

**PREPAID ELECTRICITY BILLING AND THE FINANCIAL PERFORMANCE
OF KENYA POWER AND LIGHTING COMPANY**

BY

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DECLARATION

I the undersign, declare that this project is my original work and that it has not been presented in any university or institution of higher learning or for any other award.

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I confirm that this project was written and submitted by the candidate for examination under my supervision.

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DEDICATION

I dedicate this work to my wife Lydia Maket, my children Ethan Kipchumba and Jarvis Kiplagat, who sacrificed a lot of his comfort/pleasures to give me time and inspire me to work hard. My parents John Murei and Evelyne Murei for their moral and emotional support.

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OPERATIONAL DEFINITION OF TERMS

Automatic Meter Reading: This is the technology of automatically collecting consumption, diagnostic, and status data from water meter or energy metering devices (gas and electric) and transferring that data to a central database for billing, troubleshooting, and analyzing.

Bad debt is usually a product of the debtor going into bankruptcy but may also occur when the creditor's cost of pursuing the debt collection activities is more than the amount of the debt

Collection costs is the cost incurred to collect debt that is owed, a process called debt collection.

Financial performance it is the process of measuring the results of a firm's policies and operations in monetary terms. It is the actual output or results of an organization as measured against its intended outputs or goals and objectives (Fitzgerald, 2007). In the study, it refers to profitability, sales volumes and market share of firm

Integrated Customer System: This is an extension or hybrid of the transaction processing system (TPS) that places technology in the hands of the customer and allows them to process their own transactions.

Postpaid meters: This is a billing technology where the consumers uses the services then pay for them later after readings are taken and a bill is given to the customer.

Prepaid billing: This is a billing technology where consumers pay for the services in advance before consumption.

Revenue collection period indicates the average time taken to collect trade debts

ABBREVIATIONS AND ACRONYMS

ADF	–	Augmented Dickey Fuller test
AMR	–	Automatic Meter Reading
EPRI	–	Electric Power Research Institute
EPS	–	Earnings per Share
ICS	–	Integrated Customer System
KPLC	–	Kenya Power & Lighting Company Limited
NSE	–	Nairobi Securities Exchange
OLS	–	Ordinary Least Squares
RMC	–	Revenue Management Cycle
ROCE	–	Return on Capital Employed
TAM	–	Technology Acceptance Model
UK	–	United Kingdom

ABSTRACT

Revenue collection has been a cause of great distress to Kenya Power under the postpaid system where meters are read, captured, and bills produced. Due to inefficiencies in revenue collection as a result of the postpaid systems, most electricity distributing companies including Kenya Power are forced to establish the debt collection departments. The main objective of this study was to determine the effects of prepaid electricity billing on financial performance of Kenya Power. The study objectives were to assess the effects of collection costs on financial performance of Kenya Power, to establish the effects of bad debt on financial performance of Kenya Power, to find out the effects of revenue collection period on financial performance of Kenya Power and to determine the effect of billing accuracy on financial performance of Kenya Power. The study was informed by The Technology Acceptance Model, TAM and Socio-technical model. The study employed cross sectional research design. The target population consisted of Kenya Power Company Coast Branches of Ukunda, Voi, Kilifi and Mombasa. Study collected data from annual report, financial report and other relevant documents on a monthly basis from January 2013 to December, 2015. The observations were 4 branches multiplied by 36 months (3 years) giving 144 observations. Census technique were used to get information from all the branches in Coast region. The data collection instrument used in this study was content/document analysis guide. Descriptive statistics such as mean, median, maximum, minimum, standard deviation and inferential statistics such as regression and person correlation were used to analyze data. The study was modeled along an ordinary least squares regression method. The study findings indicate that collection costs and revenue collection period have a negative and significant influence on profitability of Kenya Power at the Coast region. Billing accuracy had significant influence on profitability of Kenya Power at the Coast region. However, bad debts had no significant effect on profitability of Kenya power. Thus, there is need for the company to double its efforts in debt collection through the relevant department. In order to achieve this, Kenya Power should increase the coverage of the prepaid meters at the coast region and if possible across the country. Findings there is need to ensure billing accuracy in order to positively influence financial performance of the company.

CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

Kenya Power is a public utility company that is mandated by Kenyan government to distribute electric power throughout the country. The government is the major shareholder, controlling about 49% of shareholding. The company's shares are trading on the NSE and are therefore a mandatory requirement by law to publish and release annual financial statements to the public and other stakeholders (Kioko, 2013). KPLC, since its inception in 1975 has been on post-paid method of collecting revenue. The system allows consumers to enjoy the services and pay later at the end of the month when billing has been done. As a result the company exposed itself to risks of bad debts and revenue collection related costs such as meter reading costs, disconnection and reconnection costs, estimation of bills or readings not taken, and meter tempering (Kenya Power Annual Report, 2009). This led to establishment of the debt collection department with a budgetary allocation for hiring staff and using contracted debt collectors who earn commission. All these costs may have direct impact on the financial performance of the company (Mwaura, 2010).

1.1.1 Prepayment meter system

A prepayment meter is a special type of energy meter that can be installed in domestic properties. Prepaid meter records active energy Customers according to their demand, and purchase of a certain quantity of energy from the local electric power company. Management system with kindly man-machine interface is easy to collect, analyze and store data. Historically, prepayment meters have had a reputation for leaving

people quite literally 'in the dark', but measures have now been put in place to ensure 'black-outs' only occur at times that it's perceived safe to do so for example when the shops are open and you can nip out to buy more credit(Hangzhou Pax Electronic Technology, 2012).

Paying for gas and electricity in advance helps to ensure you do not accumulate any debt on your energy bills. According to Ariel and Luciana (2009), prepayment system refers to the outlay made by a consumer for using a good or service before consumption. In the case of electricity, the distinctive feature of the prepayment system is the reversion of the conventional commercialization system (postpaid). Whereas in the latter consumers hold a consumption credit, in the prepayment system, such credit is not available because the purchase and payment of energy are made prior to consumption. Thus, prepayment systems allow users to consume energy only when they have credit in their electricity account, as supply is automatically discontinued when such credit is exhausted (Ariel & Luciana, 2009). The Supply can be maintained or reconnected by loading further credit on the prepayment meter.

Globally there has been an increase in the number of customers preferring prepaid meters. For instance, in the U.K. which has a long tradition of offering prepaid metering as an option to any customer, have up to 15-20 percent of its customers signed up (Chartwell, 2003). Northern Ireland Electricity, which has a new, customer-friendly prepayment system, has increased prepayment enrolment to 25 percent (Energywatch, 2005). At Arizona's Salt River Project, more than 50,000 customers (about 6 percent) are prepaid meters (Chartwell, 2008) In Ontario, Woodstock Hydro reports participation by 25 percent of residential customers.

According to Chartwell (2003) the U.K. adoption of prepaid meters has considerably increased their revenue collection and reduced overheads hence leading to increased profitability. Northern Ireland Electricity reports that customers on prepaid use 4.9 percent less electricity than the average customer. By late 1990s, prepayment systems were very popular in India and in some OECD countries (Estache et al., 2000), and had probably reached their highest development in Great Britain (Waddams et al., 1997).

Countries like United States of America are already involved in projects with smart metering on a demonstration scale or implementation. The last couple of decades have seen electric power being managed using different technologies (Daniel, 2011). The era in which we are now, is very much characterized by fast growing technologies (Federal Energy Regulatory Commission, 2011). These have found their way in power management. The essence of using prepaid meters in the management of power is to help improve on cash flow, reduce credit and arrears collection costs, avoid deposits and monthly bills as well as reconnect charges, and many more

The way the system works is that the user purchases energy at the sales outlets, or through mobile money platforms. As part of the operation, a credit slip or code in the mobile phone is received. The customer loads the credit, which is generated using an encryption algorithm on their prepayment meter by entering a coded number which is usually 20- digits, using a keypad attached to the prepayment meter. The customers are given a card with a unique meter number that must be produced or quoted when purchasing credit (Kioko, 2013).

In the past, installation of prepayment meters involved the removal of the standard credit meters and replacing them with dedicated ones. More recently, it has become

possible to install a prepayment attachment module in combination with the existing standard credit meter. By using the existing metering installation, the cost of implementing prepayment metering is reduced. In addition, these prepayment modules can be remotely commissioned and decommissioned thus facilitating ease of change between the functions of prepayment and standard credit meters (Shaw, 2011).

