IV



Source: Primary data

5.6 Lessons Learnt during Project Monitoring, Phase I and II

According to project staff, among the lessons learnt during project monitoring was the need to introduce team leaders to assist the principle engineer in monitoring the project. This was because the number of installers involved in the project increased as the project moved to phase II. Project staff further stated that the other lesson learnt was the need to develop monitoring tools

before implementing the project and that good monitoring strategies were key to project success.

In addition, project staff stated that they learned that good monitoring strategies help in checking the performance of the project against targets as well as in identifying project risks. Thus, project monitoring would enable the project team institute corrective measures as well as guide in decision making, for example, timely procurement of materials.

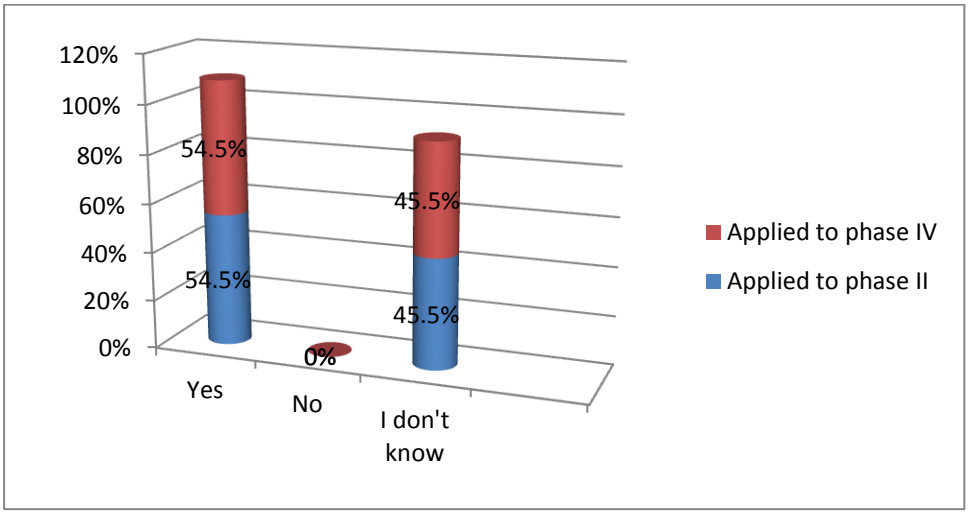
The other lesson learnt, according to project staff was that there was need to appoint supervisors that were more senior to the technicians and electricians to ensure adherence to set standards and time frames. Lastly, it was learnt that there was need to keep up-dating the database to reflect the actual number of customers on post-paid and pre-paid metering systems. They stated that this was important in order to improve project monitoring, as well enable the project team assess project performance against set targets.

5.6.1 Applications of Lessons Learnt to Phases II and IV of the Project

The rationale for learning lessons in project management is to improve future project or subsequent phases of the same project. The purpose of learning lessons is to avoid making similar mistakes in future or to apply strategies and/or methodologies that have worked in the previous project phases or projects (Wyscocki, 2004).

Therefore, project staff were asked whether the lessons learnt were applied to phases II and IV of the project. The findings indicate that 54.5 percent of project staff interviewed indicated that lessons learnt were applied to phases II and IV. On the other hand, 45.5 percent said they did not know because they were not involved in monitoring the project (see figure 5.5). Research findings suggest that all the lessons learnt during project monitoring were applied to phases II and IV of the project.

Figure 5.5: Application of lessons learnt to phases II and IV of the project



Source: Primary data

However, the application of lessons learnt to phases II and IV did not result in significant improvement to project monitoring in phases II and IV. This could be attributed to the fact that project monitoring mechanisms tended to focus more on monitoring risks to meter installations, project quality and schedule at the expense of monitoring project cost and scope. Consequently, the scope of the project constantly changed throughout the project, resulting in increased project cost and non-adherence to project schedule.

