

**STRATEGIES USED BY KENYA POWER AND LIGHTING COMPANY
LTD TO REDUCE NON-TECHNICAL ELECTRICITY LOSSES**

BY

PETER WAWERU NJENGA



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Declaration

This research project is my original work and has not been submitted for examination in any other University.



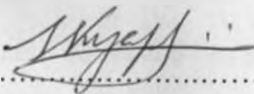
Signed..... Date.....

02/11/11

PETER WAWERU NJENGA

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This research project has been submitted for examination with my approval as the University Supervisor.



Signed..... Date.....

02-11-2011

DR. JOHN YABS

DEPARTMENT OF BUSINESS ADMINISTRATION,

SCHOOL OF BUSINESS,

UNIVERSITY OF NAIROBI, KENYA.

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Dedication

To my late Father, Morrison

Who always reminded us that education is the only sure inheritance we can get from him.

And

To the rest of my family, Peninah, Catherine and Eric

Your inspiration was not in vain.

Abstract

Electricity is one of the major drivers of the economy and is one of the prime movers of the modern sector of the economy in Kenya's vision 2030. Electricity is the most sought after energy source by Kenyan society. The energy sector in Kenya has long been facing the gigantic problem of Non-technical electricity losses. The existing law governing the electricity sector is insufficient to control the causes of Non-technical electricity losses. There exists therefore a dire need for a whole set of strategies to reduce the Non-technical electricity losses.

The purpose of the study was to investigate the strategies used by the Kenya Power & Lighting Company Ltd to reduce non-technical electricity losses. The objectives of the study were to establish the various strategies used by the Kenya Power & Lighting Company to reduce non-technical electricity losses and also to establish the factors that influence non-technical electricity losses in the company. The study used the case study design to gather qualitative data using an interview guide and it focused on the Kenya Power & Lighting Company. Secondary data from the company reports including the strategic plan reports was also incorporated. The primary data upon being cleaned and presented according to the study themes was analyzed through content analysis (qualitative analysis).

The findings suggested that customers are involved in causing Non-technical electricity losses and sometimes this is facilitated by Kenya power employees. The company has adopted several technologies and operational strategies to reduce the Non-technical electricity losses. It is recommended that the company should adopt more recent and efficient technologies to reduce Non-technical electricity losses and consider bulk metering for the informal settlement areas. The company should also involve the major stakeholders in power supply in order to be more successful as well as carry out intensive training to enhance skills and integrity values.

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List of Abbreviations

AMR	Automatic Meter Reading
APSEB	Andhra Pradesh State Electricity Board
ERB	Energy Regulatory Board
ERC	Energy Regulatory Commission
GDP	Gross Domestic Product
GOK	Government of Kenya
ICS	Integrated Customer Service
IFS	Integrated Finance System
IPPS	Independent Power Producers
IT	Information Technology
KENGEN	Kenya Electricity Generating Company
KETRACO	Kenya Transmission Company
KPLC	Kenya Power & Lighting Company
MERC	Maharashtra Electricity Regulatory Commission
MHI	Manitoba Hydro International
NTL	Non-technical Losses
REA	Rural Electrification Authority
SOE	State-owned Enterprises
T & D	Transmission and Distribution
UK	United Kingdom

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Organizations need to respond to the changing environment in order to remain competitive. In this environment we have legitimate and illegitimate customers. According to Charles and Gareth (1998), in today's global environment, change rather than stability is the order of the day: rapid changes in technology, competition, and customer's demands have increased the rate at which companies need to alter strategies and structures to survive in the market place. In their strategic response to these imperative changes, companies have had to seek to strengthen their existing core competencies and build new ones in order to compete more effectively by going through a strategic change. Charles and Gareth (1998), define strategic change as "the movement of a company from its present state to increase its competitive advantage".

Grundy (1995), states that responsiveness and flexibility are increasingly important factors that determine the success of an organization. Hill and Jones (2001) add that the achievement of superior efficiency, quality, innovation and responsiveness enables an organization to create superior value and attain a competitive advantage. Organizations need to respond to the changing environment in order to remain competitive.

According to Charles and Gareth (1998), in today's global environment, change rather than stability is the order of the day; rapid changes in technology, competition, and customer's demands have increased the rate at which companies need to alter strategies and structures to survive in the market place. In their strategic response to these imperative changes, companies have had to seek to strengthen their existing core competencies and build new ones in order to compete more effectively by going

through a strategic change. Charles and Gareth (1998), define strategic change as “the movement of a company from its present state to increase its competitive advantage”.