Ariel and Luciana (2009), indicated that the prepayment technology was initially developed in South Africa in the late 1980's with the objective of supplying energy to a large number of low income and geographically dispersed users. The system was initially geared towards minimizing difficulties arising from irregular incomes, and to overcome limited infrastructural development required to dispatch and receive credit slips (bills). A study by Casarin and Nicollier (2008) among local electricity users indicate that prepayment leads to consumer welfare and reduction of arrears in accounts receivables, operational and financial costs on the part of service providers and better allocation of resources for the user. Similarly, a study by Mwaura (2010) in Rwanda about electricity payment billing system shows that revenue rose in tandem from US\$ 261,000 in 1996 to US\$ 22.9M in 2008. Other associated benefits discovered include increased and timely revenue collection and improved service delivery to electricity users. Some other studies on the global stage have been done on efficiency in revenue collection, its effects on profitability and other stakeholders. Moreover, similar surveys have been done on such studies and their impact on users and arrears in accounts receivable.

1.1.2 Collection Costs, Bad Debt, Revenue Collection Period and Billing Accuracy

Allen, (2009) argues that there is an increase in accuracy and customer trust with the deployment of these new prepayment meters. Since metering and billing are automated, customers will be given a fair bill. This will also make energy consumers more eager to pay their bills. One reason that some Consumers give for not paying their electric bills is that the billing is not fair. They complain that electricity companies supply very little power only to bring huge estimated bills at month end. An Electronic electrical energy prepayment meter will only bill consumers for actual electric power consumed. This is fair enough for most energy consumers.

According to Bloem and Gorter, (2001), though issues relating to bad loans may affect all sectors, the most serious impact is on firm such as service firms, which tend to have large loan portfolios. Besides, the large bad loans portfolios will affect the ability of firms to provide credit. Huge non-performing loans could result in loss of confidence on the part of depositors and foreign investors who may start a run on firms, leading to liquidity problems

According to Kioko (2013), for every day bills are unpaid, businesses must find a way to cover payroll, employee benefits and other operational expenses. By reducing the collection period, i.e number of days it takes from the end of the billing or accounting period and invoices sent to clients and the date the payment is received- businesses can decrease the average collection period and reduce their dependence on additional sources of funds

Consequently, there are certain costs that may be avoided for billing a given service or good in advance (Ogujor and Otosowie, 2010). For instance, costs associated with meter reading, i.e salaries of meter readers, purchase of motor bikes for readers, fuel costs and time taken to and from reading the meters. In this study collection costs represents fuel costs used by motor bikes for readers, bill printing costs, and disconnection costs whose data is available and was obtained from management accounts of Kenya Power Coast branch. If these costs are properly managed, it will lead to increased levels of revenue as well as reduce some operational costs for a given organization. Misra and King (2012) noted that human handling should be eliminated from billing process to prevent fraud and billing errors.

1.1.3 Performance of Kenya power

In Kenya, KPLC undertook prepaid metering project, which commenced on a pilot basis in April 2009. It was introduced for purposes of meeting certain key objectives that include: improvement of the Company's services to its customers through giving them the power to control their electricity supply; elimination of estimated bills; improvement of billing accuracy; elimination of disconnection and reconnection; enhanced privacy; decongestion of the Company's banking halls, and easing bill payment. The pilot process was successful (Kioko, 2013).

Following the successful pilot project, rollout of the project commenced in March 2011, and by 30th June 2011 a total of 123,000 prepaid meters had been installed throughout the country with a majority of them in Nairobi. The project was continuing and the company anticipated that a total of 520,000 meters would be connected by the end of the financial year (Njoroge, 2011). Kioko (2013) conducted a study on perceived effects of prepaid meters on revenue collection efficiency at Kenya Power.

Using a survey research design; 396 prepaid meters in Nakuru County were targeted and a sample of 201 respondents were selected using stratified random sampling. The study concluded that Kenya Power should increase its service delivery to customers so that users can have required knowledge on the use of prepaid meters. The use of prepaid meters should be encouraged since it improves the management of daily consumption of customers, advances the revenue collection process, saves time and regulates electricity consumption.

While consumer adoption of prepaid meters has been increasing in the continent, it has been revealed that most energy supply companies have huge debts owed by customers. This inhibits their revenue collection efficiency as well as the provision of quality services. To address this problem, some companies resorted to adoption of the network operator cash collection policy known as Revenue Management Cycle (RMC) that involves using private companies in collection of monies owed (Annon, 2001). Several methods were engaged over the years by the utility provider in an attempt to ensure efficiency in revenue collection. These include cash offices and pay points, banks, supermarkets, postal corporation, and use of mobile providers among other methods. Even though this strategies have been successful to some extent, they have not been entirely effective in preventing payments evasion, revenue leakages, and numerous challenges that consumers face such as; untimely delivery of bills and crediting of bills paid to customers' accounts, delivering of bills to wrong persons, and inconvenience of travelling long distances to make payments (Mensah et al., 2012).

KPLC has over the years invested a lot in capacity development and is now embracing an advanced metering infrastructure known as 'smart metering (prepaid)'.

The company embarked on the prepaid metering system in 2009 with the aim of improving customer service delivery, cutting operation costs, as well as reducing commercial losses associated with customer defaults (Obura et al., 2012). The company's small, medium enterprise, and domestic customers are set to benefit from the newly operational smart meters that have been designed to eliminate human error and open fraud associated with meter interference. (Stima news, April – June, 2015). To alleviate these challenges, the smart meter is designed to eliminate vandalism; once the meter is installed any interference or attempt to open the meter box is immediately detected and information is sent to the system. (Stima news, April – June, 2015). It is also geared towards minimizing the risk of bad debts, revenue collection costs and monthly billing costs

Revenue collection has been a cause of great distress to Kenya Power under the postpaid system where meters are read, captured, and bills produced. Due to inefficiencies in revenue collection as a result of the postpaid systems, most electricity distributing companies including Kenya Power are forced to establish the debt collection departments. To operationalize this departments, budgetary allocations are required which eat into the resources of the company and may have direct impacts on its performance. Improving revenue collection and reducing collection costs is paramount in improving financial performance. As a result, Kenya Power adapted prepaid metering with that goal in mind among others. Despite switching to prepaid metering, the goal of revenue collection attributable to this metering system has not increased significantly (Kenya Power monthly report, 2013).

1.2 Statement of the problem

Kenya power has exposed itself to risks and costs associated with revenue collection. Such risks include meter reading costs, disconnection costs for timely non-payment of debt, bad debts for non-payment, meter tampering and establishment of a whole department with a cost centre and staff for managing debt. All these costs have always exerted pressure on the company's revenues and profits since inception. The company has also grappled with issues arising from customer complaints due to estimated bills. Some meter readers are unable to read all their meters in their itinerary because of gated compounds or they are simply lazy and therefore end up estimating in order to achieve their set target. As a result, customer dissatisfaction arises which dents the company's public image in regard to efficiency and ability to deliver good customer service

In addition there have been complaints by some customers that the prepaid system is not sufficient compared to the former postpaid billing system. According to Consumer Federation of Kenya (COFEK, 2012), faulty Gadgets, and poor consumer knowledge on how to use the technology irked some users. A team of inspectors have been sent to the field frequently which increases cost.

A number of studies have been done locally and internationally in relation to strategic responses adopted by firms to achieve organizational performance. Miyogo, et al. (2013) studied the effect of prepaid service transition in electricity bill payment on Kenya power customers. The findings show that customers have embraced the prepaid billing system and that prepaid billing system has brought with it some advantages like making them more careful with their consumption. Kioko (2013) conducted a study on perceived effects of prepaid meters on revenue collection

efficiency at Kenya Power. Study findings indicated that perceived risk was negatively correlated to revenue collection, while perceived ease of use, perceived low cost and perceived usefulness were positively related and had a significant effect on revenue collection. Moki (2012) did a research on the relationship between prepaid electricity billing and working capital management in the Kenya Power company between 2009 and 2012. His study found that there exists both negative and positive relationship between prepaid billing system and working capital management in that prepaid billing has a significant negative relationship with average collection period. Average payment period and cash conversion cycle was found to have negative but non-significant relationship with prepaid billing system. However, despite the very few studies have attempted to address the link between prepayment metering on financial performance of Kenya Power. This study therefore sought to establish the effects of prepaid metering on financial performance of Kenya Power.

1.3 Objective of the study

1.3.1 General Objective

The main objective of this study was to determine the effects of prepaid electricity billing on financial performance of Kenya Power.

1.3.2 Specific objectives

The specific objectives of this study are:

- i. To assess the effect of collection costs on financial performance of Kenya Power.