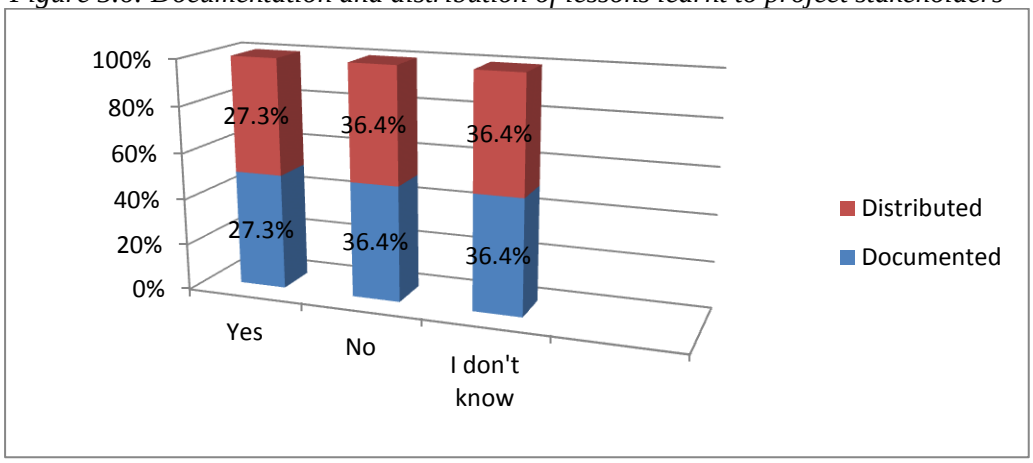
5.6.1 Documentation and Distribution of Lessons Learnt to Project Stakeholders

Through a post implementation audit, project managers are supposed to pass on what they have learnt about process and practice to other project teams that follow them. They should have learnt new approaches and strategies for improving the management of their projects that would be of value to others to follow. They might also have discovered approaches that do not work. This information should be documented and distributed for use by other projects (PMI, 2004).

Project staff were, therefore, asked whether lessons learnt were documented and distributed to all project stakeholders. As shown in figure 5.6, 27.3 percent of project staff interviewed indicated that lessons learnt were documented and distributed respectively. On the other hand, 36.4 percent stated that lessons

learnt were neither documented nor distributed to all project stakeholders. In addition, 36.4 percent indicated that they did not know whether lessons learnt were documented and distributed to all project stakeholders (see figure 5.6).

Figure 5.6: Documentation and distribution of lessons learnt to project stakeholders



Source: primary data

Although 27.3 percent of project staff interviewed indicated that lessons learnt were documented and distributed to all project stakeholders, the findings show that lessons learnt were neither documented nor distributed among project stakeholders. The findings further indicate that there were no formal lessons learnt sessions conducted at the closure of the project as per tradition in project management. In this regard, PMI (2005) asserts that depending on an informal process to share lessons learnt has never worked. However, a formal process in place to receive ideas and suggestions and filter them for general use might be the best way to manage lessons learnt. It is argued that doing so would allow lessons learnt to be used by others regardless of the projects they are managing (Ibid).

5.7 Conclusion

This chapter examined the monitoring of the Prepayment Metering Project and discussed lessons learnt. In examining the monitoring of the project, several aspects to project monitoring were taken in account, among them; adequacy of materials for project monitoring. The findings show that, generally, more than 60 percent of project staff indicated that materials for project monitoring were adequate. On the other hand, the findings also show that less than 30 percent of project staff thought materials for project monitoring were not adequate.

In addition, the findings show that there were mechanisms put in place to monitor the Prepayment Metering Project. The research findings have indicated that to monitor the project, ZESCO initiated a program for inspection of installed prepaid meters. There were three types of inspections that were conducted namely; systematic inspections, random inspections and inspections arising from sensitivity analysis of the regional monthly consumption. The findings indicate that 36.4 percent of project staff thought that the mechanisms for project monitoring were “very effective” and 45.5 percent were of the view that the mechanisms were “effective”. However, the findings also show that the mechanisms tended to focus more on monitoring project risks, quality and schedule at the expense of other key areas of project management like cost and scope.

The findings further show that, although 27 percent of project staff interviewed indicated that there were mechanisms for risk identification, there was no evidence to suggest that such mechanisms existed. The findings also show that most project staff did not understand the concept of project risk management. However, the findings also show that there were risks to the project that were identified. Some of the identified risks included, prepaid meter tampering and lack of acceptance of the project by stakeholders

Furthermore, the findings indicate that during project monitoring, communication between project staff was through VHF radio communication, weekly and monthly reports as well as emails. 54.5 percent of project staff rated the above channels of communication as “very effective” and 36.4 percent rated them as “effective”. However, the findings also show that 9.1 percent rated the channels of communication as “ineffective”

The findings further show that monitoring of the Prepayment Metering Project faced a number of problems. These ranged from lack of key result project development objectives to the non-availability of customers during random and systematic inspections. The research findings also revealed that, although 36.4 percent of project staff interviewed indicated that they did not face similar problems, there was evidence suggesting that some of the problems persisted throughout the course of project monitoring.

Lastly, the research findings indicate that there were lessons learnt during project monitoring in phases I and II. The lessons learnt included, among others, the need for good monitoring strategies. In addition, 54.5 percent of project staff interviewed indicated that lessons learnt were applied to phases II and IV of the project. The findings also show that lessons learnt were never document and distributed to all project stakeholders. The study highlighted the need to have formal and structured lessons learnt sessions if lessons learnt were to be useful to phased or future projects.