1.1.1 Concept of Strategy

According to Hax & Majiluf, (1996) there are various dimensions in the concept of strategy. Strategy can be seen as a multidimensional concept that embraces all of the critical activities of the firm, providing it with a source of unity, direction, and purpose as well as facilitating the necessary changes induced by its environment.

Johnson and Scholes (2002), identify political, economic, social, technological and ecological factors as comprising the external environment that presents the organization with opportunities, threats and constraints. Leaders in organizations have to constantly monitor developments in the environment and take action to maintain an appropriate relationship between their organization and external environment. This relationship is the strategy of the organization.

Burnes (2000) notes that due to political, economic, social and technological changes, history of organizations has been that of change and upheaval, since the industrial age. Because of the pace of change and uncertainty, such change vary from organization to organization however, no matter what level of turbulence is, what matters is the ability of the organization to cope with the environmental constraints, challenges and threats.

A strategy is a framework within which the choices about the nature and direction of an organization are made. Organizations without a strategy may survive, but they will never thrive. They need to create and implement an effective strategy in order to excel in today's ever-changing market. Current organizational theory stresses the importance of environmental conditions to organizational structure, strategy, and

change (Aldrich & Marsden, 1988). In particular, the strategic response of organizations to challenges in the external environment may determine whether an organization survives.

1.1.2 Kenya Power & Lighting Company Limited

The power industry in Kenya dates back in 1922 when East African Power and Lighting Company were incorporated, to generate and distribute electricity throughout the country. It changed its name to Kenya Power and Lighting Company limited (KPLC) through a special resolution by shareholders in 1983. Since then, the company has undergone several changes in response to the changing environment. For example the company no longer handles the generation of electricity, but only deals with transmission, distribution and retail of the electricity. The Kenya electricity generating company (Kengen) came into being in 1997, to focus on generation of electricity. This also opened the generation industry to independent power producers (IPPs) like Ibel Africa, Tsavo Power, among others. They all generate electricity and sell to KPLC in bulk at agreed prices. The Electricity Regulatory Board (ERB) was established by the electric power act, 1997, and was given the primary role of regulating the generation, transmission and distribution of electricity, promote and ensure competition in the sub-sector, approve contracts for generation and bulk sale of electricity and set or review electricity tariffs. The mandate was expanded and Energy Regulatory Commission (ERC) was established as an energy sector regulator in July 2007 under the Energy Act 2006. It is a single sector regulatory agency with responsibility for economic and technical regulation of electric power, renewable energy and downstream petroleum sub-sector, including tariff setting and review, licensing, enforcement, dispute settlement and approval of power purchase and network service contracts.

In 2005, the rural electrification function was also hived from KPLC to form the Rural Electrification Authority (REA) which is responsible for construction of rural projects funded by existing consumers, government and donors. This would also improve connectivity of the rural areas. Despite the various changes in the power sector the company continued to make losses. In 2006, KPLC signed a management contract with Manitoba Hydro International (MHI), a Canadian power utility firm. The MHI was to offer management services to the company for two years between July 2006 and June 2008 and help the company to recover from the loss making regime to profit making. One of their terms of reference was to improve the system efficiency, which is a measure of how much of the units purchased are finally wheeled to the customers, by 1.5% every year. In order to address this, the MHI management identified non-technical electricity losses as one of the areas to address. Various strategies were formulated to deal with non-technical electricity losses. This included intensified inspections of high risk areas and testing all large power customers' installations and recovering lost revenue through debiting the accounts with the lost revenue.

In 2008, Kenya Transmission Company (KETRACO) was formed to focus on construction of new transmission lines so that KPLC could focus more on service delivery. KPLC provides electricity energy that is used for various economic and social activities. Electricity consumption has traditionally been used as a reliable indicator of the economic activity and the standards of living in a given location, making the increase in power consumption in a country very significant. In the year July 2009 to June 2010, the sales of electricity grew by 8% to indicate that the society has adapted use of electricity as a way of life (KPLC annual reports, 2010). However, there has not been significant improvement in the system efficiency despite the

various efforts put in place by the organization through system reinforcements. This can be attributed to increase in non-technical electricity losses as the economy declines and people purchasing power is depleted due to inflation.