- ii. To establish the effect of bad debt in prepaid system on financial performance of Kenya Power.
- iii. To find out the effect of revenue collection period in prepaid system on financial performance of Kenya Power.
- iv. To determine the effect of billing accuracy on financial performance of Kenya Power.

1.4 Research questions

The following research questions were used to guide the researcher in order to achieve the above stated objectives.

- i. What is the effect of collection costs on financial performance of Kenya Power?
- ii. What is the effect of bad debt in prepaid system on financial performance of Kenya Power?
- iii. What is the effect of collection period in prepaid system on financial performance of Kenya Power?
- iv. What is the effect of billing accuracy on financial performance of Kenya Power?

1.5 Significance of the study

This study provides a great insight to the management of Kenya power limited on how best to implement the adoption of prepaid meters through enhancing financial performance of Kenya. The management will be informed on how collection cost, collection period, bad debts and billing accuracy of prepaid system.

The study benefits the governments on improving how to improve prepaid meters through improving collection cost, collection period, bad debts and billing accuracy of prepaid system to enhance financial performance of Kenya power hence more revenue for the firms. The findings will also be important to the community on the through effective public service delivery in improving prepaid system.

This study provides Kenya Power Company and its policy makers with important information about the prepaid meter system. It also provides important information to government and other industry useful for decision-making.

In addition, the study contributes to literature and the growing body of knowledge on issues of financial performance and strategic management.

1.6 Scope of the study

The study used information from Kenya Power Company- Coastal Region Branch. Kenya power has eight sub-regions that are semi-autonomous and this is important for better management and operation. The eight sub regions include; Nairobi, Coast, Central Rift, North Rift, Mount Kenya North, Mount Kenya South, West Kenya, and Central Office. The study prepaid meters components were limited to billing accuracy, bad debt, collection period and collection costs. The study was carried from January 2013 to December 2015

1.7 Limitations of the Study

A major limitation of the study was that management of Kenya Power Coastal Region branch was unwilling to provide data relevant to the study. The researcher overcame

this by clearly explaining to them the purpose of the study and sought for permission from Kenya Power Head office branch in Nairobi.

1.8 Organization of the Study

Chapter one represents background of the study, statement of the problem, purpose of the study, research objectives, research questions, delimitation and limitation of the study, significance of the study, research organization and definition of operational terms as used in the study. Chapter two reviews related literature. Chapter three describes research methodology of the study. This methodology comprised of research design, target population, sample size and sampling techniques, Research instruments reliability and validity of research instruments, pilot testing and data collection procedures. Chapter four describes data analysis, presentation and interpretation. Chapter five shows summary of the findings, conclusion and recommendation.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter involves a critical review of the literature relating to prepayment meters and also looks at effects of prepaid meters to organizations' financial performance from empirical research that have been conducted on related topics. Two relevant theories are posited alongside an analytical model and a conceptual framework. Variables of interest to the study are also reviewed and a research gap identified in the chapter.

2.2 Theoretical Review

2.2.1 The Technology Acceptance Model, TAM

The Technology Acceptance Model was developed by Davis (1989) and bases its arguments on the fact that perceived use and perceived ease of use are relevant aspects for computer acceptance behaviors (Davis, et al., 1989; Igbaria, et al., 1997). Broadly this model can be applied in the context of any other technological advancement in the context of perception and acceptability. In the basic TAM model system use is normally determined by a person's attitude towards the system. According to Davis, (1989) TAM is a theoretical model that explains how users come to accept and use a technology. Prepaid meters assumes perceived usefulness or the degree to which a person believes that using a particular system would be free of the influence of pre-existing external variables such as security concerns, convenience as a primary determinants for adoption of a new technology (Lu et al., 2004).

Convenience in use of prepaid meters may be as a result of the efficiency created through adoption of new technology. Perceived ease of use may have a direct effect on perceived usefulness and both determine the consumer's attitude towards use. As a result, this leads to behavioral and actual use of the system. An information systems theory suggests their decision about how and when they will use it. this study will assume that perhaps the derived convenience and efficiency derived from adopting a new technology (in this case the prepaid electricity meters) will be the basis of reducing all costs associated to demand and supply of electricity and impact positively on profitability.

2.2.2 Socio-technical model

The socio - technical model argues that there is close relationship between behaviors and infrastructure such as energy infrastructure (e.g smart meters) (Shove, 2010). The socio - technical models go beyond how people's dispositions and behaviors are influenced by others and propose that objects and technologies have an inbuilt tendency to cause the user to behave in certain ways (Guy, 2010), this in turn changes users lifestyles. These lifestyles create the need for further technologies to reinforce them.

This approach acknowledges the active role metering technology has in mediating the relationship between energy suppliers and households. This idea also supports the view that metering of energy consumption though complex, can influence the energy behavior of consumers either to consume more or lead to conserving behavior effect, Brunner et al., 2012. This in turn will have an effect in the utilities financial performance.

Thus the socio - technical perspective suggests the need to understand behaviors as mutually reinforcing systems of technologies, ideas, behaviors and institutions.

2.3 Empirical Review Literature

2.3.1 Billing Accuracy on Financial Performance

Globally, there exists empirical literature on use of prepaid meters in electricity supply and demand with a special focus on financial performance of the supplying companies. Dadzie (2012) studied customers' perception and acceptability on the use of Prepaid Meter in Accra West Region of ECG. The main aim of this study was to improve customer acceptability by determining the level of acceptability of Prepaid Meters, analyze the factors customers considers before accepting the use of Prepaid Meters, and determine management strategy in promoting prepaid usage. A descriptive method of research design adopted for the study. Both primary and secondary sources of data were used with questionnaire as the main instrument for collecting primary data on customer acceptability, factors customers perceive before accepting the use of prepaid meters. The stratified sampling method was used to categorize customers into the type of tariff whether domestic or commercial. A total sample size of 391 was drawn out of 18, 000 customers in a district. He established that one of the major findings of the study is that customers consider a number of factors before accepting the prepaid meter for use and these include billing accuracy. He recommended that management should consider improving durability and access to prepaid meter vending points in order to improve customer acceptability on the use of prepaid meters.

Salihu and Pamela (2010) did a research on evaluating the effect of ICT on development focusing on prepaid electricity billing in Nigeria by concentrating on the introduction of the prepaid billing system in Nigeria and the supporting arrangements to enable citizens have access to electricity supply. The study highlighted the extent to which the prepaid electricity system contributed to enhancing people's freedom to participate in development activities and then derived some implications on economic development

The outcome of a research conducted by the Allen Consulting Group (2009) indicates that there are two main attributes of prepayment meters that distinguish them from the Standard credit meters. And one of these unique attributes is that customers are required to pay for electricity before consumption can take place. The other is that the prepayment system more actively involves customers in their electricity supplies. These attributes of prepayment meters have important implications for electricity residential customers

A study in Ghana by Dzamboe (2009), indicated that there used to be payment options available to customers with a standard credit meter other than simply paying bills in arrears. Although the amount of the prepayments under these options smooth's the customer's payments, it is not directly linked to the electricity consumption. These payment options did not provide the same immediate link between electricity consumption decisions and the resulting frequency and amount of prepayment. Prepayment meters also changed the relationship that existed between customers and electricity retailers, with customers assuming greater responsibility for managing their own electricity.

Casarin and Nicollier, (2008) conducted a survey among local electricity users and found an improvement in welfare through use of prepaid meters. In addition, the study establishes extra advantages of the prepaid system which include; reduction of arrears in accounts receivables, operational and financial costs on the part of the service provider and better allocation of resources for the user. Estache, *et al.* (2000) conclude that a disadvantage of the prepaid system is that it would increase administrative collection costs accuracy which would lead to higher tariffs and reduce the profit margins.

Shaw, (2011) asserts that the new prepayment meters reduce corruption within ranks thus are more accurate therefore allowing consumers to depend solely on the method thus trust the electricity companies. Since customers will pay their bills upfront, the era of collecting bribe to connect defaulting customers is gradually ending. This new energy meters have capability of automatically disconnecting consumers once they run out of energy credit. Bell, (2004) argues that the prepayment meter is more accuracy to the consumer because it enhances more control. Energy consumers can hence control their energy consumption. If they find themselves using more energy, they can decide on what to cutout in order to reduce their energy consumption.

Tewari and Shah (2003) believe that prepaid system results in mixed financial fortunes to energy provider and consumers. For instance, prepayment systems may result in a decrease in metering, billing and disconnection and reconnection costs to energy provider. This is brought on by the fact that payment is made prior to consumption, which implies a significant accuracy in revenue collection and a reduction in working capital. From the consumer's perspective, prepayment systems

may result in a better understanding of how much energy is being consumed, inducing more control of energy use and budget management.