CHAPTER SIX

SUMMARY OF CONCLUSIONS

6.1 Introduction

The main purpose of this dissertation was to examine the planning, implementation and monitoring of the Prepayment Metering Project and identify lessons learnt. This chapter presents the key findings of the research.

6.2 The Planning of the Prepayment Metering Project and Lessons Learnt

This dissertation examined the planning of the Prepayment Metering Project and discussed lessons learnt. In examining the planning of the Prepayment Metering Project, the dissertation focused on the reasons for introducing the Prepayment Metering Project. It has been established that ZESCO experienced problems under the postpaid metering system, these included; huge customer debt, low revenue generation and high commercial losses, among others.

It has been highlighted in this dissertation that, to overcome the above problems, ZESCO introduced the Prepayment Metering Project whose objectives were, among others, to reduce commercial losses and the huge customer debt owed to ZESCO. The findings indicate that some of the project objectives were achieved, while others were not. Among the project objectives achieved include, improved revenue generation and energy accountability and energy balancing. The findings also indicate that the project objectives aimed at reducing customer debt and commercial losses were yet to be achieved.

In addition, the adequacy of materials needed for effective and efficient project planning was examined. The findings show that 72.7 percent of project staff indicated that machinery, equipment and tools, respectively, were adequate during project planning. The findings also show that 27.3 percent thought that technology was not adequate during project planning. The dissertation also discussed management support to the project in terms of human and financial resources. The findings show that, generally, management support in this regard was adequate.

The dissertation further discussed project scope management. According to the findings, 18.2 percent of project staff indicated that there were changes made to project scope while 27.3 percent said there were no changes. Further, project documents also indicated that project scope changed and ultimately affected project budget and completion dates. The dissertation also discussed problems faced during project planning and these included lack of acceptance of the technology by stakeholders and limited support from the procurement officer. The findings show that 36.4 percent of project staff indicated that the project did not face similar problems, while 18.2 percent said it faced similar problems in phase II and IV of the project.

Lessons learnt during project planning have also been discussed. According to the findings, there were a number of lessons learnt during project planning. Among them, the need to engage project staff regularly to share ideas and resolve issues during project planning. It was also learnt that the involvement of key stakeholders early was critical to project success.

Moreover, the findings show that 45.5 percent of project staff indicated that lessons learnt were applied to phases II and IV of the project while, 45.5 percent said they did not know. However, the findings show that some of the lessons were applied while others were not. Therefore, there was very little improvement to project planning in phases II and IV. This has been attributed to non-application of some lessons learnt in the previous phases of the project. It has been argued, in this dissertation, that lessons learnt are supposed to help improve subsequent phases of phased or future projects.

6.3 The Implementation of the Prepayment Metering Project and Lessons Learnt

The dissertation examined the implementation of the Prepayment Metering Project and discussed lessons learnt. In doing so, the dissertation focused on, among other things, project staff and their training. The findings show that there was a total of 126 project staff and that they all received training. The findings show that 81.8 percent of project staff interviewed indicated that the

training they received was adequate, while 18.2 percent stated that the training was not adequate.

The findings further show that, generally, the majority of project staff indicated that project materials were adequate. However, project reports show that equipment and tools were not adequate, especially in phase IV of the project. In addition, project cost management was taken into account in examining the implementation of the project. The findings show that the project was not completed within the approved budget due to increases in project budget and changes to project scope.

With regard to project quality, the findings show that the quality of prepaid meters was generally poor. For example, in all the three phases of the project, a total of 4,978 prepaid meters installed in customers' houses were found to be faulty. This represented 12.2 percent of the total number installed. In addition, 14.5 percent of ZESCO customers indicated that they were having problems with the prepayment metering system. The problems included; lack of network at the nearest vending stations and prepaid meters tripping on high or low voltage. The findings also show that 10.5 percent of surveyed ZESCO customers had replaced the prepaid meters in their homes due to malfunctioning. However, the majority, 89.5 percent indicated that they had never replaced the prepaid meters in their houses.

In addition, the findings show that the project was never completed on time. Some of the reasons why the project was never completed on time included delays in delivering project materials and poor quality of meters. Moreover, the findings show that the project faced a number of problems during implementation. These included, among others, inadequate project materials, load shedding (power cuts) and customers' resistance to the project. The findings further show that these problems led to delays in completing the project on time. Furthermore, some of these problems were still prevalent in subsequent phases of the project.