Due to the ever changing environment, KPLC has developed a 5 year strategic plan which includes losses reduction as a strategy in various business level activities (KPLC, 2011). Due to many developments and changing customer demands, it has been necessary for KPLC to carry out a rigorous rebranding exercise. The corporate rebranding and organizational culture change project (Project Mwangaza) commenced in January 2010 with a series of staff workshops that developed a new set of Vision, Mission and Values. Training on high performance leadership has been conducted for several members of staff. This activities have culminated in the unveiling of new company logo in June 2011 and the company is now referred to as Kenya Power as a new brand name. The company has also adapted mission leadership as a way of reviewing business processes and measuring the success of the activities being carried out on a monthly basis. It is expected that all these strategies will help the organization to achieve its corporate objectives more successfully.

1.1.3 Non-technical Electricity Losses

Generation, transmission and distribution of electrical energy involve many operational losses. Whereas, losses concerned to generation can be technically defined, Transmission and Distribution (T&D) losses cannot be precisely quantified from the sending end information. This illustrates the involvement of some non-technical parameters in T&D of electrical energy. Technical losses occur naturally and are caused because of power dissipation in transmission lines, transformers, and other power system components. Technical losses in T&D are computed from the

information about total load on the grid and total energy billed (Oliveira and Barioni, 2009). Non-technical losses (NTL) are caused by actions external to the power system and consist primarily of electricity theft, non-payment by customers, and errors in accounting and record-keeping. NTL cannot be precisely computed, but can be estimated. So, it is very difficult to represent electricity theft as a function of actions responsible for the same. In many developing countries, NTL account to about 10–40% of their total generation capacity (Smith, 2003)

Electricity theft forms a major chunk of the NTL. It includes illegal tapping of electricity from the feeder, bypassing the energy meter, tampering with the energy meter and several physical methods to evade payment to the utility company (Dick 1995). Of which, illegal tapping of electricity and tampering with energy meter are the most identified and accounted ways of theft. Electricity theft can also be defined as using electricity from utility company without a contract or valid obligation to alter its measurement (Smith, 2003). Electricity theft is a complex problem with many parameters to be evaluated before implementing any measures to detect and control that. These parameters include some issues like social, economical, regional, managerial, political, infrastructural, literacy rate, criminal, mafia, corruption, effect on genuine customers, power quality, safety, and uncertainty in time period during which electricity is stolen.

Theft refers to the generic term for all crimes in which a person intentionally and fraudulently takes personal property of another without permission or consent and with the intent to convert it to the taker's use (including potential sale). Electricity theft is defined as a conscience attempt by a person to reduce or eliminate the amount of money he or she will owe the utility for electric energy. This could range from tampering with the meter to creating false consumption information used in billing to

making unauthorized connections to the power grid. Metering and billing for electricity actually consumed by users is integral to commercial management of an electricity utility. Generation, transmission and distribution of electrical energy involve many operational losses (Smith, 2003).

The generation and transmission and distribution aspects of electricity provision are unbundled in Kenya. Non-technical losses are borne by the distribution firm. There are two dominant methods of electricity theft in Kenya, illegal hookups and meter tampering. Illegal hookups are mostly found in the inner city residents and are most easily detected. However, it is very difficult for enforcers to have these connections removed without the assistance of the police because of the resistant nature of these residents. There is a high risk to the culprits as well because of frequent electrical fires and electrocutions. The more wealthy residents and the commercial sector are the main culprits of meter related theft which can be meter tampering or bypassing the meter. This is a more sophisticated method of theft which is also more expensive. This method of theft is harder to detect and can only be confirmed by a random audit. There is a potential for very large amounts of electricity generated being lost to theft because of the lower rates of detection and the high usage activities associated with meter related theft (KPLC, 2011).

1.2 Research Problem

The environment is so dynamic that for any organization to survive, it must continuously adjust to it. Pearce and Robinson (1997) states that in order for organizations to achieve their goals and objectives it is necessary for them to adjust to their environment. Strategizing and re-strategizing is the only way that these organizations can ensure they remain relevant. Failure to effectively adapt the organization to its environment leads to a strategic problem (Ansoff and McDonnell.

1990). The problem manifests in the mismatch between what the organization offers and what the market demands.