Liao and Cheung (2002) empirically identify convenience as a significant quality attribute in the perceived usefulness of prepaid metering, which positively influences consumers' willingness to use prepaid metering. Wan, Luk and Chow (2005) confirm that convenience has a significant impact on customers' adoption of prepaid metering in Hong Kong. Lee et al. (2005) find that consumers perceive convenience to be an important determinant of intention to adopt prepaid metering services. Likewise, Yu and Lo (2007) discover that perceived convenience significantly influences consumers' actual behavior to prepaid metering.

2.3.2 Bad Debt On Financial Performance

Also when Gulliver (2009) examined the bad debt connection between aggressive accounting, poor accounting and poor earnings quality. A survey was conducted of 600 households to determine whether certain kinds of households were more inclined to join the voluntary program and self-report energy-relevant behavior. A seemingly unrelated regression equation (SURE) model was then used to estimate the possible correlation between a series of covariates familiar to the energy savings literature and the decision to initially join and then saving energy through the program. The result shows the family size and recent income changes (during the last five years) were more likely to join voluntary program, while senior citizens were less likely to join. The results also reveal that education level play significant role in changing behaviour of households in the program. Research findings and publications show that bad loans occur as a result of some factors. he also found that among signs associated with aggressive accounting, which affects accounts receivable and margins we have:

revenue recognition without earnings; capitalizing period expenses; manipulation of reserves and accounting. Hence there has to be a close look of these issues by those skillful in account.

Luciana, (2009) demonstrated using basic economic theory that there are four possible channels via which a reduction in electricity consumption can be achieved by the adoption of a pre-paid plan: nudging, price effects, information provision, and costs of being disconnected. By using customer level residential billing data from 2008-2010 of a major utility company in Phoenix metropolitan area, this study adopts a matching approach and a difference-in-differences method to estimate empirically the impact of a pre-paid electricity plan on residential electricity consumption, after correcting for selection bias. Results show that the pre-paid program is associated with a 12% reduction in electricity usage, customers with lower level of increase in bad debts or those with higher amount of arrear prior to switching to the pre-paid program tend to save more electricity after switching, and pre-paid customers save more electricity in the summer than winter. On the other hand it is argued that the prepaid meters have the tendency of decreasing consumer well-being from a net increase in financial costs associated with electricity consumption due to their level of credibility. Prepayment meter customers incur interest costs because they are required to pay for electricity before it is consumed rather than in arrears as for customers with standard credit meters and because they are not be able to accumulate bad debts on their electricity charges. Prepayment meter customers are likely to incur additional costs associated with more frequent disconnections from their electricity supply.

Berger and De Young (2007) identified poor management as one of the major causes of problem loans. A case study was used; a sample of 60 respondents was used. Data

collection methods were questionnaires and documentary analysis. Data were analysed using both Descriptive and Inferential Statistics with the aid of Statistical Package for Social Sciences (SPSS). Descriptive Statistics used included percentages and frequencies. The challenges include hindering energy provision is the loss of revenue as a result of poorly managed revenue collection systems resulting to bad debts. This study examined the effect of prepaid meters on revenue collection. They argue that managers in most banks with problem loans do not practice adequate loan underwriting, monitoring and controlling.

Organizations have been making credit sales with the aim of increasing sales, albeit some sales are made to customers with less advantageous credit. Whilst some of the creditors demand more time to make the payments, there are others who will never pay their dues. Bad debts, undoubtedly affect the business. In addition to costing money to a business, these bad debts also affects the accounting process by making it more complicated. This is because it is important to recognize income at the point when sales are made and not when it comes in. Due to the delay in payments, the non-paid sales become an overdue account thus leading the business to go through different collection procedures. The overdue account, however, turns into a bad debt when the business does not realize it until later (William, 2014).

2.3.3 Collection Period On Financial Performance

Manyo et al (2013) investigated the effects of collection period on the return on assets of some selected Nigerian firms between 2000 and 2009 by use of cross sectional and regression analysis. It was found that the collection period had a negative relationship with the profitability which was measured by the return on assets. The conclusion was that profitability increased with decrease in collection period. This find was confirmed

by Asif Iqbal & Wang Zhuquan (2015) who conducted a similar research on Pakistani firms listed on Karachi Stock Exchange. Many other researchers have conducted similar researches with similar findings though the tea industry has not attracted many researchers.

Deloof (2003) studied the relationship between average collection period (ACP) and corporate profitability. He used a sample of 1,009 large Belgian non-financial firms for a period of 1992 – 1996. By using correlation and regression tests, he found significant negative relationship between gross operating income and ACP of Belgian firms. Based on the study results, he suggested that managers can increase corporate profitability by reducing the ACP. Most researchers for example Deloof (2003), Amarjit et al(2010), Biger et al (2010), Mogaka and Jagongo (2013) and Melita, Elfani and Lois (2010) have agreed on the definition of and formula for calculating the number of days accounts receivable or receivables collection period.

Mishra (2001) asserts that a firm that tends to grant long period credits and its debtors include even those customers whose financial position is doubtful. Such a firm is said to be following lenient credit policy. Contrary to this, a firm providing credit sales for a relatively short period of time that too on highly selective basis only to those customers who are financially strong and have proven their credit worthiness is said to be following stringent credit policy

2.3.4 Collection Costs On Financial Performance

Some local researches have also been done on similar subject. A study by Electricity Regulation of Uganda (2011) found that the prepaid billing system implemented by Umeme has certainly played a vital role in loss reduction. Umeme, in its loss

reduction strategy for 2006-2009 had acknowledged that non-technical losses would be reduced after the implementation of prepaid system. As part of this study, the following parameters were analyzed to determine the impact of the prepaid billing system on loss reduction: the billing efficiency ratio is an important parameter based on which Umeme performance can be monitored.

Another related study done by Mwaura (2010) on adopting electricity prepaid billing system to reduce non-technical energy losses in Uganda and found that the prepaid system reduced power theft and the benefits surpasses cost. Although the study by Mwaura compared Rwanda's experience with that of Uganda, it was noted that apart from non-technical losses, prepaid meters had an effect on financial losses such as revenue collection losses including bad debts.

Moki (2012) studied the relationship between prepaid electricity billing and working capital management at Kenya Power Company between 2009 and 2012. The study used a three year period data and found that there exists both negative and positive relationship between prepaid billing system and working capital management in that prepaid billing has a significant negative relationship with the average collection period. The average payment period and cash conversion cycle was found to have a negative but non-significant relationship with prepaid billing system.

Moki (2012) did a research on the relationship between prepaid electricity billing and working capital management in the Kenya Power company between 2009 and 2012. He used a three year period data and found that there exists both negative and positive relationship between prepaid billing system and working capital management in that prepaid billing has a significant negative relationship with average collection period. Average payment period and cash conversion cycle was found to have negative but

non-significant relationship with prepaid billing system. His empirical findings conflicted with theoretical and general expectation that there is a positive non-significant relationship with regard to inventory turnover in days. He concluded that this system should initially be introduced as a means of revenue collection or debtor management until a significant number is achieved when the relationship with other working capital elements such as average payment period and cash conversion cycle are perfected

2.4 Critique of Literature Reviewed

The concept of prepaid system is relatively new in Kenya. From the foregoing discussion, several studies have been carried out in reference to prepaid billing. However, little has been done in Kenya showing the effects of such a system on financial performance as shown in the review of local literature. Evidently, while majority of global and local literature have concentrated on the qualitative aspects of prepayment, such as opinion and perceptions of the prepaid users and acceptability of the prepaid system, quantitative aspects of prepaid billing system have not been adequately explored. To the best of our knowledge no such work has been done on the effect of prepaid billing on financial performance. (Ontomwa, 2014)

This study therefore seeks to assess the effect prepaid billing has had on revenue collection costs which influence financial performance at Kenya Power and disclose any link that may exist between these parameters.

2.5 Summary and research gaps

In today's competitive environment, firms must sell on credit to enhance sales (turnover). However, selling on credit has its dis-advantages. Collecting these

revenues has been a problem since customers will routinely seek the best terms possible, often attempting to postpone payments as long as possible. Unfortunately, delinquent payments hurt company's cash flows and eventually results into write offs (bad debt) which according to Ontomwa (2014) erode company's profitability.

To alleviate these challenges, the smart meter is designed to eliminate vandalism; once the meter is installed any interference or attempt to open meter box is immediately detected and this information is sent to the system. (Stima news, April – June 2015). It is also geared towards minimizing the risk of bad debts, revenue collection costs and monthly billing costs

This in turn may lead to improved revenue collection levels and cash flows thus improving the general financial performance of the company. However, this has not been achieved since revenue collection that can be related to prepaid meters has not increased significantly (Kenya Power monthly report, 2013).