The findings further show that there were lessons learnt during project implementation. Some of them include the need to have regular review meetings with team members in order to share experiences and resolve

outstanding issues. It was further learnt that management support and involvement through regular briefing was necessary if the project was to succeed. According to the findings, 54.5 percent of project staff stated that the lessons learnt were applied to phases II and IV respectively. However, the findings also show that some of the lessons learnt were never applied to phases II and IV of the project, respectively. This could be the reason for the little improvement to project implementation in phases II and IV of the project.

6.4 The Monitoring of the Prepayment Metering Project and Lessons Learnt

The dissertation examined the monitoring of the Prepayment Metering Project and discussed lessons learnt. In examining the monitoring of the project, several aspects to project monitoring were taken into account, among them, adequacy of materials for project monitoring. The findings show that, generally, materials for project monitoring were adequate. However, findings also show that less than 30 percent of project staff thought that materials for project monitoring were not adequate.

Moreover, the findings also show that there were mechanisms put in place to monitor the Prepayment Metering Project. The research findings indicate that to monitor the project, ZESCO initiated a program for inspection of installed prepaid meters. There were three types of inspections that were conducted, namely; systematic inspections, random inspections and inspections arising from sensitivity analysis of the regional monthly consumption. The findings indicate that 36.4 percent of project staff thought that the mechanisms for project monitoring were “very effective” and 45.5 percent were of the view that the mechanisms were “effective”. However, the findings also show that the mechanisms tended to focus more on monitoring project risks, quality and schedule at the expense of other key areas of project management like cost and scope.

The findings further show that, although 27 percent of project staff interviewed indicated that there were mechanisms for risk monitoring, there

was no evidence to suggest that such mechanisms existed. The findings also show that most project staff did not understand the concept of project risk management. However, the findings also show that there were risks to the project that were identified. Some of the identified risks included, prepaid meter tampering and lack of acceptance of the project by stakeholders.

Furthermore, the findings indicate that during project monitoring, communication between project staff was through VHF radio communication, weekly and monthly reports as well as emails. The findings show that 54.5 percent of project staff rated the above channels of communication as “very effective” and 36.4 percent rated them as “effective”. However, the findings also show that 9.1 percent rated the channels of communication as “ineffective”. The dissertation has therefore, concluded that channels of communication during project monitoring were effective.

The findings further show that the monitoring of the Prepayment Metering Project faced a number of problems. These ranged from lack of key result project development objectives to the non-availability of customers during random and systematic inspections. The research findings also revealed that, although 36.4 percent of project staff interviewed indicated that they did not face similar problems, there was evidence suggesting that some of the problems persisted throughout the course of project monitoring.

Lastly, the research findings indicate that there were lessons learnt during project monitoring in phases I and II. The lessons learnt included, among others, the need for good monitoring strategies. In addition, 54.5 percent of project staff interviewed indicated that the lessons learnt were applied to phases II and IV of the project. The findings also show that the lessons learnt were never documented and/or distributed to all project stakeholders. Finally, the dissertation has highlighted the need to have formal and structured lessons learnt sessions conducted, if lessons learnt are to be useful to phased or future projects.

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ANNEXES

THE UNIVERSITY OF ZAMBIA

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES

DEPARTMENT OF POLITICAL AND ADMINISTRATIVE STUDIES

Interview Guide for Project Manager

TITLE: THE PLANNING, IMPLEMENTATION AND MONITORING OF ZESCO's PREPAYMENT METERING PROJECT IN LUSAKA PROVINCE: LESSONS LEARNT

Dear Respondent,

I am a Post-graduate student at the University of Zambia conducting a research as part of the requirement for the award of **Master of Public Administration.** You are, with honour, therefore requested to assist providing certain information in this research. Please, be assured that the information thus collected is solely for academic purposes and shall be treated with strict confidentiality.

Date of interview _____

Start Time: _____

End Time: _____

PART ONE: RESPONDENT'S PROFILE

1.1 Age of the respondent

18-30	1
31-40	2
41-50	3
51-60	4
61 and above	5

1.2 Sex of the respondent

Male	1
female	2

1.3 What is your highest level of education?

Secondary education	1
College education	2
University under-graduate education	3
University post-graduate education	4

1.4 What is your qualification? _____

PART TWO: PROJECT MANAGEMENT AND PLANNING

2.1 What derived the initiation of the pre-paid metering project?

_____

2.2 What were the objectives of the pre-paid metering project?

_____

2.3 Were these objectives achieved?

Yes	1	If yes, skip to question to 2.5
No	2	

2.4 If no to question 2.3 above, why were the objectives not achieved?

_____

2.5 Were the project objectives clear to and understood by all key project stakeholders?

	Yes	No
a. Clear	1	2
b. Understood	1	2

2.6 What was the project management structure used to implement the pre-paid metering project?

_____

2.7 What was your position in the project management structure?

_____

2.8 How many subordinates did you have?

_____

2.9 What were your responsibilities during;

a, project planning?