Electricity is one of the major drivers of the economy. In fact it is identified as one of the prime movers of the modern sector of the economy in Kenya's vision 2030. (GOK, 2007). Electricity remains the most sought after energy source by Kenyan society and access to electricity is normally associated with rising or high quality of life. Without electricity, people would not take better advantage of the technological advances in social networks, mobile communication, and internet. Economic generating activities like jua kali and cyber cafes among others are also numerous where electricity is available. Electricity provides light to enhance learning as well as improving security. It has therefore become a basic need rather than a luxury. It is therefore imperative that any threat, in this case Non-technical electricity losses, which would hinder development and expansion of this form of energy, should be curtailed.

According to Targosz (2009), Commercial, or in other words non-technical losses account for more than 1% of the electricity use around the world. The dominant component of these losses is electricity theft. In some countries, electricity theft is in the range of, or far exceeding, technical losses in the transmission and distribution sector. Amounts of unbilled electricity may completely disturb the normal process of regulation of electrical distribution companies. It is also a moral problem that the energy conservation efforts of one group of people are wasted by others. The energy sector in Kenya has long been facing the gigantic problem of Non-technical electricity losses. Theft is not only a major reason for frequent power interruptions, but the financial loss occurring from theft also does not allow the company to improve upon its distribution system. hence aggravating the problem of blackouts, causing a great

deal of inconveniences to customers. Besides, the existing law governing the electricity sector is insufficient to control the menace of electricity theft, as it does not prescribe strict action against electricity thieves nor does it provide any relief to legitimate consumers or to power companies. There exists therefore a dire need for a whole set of strategies to reduce and curb electricity theft if we really desire a measurable improvement in today's electricity supply situation. The laws should also be reviewed so that hefty fines are imposed on culprits to curb the menace. The Kenya power loses enough power to theft and nonpayment of bills that a separate power plant would be required just to compensate for this loss alone. Electricity theft results in incessant load-shedding, crippling financial losses and disruption in the lives of the people of urban areas and its adjoining areas.

A number of scholars have researched on strategic responses by organizations to external environment. Maina (2006) looked at Response of KPLC to changes in the environment; Opiyo (2006) looked at Responses of Pharmaceutical importers to the challenges of illegal trade in Pharmaceuticals; Waka (2007) looked at the response strategies of HACO industries to the challenges of counterfeit products in East Africa; Kiplagat (2008) looked at the strategic responses to challenges of energy sector regulation in Kenya by the energy regulatory commission; while Wanemba (2010) carried out a study on the strategies adopted by commercial banks in Kenya to combat fraud. There has been no known study that has focused on strategies used by Kenya Power to reduce non- technical electricity losses. This is despite the fact that non-technical electricity losses are a threat to the financial stability of Kenya Power. This research therefore sought to fill the gap of knowledge by establishing strategies used by Kenya Power to reduce non-technical electricity losses by answering the following questions: what are the causes of non- technical electricity losses in Kenya Power?;

what factors influence non-technical electricity losses in Kenya Power?; and what strategies are used by Kenya Power to reduce the non-technical electricity losses?

1.3 Research Objectives

The objectives of the study were:

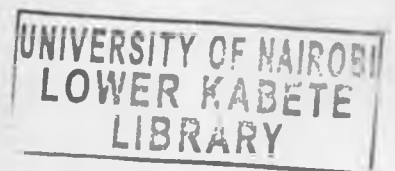
- i) To establish the various strategies used by Kenya Power to reduce non-technical electricity losses.
- ii) To establish the factors that influence non-technical losses in Kenya Power.

1.4 Value of the Study

To Kenya Power, the study will be an instant source of information for management as they will be able to understand the various causes of non-technical electricity losses and, the strategies employed to reduce the same so as to improve their profits as well as shareholders value. The study is important to the government as well. It is the purpose of the government to achieve a middle-income country status by 2030 under the Vision 2030. To realize this vision, availability of reliable electricity is considered to be one of the most important items. Thus the government would want to know whether effective controls are in place within the firm in the sector to reduce non-technical electricity losses.

The policy makers will also obtain information on the service industry dynamics and the appropriate strategies and therefore they can obtain guidance from the study in designing policies that will help the industry in surmounting the threat of non-technical electricity losses. To the academicians, the study will contribute to the existing literature in the field of strategic management in general and strategy response and control in overcoming challenges and threats to organizations survival in

particular. It will also be of interest for further research in strategies for non- technical electricity losses reduction.



CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter provides theoretical and empirical information from publications on topics related to the research problem. It examines what various scholars and authors have written about strategy.