In addition, there have been complaints by some customers that the prepaid system is not sufficient compared to the postpaid the d billing system. COFEK, 2012 faults gadgets, and poor consumer knowledge on how to use the technology irked some consumers.

2.6 Conceptual Framework

The study independent variables were collection cost, collection period, billing accuracy and bad debts while the study dependent variable was financial performance measured in term return on asset. The relationship between the collection cost, collection period, billing accuracy, bad debts and financial performance are diagrammatically presented in figure 1 below.

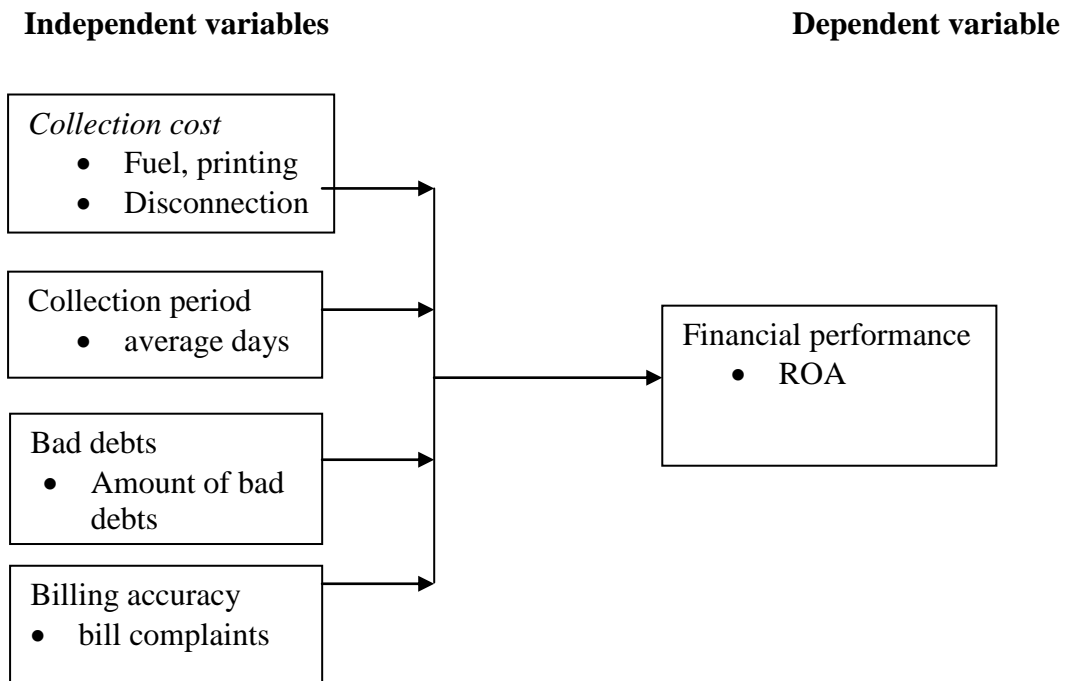


Figure 1: Conceptual Framework

Source: Author, 2016

From Figure above financial performance is measured using Return on Asset which represent the profitability of the firm. The study assumed the efficiency in revenue collection is critical for proper management of operational costs in any organization hence affect financial performance (Ontomwa, 2014). This involve ability to maximize revenue collection at the same time minimize costs associated with revenue collection. Prepaid billing system is one where a service or a good is consumed after paying for it. In many countries, reforming billing processes, coupled with strengthening collection processes, has improved revenue collection efficiency. Most of the evidence about the role of billing in revenue collection efficiency comes from the water sector (World Bank Report, 2012). According to Aguilar (2013), billing is an endless cycle and processing of daily call details and suspense may continue during the billing process or immediately once billing is completed in preparation for the next month’s bills. Larger companies may need to stagger billing into a weekly

process for different groups of customers to regulate the billing manager's workload or level out the cash flow.

Prepaid billing refers to a billing mechanism where a customer pays in advance and after that starts using a service. Usually, prepaid customers do not receive any invoice and are charged in real time. Post-pay billing is the conventional billing used for many years. Here, customers buy products and services and use them throughout the month. At end month, invoices are generated by the service provider and sent to the customers requiring them to make their due payment (Aguilar, 2013).

The meter is a critical part of electric utility infrastructure. It doesn't provide a control function for the power system, but it is one of the most important elements from a monitoring and accounting point of view. Like the cash register in a store, these consumer meters are the place where the transaction occurs, where the consumer takes possession of the commodity, and where the basis for the bill is determined. (EPRI, 2010)

Billing accuracy is expected to reduce customer complaints and would therefore be proxied as "number of bill complaints" whose data is available. For time and materials work, employees' time spent on jobs needs to be tightly managed to maximize revenue. One of the best practices that has the biggest impact on the billing cycle is to develop a documented billing process, including a monthly billing calendar that dictates when billing reports are to be sent to project managers, edited, and returned to the accounting department. The faster bills are edited and sent to customers, the sooner the payment. The collection period was proxy by the average number of days taken between billing and receipt of payment from the clients. It is postulated that an increase in the average number of collection days implies

challenges in collecting company revenue and may influence profitability negatively. Certainly, such anticipated company revenue may end up forming bad debts if the situation is not arrested on time. An effective billing process should be strictly enforced and scheduled to be completed in five or fewer days (Kioko, 2013).

.Financial performance analysis is the process of determining the operating and financial characteristics of a firm from accounting and financial statements. The goal of such analysis is to determine the efficiency and performance of firm's management, as reflected in the financial records and reports. The analyst attempts to measure the firm's liquidity, profitability and other indicators that the business is conducted in a rational and normal way; ensuring enough returns to the shareholders

The ability of an organization to analyse its financial position is essential for improving its competitive position in the marketplace. Through a careful analysis of its financial performance, the organization can identify opportunities to improve performance of the department, unit or organizational level. (Maxwell Scientific Organization, 2011). In this context researcher has undertaken an analysis of the effects prepaid electricity meters on financial performance of Kenya Power.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the procedures that were used to conduct the study. It focuses on the research design, target population, the sampling technique, data collection process and instruments, and data analysis techniques.

3.2 Research Design

This research used a case study and the method was chosen because it enables the researcher to probe and obtain an in-depth understanding of a particular phenomenon. This design is of value for its detailed analysis as Schlesselman, (1982) concurs that a case study often provides focused and valuable insights to a phenomena that may be vaguely known and less understood. The study employed cross sectional research design. The study used cross sectional study because most of the data was observational and all the measurements for a sample were obtained at a single point in time. In addition, In cross sectional study either the entire population or a subset thereof is selected, and from these individuals, data are collected to help answer research questions of interest. It is called cross-sectional because the information about prepaid billing system and financial performance that is gathered represents what is going on at only one point in time. The benefit of a cross-sectional study design is that it allows researchers to compare many different variables at the same time.

3.3 Target population

The target population consisted of Kenya Power Company Coast Branches of Ukunda, Voi, Kilifi and Mombasa. The study collected data from annual report, financial report and other relevant documents on a monthly basis from January 2013 to December, 2015. This period was particularly important since it covers the time after the installation of the pre-paid meters at the Coastal region. Understanding the relationship between profitability of Kenya Power and some of the variables of interest during this period is important in informing the policy makers on whether the intended purpose of the project was being met. Thus, the observations were 4 branches multiplied by 36 months (3 years) giving 144 observations.

3.4 Sampling approach

The study used census approach to collect data from annual report, financial report and other relevant documents on a monthly basis from January 2013 to December, 2015. The study used monthly data obtained from Kenya Power Coastal branch records on various indicators which include collection costs (proxied as either fuel, printing and disconnection costs); collection period (proxied as average collection period); bad debts; billing accuracy (proxied as number of bill related complains) and performance/profitability (ROA). Sampling technique were not used since the census technique were used to get information from all the branches in Coast region

3.4.1 Data Collection Instruments

The data collection instrument to be used in this study was content/document analysis guide. The study was conducted using secondary sources which was achieved by analyzing the content of financial reports. This was suitable for this study because all

the audited information about the company found readily available for the public as required by the company law of Kenya Act. According to Oso and Onen (2009), document analysis is an instrument for collecting secondary information. Document analysis as used because data being collected is secondary in nature. Corbetta (2003) identified a number of advantages of the documents over other research methods. It is a non-reactive technique where the information given in a document is not subject to a possible distortion as a result of the interaction between the researcher and the respondent. However, documents may have some limitations in terms of the accuracy and completeness of the data (Patton, 2002).