_____

b, project implementation?

_____

c. project monitoring?

_____

2.10 Do you think you were given adequate tools, equipment, technology and machinery to work with during project planning?

	Yes	No
a. Tools	1	2
b. Equipment	1	2
c. Technology	1	2
d. Machinery	1	2

2.11 Did the project receive adequate support from management in terms of:

a. human resource?

Yes	1	If yes, skip to question 2.13
No	2	

b. finance?

Yes	1	If yes, skip to question 2.13
No	2	

2.12 If no to question 2.11 a or b above, in what way(s) was the support received not adequate?

_____

2.13 What problems did you encounter during project planning in phase I?

_____

2.14 How did you resolve these problems?

_____

2.15 Did you face similar problems during project planning in phase II and IV of the project?

	Yes	No
a. Phase II	1	2
b. Phase IV	1	2

PART THREE: PROJECT IMPLEMENTATION AND PERFORMANCE

3.1 Did you receive any kind of training before the project commenced?

Yes	1	
No	2	If no, skip to question 3.5

3.2 What kind of training did you receive?

_____

3.3 Was the training you received adequate?

Yes	1	If yes, skip to question 3.5
No	2	

3.4 If no to question 3.3 above, in what way(s) was the training you received not adequate?

_____

3.5 Did you make any adjustment to planned project scope?

Yes	1	
No	2	If no, skip to question 3.8

3.6 If yes, what kind of adjustment did you make?

_____

3.7 How did these adjustments affect the overall project implementation?

_____

3.8 Did you make any adjustment to planned project budget?

Yes	1	
No	2	If no, skip to question 3.10

3.9 If yes to question 3.8 above, how did these adjustments affect the overall financing of the project?

_____

3.10 Were there any changes made to planned project quality?

Yes	1	
No	2	If no skip to question 3.12

3.11 If yes to question 3.10 above, what effect did these changes have on the overall project quality?

_____

3.12 On average, how long did ZESCO take to install one pre-paid electricity meter?

a. Less one hour	1
b. One hour	2
c. More than one hour	3
d. Two hours and above	4

3.13 On average, how long was ZESCO supposed to take to install one pre-paid electricity meter?

a. Less one hour	1
b. One hour	2
c. More than one hour	3
d. Two hours and above	4

3.14 Did the project proceed as planned in terms of:

	Yes	No
a. Scope?	1	2
b. Quality?	1	2
c. Budget?	1	2
d. Time frame?	1	2

If yes to all, skip to question 3.16

3.15 If no to either a, b, c or d above, why did the project not proceed as planned in terms of:

a. Scope

_____

b. Quality

_____

c. Budget

_____

d. Time frame

_____

3.16 What problems did you encounter during project implementation in phase I?

_____

3.17 How did you resolve these problems?

_____

3.18 Did you face similar problems during project implementation in phase II and IV?

	Yes	No
a. Phase II	1	2

b. Phase IV	1	2

3.19 Do you think you were given adequate tools, equipment, technology and machinery to work with during implementation?

	Yes	No
a. Tools	1	2
b. Equipment	1	2
c. Technology	1	2
d. Machinery	1	2

3.20 What factors outside the control of the project team affected:

a. Project planning?

_____

b. Project implementation?

_____

c. Monitoring?

_____

3.21 What was done to resolve these factors?

_____

3.22 Were there unintended outcomes (positives or negatives) arising from project implementation?

	Yes	No
a. Positive outcomes	1	2
b. Negative outcomes	1	2

3.23 What were these unintended outcomes? (Please kind the nature of the outcomes, positive or negative)

_____

PART FOUR: PROJECT MONITORING, COMMUNICATION AND RISK MANAGEMENT

4.1 Do you think you were given adequate tools, equipment, technology and machinery to work with during project monitoring?