2.2 Concept of Strategy

Strategy is a set of decision-making for guidance of organization behaviors. Strategy and objectives are used to filter projects hence they appear similar but they are distinct. Objectives represent the ends which the firm is seeking to attain while strategy is the means to these ends, (Ansoff & McDonnell, 1990). According to Hax & Majiluf. (1996) there are various dimensions in the concept of strategy. Strategy can be seen as a multidimensional concept that embraces all of the critical activities of the firm, providing it with a source of unity, direction, and purpose as well as facilitating the necessary changes induced by its environment.

The critical dimensions are; Strategy as a coherent, unifying and integrative pattern of decisions. It gives rise to the plans that assure that basic objectives of the total enterprise are fulfilled; Strategy as a means of establishing the organizational purpose in terms of its long term objectives, action programs and resources allocation priorities; Strategy as a definition of the competitive domain of the firm. It is placed as the basic force that addresses issues of growth, diversification and divestment; Strategy as a response to external opportunities and threats and internal strengths *and* weaknesses in order to achieve competitive advantage. Strategy is *needed for* organizations to obtain a viable match between their external environment *and their*

internal capabilities. The role of strategy is not viewed as just passively responding to the opportunities and threats presented by the external environment but as continuously and actively adapting the organization to meet the demands of a changing environment; Strategy as a channel to differentiate managerial tasks at the corporate, business and functional levels: Strategy as a definition of the economic and non economic contribution the firm intends to make to its stakeholders. (Hax & Majiluf, 1996).

Johnson and Scholes (1997) notes that strategy is the long term direction and scope of an organization that facilitates the achievement of an advantage, for the organization, through the mode of arrangement of resources within a changing environment. This would enable the organization to meet the needs of markets and to fulfill stakeholder expectations. Thus strategy is viewed as the matching of the activities of an organization to the environment in which it operates. According to Ohmae, (1993), the only purpose of strategic planning is to empower an organization to efficiently gain a sustainable competitive edge over its competitors. Hill and Jones (2001) conclude that the strategies an organization pursues have a major impact on its performance relative to its peers.

According to Andrew (1971, p 16), "strategy is a pattern of objectives, purposes or goals and the major policies and plans for achieving these goals stated in such a way as to define what business the company is in or is to be and the kind of company it is or is to be". Strategy therefore, not only focuses on the means of achieving them, but also gives an indication of the nature of the company and its business, both in the present and in the long-run. Risk-averse managers who think they are in uncertain environments don't trust their gut instincts and suffer from decision paralysis. They avoid making critical strategic decisions about the products or services, markets and

technologies they should develop. They focus instead on reengineering, quality management or internal cost-reduction programs. Although valuable those programs are not substitute for strategy (Courtney, et al, 1997).

Johnson and Scholes (2002), identify political, economic, social, technological and ecological factors as comprising the external environment that presents the organization with opportunities, threats and constraints. Leaders in organizations have to constantly monitor developments in the environment and take action to maintain an appropriate relationship between their organization and external environment. Burnes (2000) notes that due to political, economic, social and technological changes, history of organizations has been that of change and upheaval since the industrial age. Because of the pace of change and uncertainty, such change vary from organization to organization however, no matter what level of turbulence is, what matters is the ability of the organization to cope with the environmental constraints, challenges and threats.

2.3 Strategic Response

According to Tregoe (2001), effective strategic response can be achieved in five phases: phase I entails strategic intelligence gathering and analysis and it ensures that the depth and breadth of information on which strategic decisions are based is up-to-date, accurate, and relevant; phase II consist of strategy formulation which gives results in the creation of a strategic vision or profile; phase III is referred to as strategic master project planning during which the plan for strategy implementation is developed in order to align the organization structure with the strategy; phase IV involves strategy implementation whereby the planned actions are taken, implementation is monitored, and the Strategic Master Project Plan is modified as and

when required; and phase V, strategy monitoring, review, and updating helps to determine whether there's success in the overall strategic response.

Strategic surveillance is designed to monitor a broad range of events that are likely to affect the strategy of the company. Strategic surveillance can be done through a broad-based, general monitoring, on the basis of selected information sources to uncover events that are likely to affect the course of the strategy of an organization (Hill & Jones, 2001). According to Schreyogg and Steinmann (1987) strategic surveillance task involves scanning the firm's internal and external environments to identify emerging issues and trends which could eventually disrupt the effectiveness of existing strategies. Strategic surveillance processes try to anticipate the need to change strategy, so that action can be taken before the window of opportunity for effective response closes. From these definitions, strategic surveillance can be considered as a generalized and overarching control designed to monitor a broad range of events inside and outside the company that are likely to threaten the course of a firm's strategy.