3.5 Data Collection Procedures

Upon approval of the research proposal, an introductory letter from Kenyatta University the researcher secured a permit from the National Council for Science and Technology (NACOSTI) for the purpose of conducting research in Kenya power. When the permission was granted, the researcher sought appointment with directors' office to approve research conduction in the parastatal. In addition the researcher sought appointment and consult with the management, after which appointments were booked within authorities. The researcher then visited the respective departments to obtain documents.

3.6 Data analysis and presentation

Data collected was analyzed quantitatively through an Ordinary Least Squares Method (OLS). Descriptive statistics such as mean, median, maximum, minimum, and standard deviation will be provided. Descriptive statistics have an advantage to the researcher because they allow organization of information in an effective way and

understandable format (Nachmias & Nachmias, 2006). Tables were used to make presentation of the study findings. The study uses E-views version 5 software for data analysis.

3.6.1 Analytical Model

The study was modeled along an ordinary least squares regression method where a linear relationship was established between the dependent variable and independent variables. The general model takes the following format;

$$Y = \alpha_0 + \beta X + \varepsilon \dots \dots \dots 1$$

Where Y represents the financial performance of Kenya Power Coast region branch as the dependent variable.

α_0 – represents a constant in the model

β – represents a co-efficient

X – represents the independent variables postulated to affect profitability

ε – is an error term

In view of the above the model estimated is stated as follows;

$$y_{it} = \beta_{0it} + \beta_1 x_{it} + \beta_2 x_{it} + \beta_3 x_{it} + \beta_4 x_{it} + \rho_{it} \dots \dots \dots 2$$

Where

P – Financial performance in terms of profitability for Kenya Power Coast branch

CC – Collection Cost

CP – Average collection period

BD – Bad debts per month

BA – Billing accuracy measured in terms of Number of bills complaints per month

ρ is error term

i represent the branch

tis the measure of time

3.7 Measurement of Variables

The table below shows the variables, their symbols, and how they are measured.

Table 3.1: Operationalization And Measurement of Variables

Variable	Symbol	Measurement
Financial performance (Profitability)	FP	Monthly <u>Net profit margin</u> measures how much a company earns (usually after taxes) relative to its sales. A company with a higher profit margin than its competitor is usually more efficient, flexible and able to take on new opportunities. <u>Return on equity (ROE)</u> measures how well the business is doing in relation to the investment made by its shareholders. It tells the shareholders how much the company is earning for each of their invested shillings.
Average collection Cost		
Disconnection costs	DC	Monthly disconnection costs incurred by the company in shillings
Fuel costs	FC	Monthly fuel costs incurred by the Company's field staff in shillings
Printing costs	PC	Monthly printing costs incurred by the company in shillings
Average Collection Period	ACP	Number of days taken to receive payments after customers have been billed. Data indicates that this period maintained some consistency in every quarter of the year
Bad debts	BD	The amount of bad debts maintained in the books of the company on a monthly basis.
Billing accuracy (Number of complaints)	NC	Number of bill related complaints per month

Source: Author, 2016

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the data analysis and interpretation. It focuses on the descriptive statistics, correlation matrix, diagnostic tests, and the estimation results.

4.2 Descriptive Statistics

The study descriptive statistics are presented below; The study investigated the collection cost of using prepaid meters for the year 2013 to 2015 on monthly basis as shown in table 4.1

Table 4.1 Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Deviation	Obs
Collection Costs	104,141.60	99,748.80	164,989.30	48,529	36,544.01	36
Average Collection Period	36.08	36	46	25	6.17	36
Bad debts	924,960.00	929,815	1,279,917	516,077.50	175,109.00	36
Billing Accuracy	797	801	1,342	501	199	36
Profit	46,859,889	41,132,115	80,332,266	17,803,339	18,566,232	36

From the table 4.1, the average collection cost incurred per month by Kenya Power Coast Branch were Kshs. 104,141.60 with the highest amount spent being Kshs. 164,989.30 and the lowest amount being Kshs. 48,529. These costs have impact on profitability of the company (Table 1). It is argued that the prepaid meters have the tendency of decreasing consumer well-being from a net increase in financial costs

associated with electricity consumption due to their level of credibility. Prepayment meter customers incur interest costs because they are required to pay for electricity before it is consumed rather than in arrears as for customers with standard credit meters and because they are not be able to accumulate bad debts on their electricity charges. Prepayment meter customers are likely to incur additional costs associated with more frequent disconnections from their electricity supply (Luciana, 2009). Table 4.1 below shows the average collection period was 36.08 days with a minimum of 25 days and a maximum of 36 days. The shorter the collection period the better for the company.

According to Mishra (2000) a collection policy should always emphasize promptness, regularity and systematization in collection efforts. It will have a psychological effect upon the customers, in that; it will make them realize the attitude of the seller towards the obligations granted. The collection programme of the firm aimed at timely collection of receivables, any consist of many things like monitoring the state of receivable, dispatch of letter to customers whose due date is approaching, telegraphic and telephone advice to customers around the due date, threat of legal action to overdue accounts, legal action against overdue accounts. Beckman (2008) in his study argues that the firm has to be very cautious in taking the steps in order to collect from the slow paying customers. If the firm is strict in its collection policy with the permanent customers, who are temporarily slow payers due to their economic conditions, they will get offended and may shift to competitors and the firm may lose its permanent business. In following an optimal collection policy the firm should compare the cost and benefits. The optimal credit policy will maximize the profit and will consistent with the objective of maximizing the value of the firm. The study investigated the bad debts resulting from prepaid meters for the year 2013 to 2015 on

monthly basis as shown in table 1 . In terms of bad debts, the mean was Kshs. 924,960 with a minimum of Kshs. 516,077.5 and a maximum Kshs. 1,279,917 (Table 4.2.5). These are debts that are written off since the company could not be able to collect it. The higher the bad debts, the lower the profits of the company. This agrees with Ogujor and Otosowie (2010), Ariel and Luciana (2008) who stated that prepaid system were developed to assist utility company to collect debt

Research findings and publications show that bad debts occur as a result of some factors. Berger and De Young (2007) identified poor management as one of the major causes of problem debts. They argue that managers in most electric supplying firms with problem debts do not practice adequate loan underwriting, monitoring and control.

Billing accuracy was measured in terms of Number of Bill Complaints. The number of bill complaints averaged 797 per month with the least being 501 and the most complaints being 1,341. These complaints relate to wrong meter readings thus the customer is given wrong billing or the meter readers fails to go and read the meters thus doing wrong estimations by either over or under billing the customer. This makes customers unsatisfied with the services provided and thus may look for an alternative thus the company loses the revenue.

Shaw, (2011) asserts that the new prepayment meters reduce corruption within ranks thus are more reliable therefore allowing consumers to depend solely on the method thus trust the electricity companies. Since customers will pay their bills upfront, the era of collecting bribe to connect defaulting customers is gradually ending. This new energy meters have capability of automatically disconnecting consumers once they run out of energy credit. Allen, (2009) argues that there is an increase in reliability

and customer trust with the deployment of these new prepayment meters. Since metering and billing are automated, customers will be given a fair bill. This will also make energy consumers more eager to pay their bills. One reason that some Consumers give for not paying their electric bills is that the billing is not fair. They complain that electricity companies supply very little power only to bring huge estimated bills at month end. An Electronic electrical energy prepayment meter will only bill consumers for actual electric power consumed. This is fair enough for most energy consumers. The mean profit recorded by the branch was close to Kshs. 47 million with a minimum of Kshs. 17.8 million and a maximum of Kshs. 80.3 million. The higher the profits, the better for the company and shareholders.