	Yes	No
a. Tools	1	2
b. Equipment	1	2
c. Technology	1	2
d. Machinery	1	2

4.2 What monitoring mechanisms were put in place to monitor the pre-paid metering project?

_____

4.3 How effective were the above monitoring mechanisms in monitoring the pre-paid metering project?

a. Very effective	1
b. Effective	2
c. Ineffective	3
d.Very ineffective	4

4.4 What problems did you encounter in monitoring phase I of the pre-paid metering project?

_____

4.5 How did you resolve these problems?

_____

4.6 Did you face similar problems when monitoring phase II and IV of the pre-paid metering project?

	Yes	No
a. Phase II	1	2
b. Phase IV	1	2

4.7 What communications channels were established during project implementation and monitoring?

_____

4.8 How effective were these communication channels in relaying relevant information to project stakeholders?

a. Very effective	1
b. Effective	2
c. Ineffective	3
d. Very ineffective	4

4.9 How often did you communicate with;

	a. Project Staff	b. Management	c. Stakeholders
1.Never			
2.Seldom			
3.Frequently			
4.Most times			
5.Always			

4.10 How long did it take for you to receive feedback on issues you needed clarifications or had questions?

a. Minutes	1
b. One hour	2

c. One day	3
d. One week	4
3. One month	5

4.11 What mechanisms were put in place to identify risks to the project?

_____

4.12 How effective were these mechanisms in identifying risks to the project?

a. Very effective	1
b. Effective	2
c. Ineffective	3
d. Very ineffective	4

4.13 What risks did the pre-paid metering project face?

_____

4.14 How were these risks managed?

_____

PART FIVE: LESSONS LEARNT

5.1 What areas of improvement were identified in phase I of the pre-paid metering project?

_____

5.2 What best practices did you identify in phase I of the pre-paid metering project?

_____

5.3 Were these best practices applied to phases II and IV of the pre-paid metering project?

	Yes	No
a. Phase II	1	2
b. Phase IV	1	2

5.4 What was learnt about project planning in;

a. phase I?

_____

b. phase II?

_____

5.5 What was learnt about project implementation in;

a. phase I?

_____

b. phase II?

_____

5.6 What was learnt about project monitoring in;

a. phase I?

_____

b. phase II

_____

5.7 What was learnt about project procurement?

_____

5.8 What was learnt about working with ZESCO management?

_____

5.9 What was learnt about working with government?

_____

5.10 What was learnt about working with Energy Regulation Board?

_____

5.11 What was learnt about working with suppliers?

_____

5.12 What was learnt about what went well?

_____

5.13 What was learnt about what went wrong?

_____

5.14 What was learnt about project management in general?

_____

5.15 Were the lessons learnt documented and distributed to all key project stakeholders?

	Yes	No
a. Documented	1	2
b. Distributed	1	2

5.16 What do you think were the reasons for:

a. project success? _____

b. project failure?_____

THE UNIVERSITY OF ZAMBIA

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES

DEPARTMENT OF POLITICAL AND ADMINISTRATIVE STUDIES

Interview Guide for Project Implementer

TITLE: THE PLANNING, IMPLEMENTATION AND MONITORING OF ZESCO's PREPAYMENT METERING PROJECT IN LUSAKA PROVINCE: LESSONS LEARNT

Dear Respondent,

I am a Post-graduate student at the University of Zambia conducting a research as part of the requirement for the award of **Master of Public Administration.** You are, with honour, requested to assist in providing certain information in this research. Please, be assured that the information thus collected is solely for academic purposes and shall be treated with strict confidentiality.

Date of interview _____

Start Time: _____

End Time: _____

PART ONE: RESPONDENT'S PROFILE

1.1 Age of the respondent

18-30	1
31-40	2
41-50	3
51-60	4
61 and above	5

1.2 Sex of the respondent

Male	1
female	2

1.3 What is your highest level of education?

a. Secondary education	1
b. College education	2
c. University under-graduate education	3
d. University post-graduate education	4

1.4 What is your qualification? _____

PART TWO: PROJECT MANAGEMENT AND PLANNING

2.1 What derived the initiation of the pre-paid metering project?

_____

2.2 What were the objectives of the pre-paid metering project?

_____

2.3 Were these objectives achieved?

Yes	1	If yes or don't know (DK) skip to question 2.5
No	2	
DK	9	

2.4 If no question 2.3 above, why were the objectives not achieved?

_____

2.5 Were the project objectives clear to and understood by all key project stakeholders?

	Yes	No
a. Clear	1	2
b. Understood	1	2
c. DK	9	

2.6 What were your responsibilities during:

a, project planning?

_____

b, project implementation?

_____

c. project monitoring?

_____

2.7 Do you think you were given enough tools, equipment, technology and machinery to work with during project planning?

	Yes	No
a. Tools	1	2
b. Equipment	1	2

c.Technology	1	2
d. Machinery	1	2

2.8 Did the project receive adequate support from management in terms of:

a. human resource?

Yes	1	If yes or don't know (DK) skip to question 2.10
No	2	
DK	9	

b. finance?

Yes	1	If yes or don't know (DK) skip to question 2.10
No	2	
DK	9	

2.9 If no to question 2.8 a or b above, in what way(s) was the support received not adequate?

_____

2.10 What problems did you encounter during project planning in phase I?

_____

2.11 How did you resolve these problems?

_____

2.12 Did you face similar problems during project planning in phase II and IV of the project?

	Yes	No
a.Phase II	1	2
b. Phase IV	1	2

PART THREE: PROJECT IMPLEMENTATION AND PERFORMANCE

3.1 Did you receive any kind of training before the project commenced?

Yes	1	
No	2	If no skip to question 3.5

3.2 What kind of training did you receive?

_____

3.3 Was the training you received adequate?

Yes	1	If yes skip to question 3.5
No	2	

3.4 If no to question 3.3 above, in what way(s) was the training you received not adequate?

_____

3.5 Did you make any adjustments to planned project scope?

Yes	1	
No	2	If no or don't know (DK) skip to question 3.8
DK	9	

3.6 If yes, what kind of adjustments did you make?

_____

3.7 How did these adjustments affect the overall project implementation?

_____

3.8 Did you make any adjustments to planned project budget?

Yes	1

No	2
DK	9

If no or don't know (DK) skip to question 3.10

3.9 If yes to question 3.8 above, how did these adjustments affect the overall financing of the project?

_____

3.10 Were there any changes made to planned project quality?

Yes	1
No	2
DK	9

If no or don't know (DK) skip to question 3.12

3.11 If yes to question 3.10 above, what effect did these changes have on the overall project quality?

_____

3.12 On average, how long did ZESCO take to install one pre-paid electricity meter?

a. Less one hour	1
b. One hour	2
c. More than one hour	3
d. Two hours and above	4

3.13 On average, how long was ZESCO supposed to take to install one pre-paid electricity meter?

a. Less one hour	1
b. One hour	2
c. More than one hour	3
d. Two hours and above	4

3.14 Did the project proceed as planned in terms of:

	Yes	No
a. Scope?	1	2
b. Quality?	1	2
c. Budget?	1	2
d. Time frame?	1	2

If yes to all, skip to question 3.16

3.15 If no to either a, b, c or d above, why did the project not proceed as planned in terms of:

a. Scope

_____

b. Quality

_____

c. Budget

_____

d. Time frame

_____

3.16 What problems did you encounter during project implementation in phase I?

_____

3.17 How did you resolve these problems?

_____

3.18 Did you face similar problems during project implementation in phase II and IV?

	Yes	No
a. Phase II	1	2
b. Phase IV	1	2

3.19 Do you think you were given enough tools, equipment, technology and machinery to work with during implementation?

	Yes	No
a. Tools	1	2
b. Equipment	1	2
c. Technology	1	2
d. Machinery	1	2

3.20 What factors outside the control of the project team affected:

a. Project planning?

_____

b. Project implementation?

_____

c. Monitoring?

_____

3.21 What was done to resolve these factors?

_____

3.22 Were there unintended outcomes (positives or negatives) arising from project implementation?

	Yes	No
a. Positive outcomes	1	2
b. Negative outcomes	1	2
c. DK	9	

If no or don't know (DK), skip to part four below

3.23 What were these unintended outcomes? (Please kind the nature of the outcomes, positive or negative)

PART FOUR: PROJECT MONITORING, COMMUNICATION AND RISK MANAGEMENT

4.1 Do you think you were given enough tools, equipment, technology and machinery to work with during project monitoring?

	Yes	No
a. Tools	1	2
b. Equipment	1	2
c. Technology	1	2
d.Machinery	1	2

4.2 What monitoring mechanisms were put in place to monitor the pre-paid metering project?

4.3 How effective were the above monitoring mechanisms in monitoring the pre-paid metering project?

a. Very effective	1
b. Effective	2
c. Ineffective	3
d. Very ineffective	4

4.4 What problems did you encounter in monitoring phase I of the pre-paid metering project?

4.5 How did you resolve these problems?

4.6 Did you face similar problems when monitoring phase II and IV of the pre-paid metering project?

	Yes	No
a. Phase II	1	2
b. Phase IV	1	2

4.7 What communications channels were established during project implementation and monitoring?

_____

4.8 How effective were these communication channels in relaying relevant information to project stakeholders?

a. Very effective	1
b. Effective	2
c. Ineffective	3
d. Very ineffective	4

4.9 How often did you communicate with;

	a. Project Manager?	b. Project Staff?	c. Stakeholders?
1.Never			
2.Seldom			
3.Frequently			
4.Most times			
5.Always			

4.10 How long did it take for you to receive feedback on issues you needed clarifications or had questions?

a. Minutes	1
b. One hour	2
c. One day	3

d. One week	4
e. One month	5

4.11 What mechanisms were put in place to identify risks to the project?

_____

4.12 How effective were these mechanisms in identifying risks to the project?

a. Very effective	1
b. Effective	2
c. Ineffective	3
d. Very ineffective	4

4.13 What risks did the project face?

_____

4.14 How were these risks managed?

_____

PART FIVE: LESSONS LEARNT

5.1 What areas of improvement were identified in phase I of the pre-paid metering project?

_____

5.2 What best practices did you identify in phase I of the pre-paid metering project?

_____

5.3 Were these best practices applied to phases II and IV of the pre-paid metering project?

	Yes	No
a. Phase II	1	2
b. Phase IV	1	2

5.4 What was learnt about project planning in;

a. Phase I?