4.3 Diagnostic tests

4.3.1 Test for Stationarity

The study uses Augmented Dickey Fuller test (ADF) to test for stationarity of the variables. By nature, time series data is normally affected by the unit root (stationarity) problem and is therefore important to correct this anomaly before regression. The results of the ADF test are reported table 4.2:

Table 4.2 above reports stationarity tests using ADF. The results indicate that average collection period (ACP), bad debts (BD), disconnection costs (DC), fuel costs (FC), printing costs (PC) and profitability (P) are non-stationary (have unit root). The variables obtain stationarity (no unit root) after differencing once and the results are significant at 1% significance level. The number of bill related complaints (NC) data is stationary and was therefore not differenced

Table 4.2: Stationarity Test Results

Variable	ADF test results at intercept
ACP	-2.07 (-3.35)
Δ ACP	-1.85*** (-6.57)
BD	-3.69 (-8.67)
Δ BD	-1.54*** (-5.55)
DC	-2.04 (-3.81)
Δ DC	-0.9*** (-3.71)
FC	-4.32 (-6.72)
Δ FC	-1.69*** (-6.00)
NC	-0.64*** (-3.70)
PC	-1.63 (-4.54)
Δ PC	-0.99*** (-4.55)
P	-3.04 (-6.86)
Δ P	-1.30*** (-4.44)

*** Significant at 1% level; ** Significant at 5% level and * Significant at 10% level. t-Statistics in parentheses.

Source: Author, 2017

4.3.2 Test for Normality

To identify the shape of distribution, normality of data was further tested statistically using Kolmogorov-Smirnov and Shapiro Wilk analysis (Shapiro and Wilk, 1965) which were calculated for each variable.

Table 4.3 Normality Analysis Results

Study Variables	Kolmogorov-Smirnov		
	Statistic	N	Sig.
Collection cost	0.918	36	0.154
Collection Period	0.962	36	0.089
Bad debts	0.966	36	0.083
Billing Accuracy	0.971	36	0.133
Firm performance	0.94	36	0.197

a Lilliefors Significance Correction

Source: Survey Data, (2017)

If the significance value of of Kolmogorov-Smirnov and Shapiro Wilk is $p > 0.05$, then the data is normally distributed, if it is below 0.05 the data significantly deviate from normal distribution (Ghasemi and Zahediasl, 2012). The test statistics shown in (Table 4.3) reveal that all the variables had values greater than 0.05 satisfies the assumptions of normality. The study, can therefore conclude that the data comes from a normal distribution.

4.3.3 Test for Multicollinearity

Multicollinearity means that two or more of the independent variables are highly correlated and this situation can have damaging effects on the results of multiple regressions. The correlation matrix was a powerful tool for getting a rough idea of the relationship between predictors. Multicollinearity was also tested by running regression models in Variance Inflation Factor (VIF) and tolerance values were generated.

Table 4.4 Test for Multicollinearity

Variables	Collinearity Statistics	
	Tolerance	VIF
Collection cost	0.628	1.593
Collection Period	0.571	1.751
Bad debts	0.639	1.565
Billing Accuracy	0.509	1.967

a Dependent Variable: firm performance
Source: Survey Data, (2017)

The tests (VIF & Tolerance) indicated that multicollinearity problem among predictor variables did not exist because all the values were below the cut-off value, as per the rule of 10 which advocates for threshold VIF of 10 or tolerance ratio of 0.1 (OBRIEN, 2005; Scott, 2003; Kutner, 2004 & Chong Ho Yu, 2008). The VIF values in Table 4.4 were less than ten while tolerance was more than 0.05 meaning that there was no multicollinearity. It is a sign that predictor variables are not highly related and each accounts for variance in adoption of cloud computing. Basing on these results the validity of the regression tests in this study is unquestionable.

4.3.4 Autocorrelation tests

Autocorrelation, also known as serial correlation, refers to the correlation of error components across time periods. It refers to the similarity of data among variables (Wooldridge, 2003). This condition violates the classical assumption of regression analysis but it is a reasonable characteristic of error term in time series analysis.

Table 4.5 Autocorrelation tests

Variables	Durbin-Watson
Collection cost	1.981
Collection Period	2.001
Bad debts	1.744
Billing Accuracy	2.105

Source: Survey Data, (2017)

This was identified using Durbin-Watson statistic which is a ratio of the sum of squared differences in successive residuals to the Regression Sum of Squares. From the findings, the Durbin- Watson value was within the thumb rule 1.968 within the acceptable range of 1.5 - 2.5 (Hayes, 2013). Therefore, for collection cost, collection period, bad debts and billing accuracy indicated lack of serial correlation. (See Table 4.5).

4.4 Correlation Matrix

The table below presents the level of association between the variables and gives us an intuition about the direction of relationships.

Table 4.6: Correlation Matrix

	firm performance	Collection cost	Collection Period	Bad debts	Billing Accuracy
firm performance	1				
Collection cost	-0.634**	1			
Collection Period	-0.467**	-0.124*	1		
Bad debts	-0.581*	0.238	0.738	1	
Billing Accuracy	0.416*	0.406*	-0.643*	0.811*	1

**Correlation is significant at the 0.01 level (2-Tailed).

*Correlation is significant at the 0.05 level (2 – Tailed)

Source: Author, 2017

From table 4.6 above, there exists a strong but negative relationship between the average collection period and profitability of the company. This implies that an increase in the number of collection days affects revenue collected and eventually profitability due to the delay in receipt. Additionally, bad debts, number of bill related complaints, and disconnection costs all record a negative relationship against profitability with the latter being weaker. On the other hand, fuel costs and printing costs record a positive association with profitability.

4.5 Regression Results

Table 4.7 above reports the results from a linear regression model. From the results and in line with the study objectives the following can be deduced;

Table 4.7: Regression Results

.R-sq: Within = 0.0597		Number of obs = 144				
Between = 0.6963		Number of groups = 11				
Overall = 0.6978		Obs per group: min = 10				
		Avg = 10.8				
		max = 11				
		Wald χ^2 (4) = 16.72				
Corr (u_i, Xb) = 0 (assumed)		Prob > χ^2 = 0.0022				
FP	Coef.	Std. Err.	Z	P>t	[95% Conf.	Interval]
Collection cost	-0.36213	-4.09989	-2.49	0.013	-0.2001	-0.02375
Collection Period	-0.48666	-5.82443	-1.38	0.008	-0.66952	0.116203
Bad debts	-3.183562	-3.55163	2.08	0.137	0.010766	0.356358
Billing Accuracy	0.1568	2.23493	0.15	0.001	-0.09596	0.082368
_cons	3.119931	0.952561	3.28	0.001	1.252945	4.986917
sigma_u	0. 8363642					
sigma_e	1. 0639305					
rho	0. 38193993 (fraction of variance due t u_i)					

Source: Author, 2017

4.5.1 Effects of Collection costs on financial performance of Kenya Power

The study represented collection costs as fuel, printing and disconnection costs. The study findings indicate that collection costs have a positive and significant influence on profitability of Kenya Power at the Coast region. Intuitively increased expenditure on fuel used in motor cycles and motor vehicles for field purposes is expected to increase profitability of the company. This finding was interesting and contrary to expectation since installation of pre-paid meters had been anticipated to reduce expenditure on fuel costs by field employees. The finding may however be an

indicator to the fact that the whole of the coast region has not been fully connected to prepaid electricity meters hence the services of the field employees are still relevant. In addition, the time frame considered captured the initial stage of project implementation hence constant monitoring by the field officers was required. Constant power outages which are exogenous to the project implementation may also provide an explanation to this relationship. The findings agrees Manyo et al (2013) who found that the collection period had a negative relationship with the profitability which was measured by the return on assets. Similarly findings coincided with Asif Iqbal & Wang Zhuquan (2015) that collection cost emanating from prepaid meters reduces the profitability of firm.

\While installation of pre-paid meters was premised on reducing the bill printing costs, this relationship points to the fact that the Coast region is not widely covered by the pre-paid electricity meters. As a result more installations need to be undertaken going forward to not only reduce these costs on the company side but also increase coverage, efficiency and reliability in service provision and ultimate profitability. This finding intuitively points to the fact that increased disconnection costs reduce profitability and essentially performance of the company and vice versa. This finding is consistent to Moki, (2012); Casarin and Nicollier, (2008); and Chartwell, (2003).

4.5.2 Effects of bad debts on financial performance of Kenya Power

The study results posted insignificant effect of bad debts on profitability of Kenya Power Company – Coastal branch. Theoretically, increased bad debts have an adverse effect on profitability since anticipated revenue is normally delayed or lost due to write-offs. On the contrary, if the company maintains fewer bad debts profitability will be positively influenced. From the ongoing results, installation of pre-paid meters

appears to have had a desired effect of reducing bad debts hence impacting profitability positively. This outcome is consistently anticipated to be carried into the future performance of the company. The findings concurs with Pandey (2008), that average collection period determines the speed of payment by customers and delayed payment is a potential ground for bad debts which have a negative effect on a firm's financial performance. As stated by Pandey (2008), a firm can shorten its credit period if customers are defaulting too frequently and bad debts are building up. However, through expanded sales, a firm will lengthen credit period to increase its operating profit.