_____

b. Phase II?

_____

5.5 What was learnt about project implementation in;

a. Phase I?

_____

b. Phase II

_____

5.6 What was learnt about project monitoring in;

a. Phase I?

_____

b. Phase IV

_____

5.7 What was learnt about project procurement?

_____

5.8 What was learnt about working with ZESCO management?

_____

5.9 What was learnt about working with government?

_____

5.10 What was learnt about working with Energy Regulation Board?

_____

5.11 What was learnt about working with suppliers?

_____

5.12 What was learnt about what went well?

5.13 What was learnt about what went wrong?

5.14 What was learnt about project management in general?

5.15 Were the lessons learnt in each project phase documented and distributed to all key project stakeholders?

	Yes	No
a. Documented	1	2
b. Distributed	1	2
c. DK	9	

5.16 What do you think were the reasons for project;

a. Project success?

b. Project failure?

THANK YOU FOR YOUR COOPERATION

THE UNIVERSITY OF ZAMBIA

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES

DEPARTMENT OF POLITICAL AND ADMINISTRATIVE STUDIES

Questionnaire for ZESCO Customers

TITLE: THE PLANNING, IMPLEMENTATION AND MONITORING OF ZESCO's PREPAYMENT METERING PROJECT IN LUSAKA PROVINCE: LESSONS LEARNT

Dear Respondent,

I am a Post-graduate student at the University of Zambia conducting a research as part of the requirement for the award of **Master of Public Administration.** You have therefore been randomly selected to be a respondent in this research. Please, be assured that the information thus collected is solely for academic purposes and shall be treated with strict confidentiality.

Name of Township _____

Date of interview _____

Start Time: _____

End Time: _____

PART 1: PROFILE OF THE RESPONDENT

1.1 How old are you?

1. 18-25	
2. 26-34	
3. 35-45	
4. 46-55	
5. 56 and above	

1.2 Sex of the respondent

Male	1
Female	2

1.3 What is your highest level of education?

1. Not attended school	
2. Primary	
3. Secondary	
4. College	
5. University Under-graduate	
6. University Post-graduate	

1.4 How long did ZESCO take to install a pre-paid meter in your house?

a. Less than one hour	1
b. One hour	2
c. More than one hour	3
d. Two hours and above	4

1.5 How long have you been occupying this house?

1 month to 12 months	1
1 year to 5 years	2
6 years to 10 years	3
11 years and above	4

PART 2: QUALITY AND MAINTAINANCE OF PRE-PAID ELECTRICITY METER

2.1 Are you happy with the kind of pre-paid electricity meter in your house?

Yes	1	If yes skip to question 2.3
No	2	

2.2 If no to question 2.1, why are you not happy with the kind of pre-paid electricity meter in your house?

_____

2.3 Have you ever replaced the pre-paid electricity meter in your house?

Yes	1	
No	2	If no skip to question 2.6

2.4 If yes to question 2.3, why did you have to replace the pre-paid electricity meter in your house?

_____

2.5 How many times have you had to replace the pre-paid electricity meter in your house?

1. Once	
2. Twice	
3. Thrice	
4. Four times	

2.6 Are you familiar with the operations of the pre-paid electricity meter in your house?

Yes	1	
No	2	If no skip to question 2.10

2.7 If yes to question 2.6 above, what features of your pre-paid electricity meter are you familiar with?

_____

2.8 Are you happy with the operations of the pre-paid meter in your house?

Yes	1
No	2

2.9 Do you know how to enter credit into the pre-paid meter?

Yes	1
No	2

2.10 What are the benefits of pre-paid metering system to you as ZESCO customer?

_____

2.11 Would you prefer conventional (credit) metering system to pre-paid metering system?

Yes	
No	

2.13 What are the advantages of the pre-paid metering system to you?

_____

2. 14 What are the disadvantages of the pre-paid metering system to you?

_____

2. 15 Are you having any problems with the pre-paid metering systems?

Yes	
No	

2.16 If yes to question 2.15, what problems are you having?

_____

THANK YOU FOR YOUR COOPERATION