4.5.3 Effects of revenue collection period on financial performance of Kenya Power

From the study, revenue collection period was proxied by average collection period. The study findings posted a negative and significant relationship between average collection period and the profitability of Kenya Power Company – Coast branch. This implies that as the number of revenue collection days increase, the profitability of the company will reduce and as they reduce, the profitability will increase. This is simply because increase in the number of revenue collection days means company revenue is held by the debtors for a long time hence affects the day to day running of the company which has an undesired effect on profitability. Intuitively, the installation of prepaid meters at the Coastal region has had a desired effect of reducing the average collection period and increasing the company's profitability. The findings concurs with Biwott, (2011) found a significant negative relationship between net operating profitability and the average collection period for a sample of Kenyan firms listed on Nairobi Securities Exchange. Similar relationship was observed for average collection

period, inventory turnover in days, and average payment period. At company level it was observed that cash gap (cash conversion cycle) is more important as measure of liquidity than the current ratio as measure of liquidity that affects profitability, (Raheman and Nasr, 2007)

4.5.4 Effects of billing accuracy on financial performance of Kenya Power

The study proxied billing accuracy by the number of bill related complaints. The study findings indicate that bill accuracy had a positive and significant relationship with profitability of the company. As a result, decreased complaints related to pre-paid electricity meter billing affects profitability positively and vice versa. Statistically, installation of pre-paid electricity meters at the coast region has reduced the number of bill related complaints from the study findings. However, complaints arising from the installation of pre-paid electricity meters should be solved in the shortest time possible to mitigate revenue loss to the company. In general this findings are consistent to Moki, (2012); Casarin and Nicollier, (2008); and Chartwell, (2003).

4.6 Overview of the Regression Analysis

The resulting regression equation from the study is as follows;

$$FP = 3.119931 - 0.36213CC - 0.48666ACP + 0.1568BA + \varepsilon$$

FP= financial performance, CC=collection cost, ACP= Average collection period,
BA= billing accuracy

The findings indicate that when all the other factors are held constant; the profitability of Kenya Power will increase by 3,214 units monthly. When all the other variables are held constant, a unit increase in collection costs increases the profits of Kenya Power

by 0.15 units. On the other hand, a unit increase in the average collection period decreases the profitability of Kenya Power by 0.36 units. Similarly, a unit increase in billing accuracy increases the profitability of Kenya Power by 0.15 units respectively. The explaining power of the model is indicated through the R^2 . As a result the R^2 of 0.6978 shows that 69.78 % of the attributes of interest have been captured and explained by the model of estimation.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary and conclusion of the study. Policy recommendations emanating from the study findings are also presented.

5.2 Summary of findings

The study sought to determine the effects of prepaid electricity billing on the financial performance of Kenya Power. The findings of the study can be summarized per objective as follows;

From the study findings fuel costs and bill printing costs posted a positive relationship with profitability of the company; the former being significant while the latter was insignificant. On the other hand, disconnection costs posted a negative but insignificant relationship with profitability. The study findings therefore indicate that increase in fuel and bill printing costs will increase profitability and vice versa while an increase in the disconnection costs is expected to reduce profitability and vice versa.

From the study findings, bad debts recorded a negative but significant relationship with profitability of the company. Thus, increase in bad debts will result in a reduction in the profitability of Kenya Power while a decrease in bad debts increases profitability of the company.

The study findings indicate that the average collection period posted a negative but significant relationship with profitability. This implies that an increase in the average collection period leads to a decrease in profitability while a decrease in the same will increase profitability.

The number of bill related complaints which connotes a measure of billing accuracy posted a negative but significant relationship with profitability. Thus, increases in the number of bill complaints have a negative effect on profitability and vice versa.

The findings perhaps reinforce the importance of the prepaid electricity meter system in mitigating / reducing some of the challenges related to revenue collection and upholding the gains that have been achieved so far.

5.3 Conclusions

The study findings establish both positive and negative relationships between profitability of Kenya Power Company and the independent variables of interest. Firstly, there is a strong and significant relationship between profitability of the company and average collection period, bad debts and bill accuracy. This finding indicates that perhaps to grow profitability of the company, the average collection period should reduce tremendously. Disconnection costs should also be reduced to have a desired effect on profitability albeit the results were insignificant. Policy efforts by the company brought about through innovation such as adoption of prepaid meter system of payment aimed at reducing these costs should be upheld and rolled out all over the region and country. The positive relationship between the fuel costs and bill printing costs are however interesting findings contrary to expectation. This finding however may be attributed to the fact that since the adoption of the

prepayment meter system is still at its initial stages: the whole coast region has not been fully covered; and the normal systemic challenges arising from roll-out of a new product are still being experienced hence requiring more field staff attention to address the issues. Additionally, other external challenges that the company suffers such as power outages and vandalism have not been fully addressed hence requiring constant attention from field officers which increases the fuel costs.

5.4 Recommendations

From the findings of the study, the adoption of prepaid metering system seems to be having desired effects despite the project still in its initial stages of implementation. The following recommendations should therefore be considered going forward;

Kenya power still incurs a lot of connection costs (fuel, printing and disconnection) despite having adopted the prepaid metering system at the Coast region. This alludes to the fact that all the consumers of electricity have not been brought aboard the new prepaid new prepaid metering system. This may also point to the fact that there is increased vandalism of the company's equipment resulting to frequent outages which require immediate attention hence increased connection costs. As a result, there is need for Kenya Power to increase the coverage of the prepaid meters at the coast region and if possible across the country in order to increase access to the new metering system. In addition, there is need for the company to carry out more public awareness specifically tailored towards reducing vandalism of its property in order to reduce disconnection costs hence positively impact profitability.

Increased bad debts impact negatively on the profitability of Kenya Power. To mitigate against this, there is need for the company to double its efforts in debt

collection through the relevant department. Debts which are in arrears for a long period of time should be provided for writing off in order to cushion the company from reduced profits going forward.

From the study findings there is need to reduce the revenue collection period in order to positively impact profitability. In order to achieve this, Kenya Power should increase the coverage of the prepaid meters at the coast region and if possible across the country. This will ensure that the post-paid metering system which is associated with high revenue collection periods is phased out.

From the study findings there is need to ensure billing accuracy in order to positively influence financial performance of the company. As a result, there is need for Kenya Power to ensure efficiency of the prepaid metering system to reduce customer related complaints emanating from the same. Secondly, customer complaints either related or not to prepaid meters should be solved within the shortest time possible in order to avoid losing revenue from customers who despair. If achieved, fewer complaints against the company will increase customer satisfaction; enhance loyalty and profitability of the company in general. Thirdly, the company should carry out more public awareness about the project to encourage uptake and usage which will reduce complaints and positively influence the company's profitability going forward. This awareness should also be tailored towards discouraging vandalism of the prepaid meters and the company's equipment in general. Finally, Kenya Power should continue pursuing other alternative avenues of getting extra power supply to the grid to guard against frequent power outages that pose more costs to the company and consumers in form of destroyed equipment such as transformers and household

appliances. This frequent outages lead to increased customer complaints which may negatively influence profitability going forward.

5.5 Suggestion for further research

The study investigated the effects of prepaid electricity billing on the financial performance of Kenya Power – Coastal branch. The limitation to the study is that only Kenya Power, Coast branch data was obtained and used in analyzing and providing a general opinion about the performance of Kenya Power. Going forward, future research may seek to include all other branches and by extension provide a general opinion on the performance of Kenya Power. In addition blending use of both secondary and primary data for analysis may provide a more robust perspective of performance of the company with specific reference to the attributes of interest.

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APPENDICES

APPENDIX I: LETTER OF INTRODUCTION

KENYATTA UNIVERSITY

SCHOOL OF BUSINESS

Dear Sir/ Madam,

**RE: THE EFFECTS OF PREPAID ELECTRICITY BILLING ON
FINANCIAL PERFORMANCE OF KENYA POWER COAST REGION**

I am a post graduate student of Kenyatta University wishing to carry out a research on the above topic. I wish to collect secondary data on attributes that relate to Profitability of the Company, Collection costs, Collection period, and number of bill related complaints. All information obtained will used for the purpose of the study only and will be treated with utmost confidentiality and privacy. Your positive response will be highly appreciated.

Yours sincerely

Richard K. Tirop

APPENDIX II: DATA COLLECTION SCHEDULE

	Collection Cost	Average collection period	Bad debts per month	No. of complaints	ROA	Profit
Branch 2013						
1. VOI						
Ukunda						
2. Kilifi						
3. Mombasa						
Branch 2014						
4. VOI						
Ukunda						
5. Kilifi						
6. Mombasa						
Branch 2015						
7. VOI						
Ukunda						
8. Kilifi						
9. Mombasa						