External monitoring does not only allow assessment of strategic progress relative to pre-established goals or competitors but also allows organizations to determine whether environmental circumstances has changed enough to make current strategic plans and control strategies obsolete (Preble, 1992). Methods available for monitoring external performance include competitive benchmarking of products and process relative to competitors or other industry players, strategic audits of company position in respect to key competitive threats, and measurement of customer satisfaction with and competitor responses to strategic moves. Potential actions during the feedback process include revising organizational strategies, reassessing planning premises and action plans, or recasting managerial objectives.

In the present day competitive business environment, evaluation and control process is crucial to ensure sustainable competitive advantage by the firm. The environment is dynamic, changing and unpredictable. The rate and intensity of change facing every organization is increasing daily. These changes are driven by new technologies, regulatory changes, globalization, increasing customer expectations and so on. Moreover, there is increasing cost of doing business owing to a number of factors such as expensive power, expensive fuel and labour unrest due to rising cost of goods and poor remuneration (Charles and Gareth, 1998).

Changes in climate conditions affect hydro generation of power and other expensive sources are sought to cover the power deficiency. Evaluation and control involves evaluation of external and internal factors so as to align the firm's strategic plans accordingly. This is done through measurement of performance, noting deviations if any and taking corrective action where necessary. In today's global environment, change rather than stability is the order of the day; rapid changes in technology, competition, and customer's demands have increased the rate at which companies need to alter strategies and structures to survive in the market place (Charles and Gareth, 1998). In their strategic response to these imperative changes, companies have had to seek to strengthen their existing core competencies and build new ones in order to compete more effectively by going through a strategic change.

2.4 Strategic Control Theory

Strategic control involves the monitoring and evaluation of plans, activities, and results with a view toward future action (Goold & Quinn, 1990; Preble, 1992), providing a "warning bell" through diagnosis of data (Quinn, 1996). The clear intent of strategic control is the triggering of appropriate changes in strategy, be they either

tactical adjustments or strategic reorientations (Lorange, 1988). This set of rational procedures strongly reflects what Rajagopalan and Spreitzer (1997) termed the "rational lens" perspective of strategic change.

One could argue that identifying and interpreting change triggers is equivalent to testing hypotheses: the researcher faces the risk of both Type I and Type II errors (Boyd, Dess & Rasheed, 1993). An effective strategic control system is one that triggers the appropriate response at the appropriate time, avoiding both types of errors. From a strategic control perspective, a Type I error occurs when the situation does not require a tactical or strategic change yet managers misread signals and assume that such change is required. A Type II error occurs when the organization is too inert: managers fail to recognize the need for strategic change in situations where it actually exists.

To trigger either tactical adjustments or strategic reorientations, decision-makers must collect data, make a determination as to its meaning through comparison to preexisting standards or aspirations, and then respond in some way. It is, in other words, inherently a data interpretation process. This interpretation is more than simple analysis of data and is an elaborate sense-making activity whereby organizational actors try to give meaning to complex, and possibly unordered, data (Daft & Weick, 1984; Weick, 1995). Through formal analysis, managerial judgment, intuition, and social information processing, organizational members make sense of the world around them. Strategic control theory has three components: strategic surveillance, premise control, and implementation control.

Strategic surveillance is broad-based monitoring of the environment whereby the organization interprets, analyzes, and responds to strategic issues (Preble, 1992; Schreyogg & Steinmann, 1987). Since the process of strategy planning and

implementation normally tends to narrow the scope of awareness to a relatively few number of factors (Miller, 1993), organizations need to broaden their scope of attention. Strategic surveillance helps identify trends and developments emerging from areas not previously identified as important (Preble, 1992).

Decision makers package unordered data and stimuli from the environment into coherent and related sets called "issues" that they then can analyze and assess as to their potential impact (Martins & Kambil, 1999; Sharma, 2000). Concerning strategic surveillance, some environmental changes have sudden and immediate impact. For example, the discovery of mad cow disease in the UK in 2000 depressed beef sales in Europe requiring fast food firms to promote alternative menus of chicken or fish. Other environmental changes like deregulation emerge more slowly and have predictable consequences: increased competition, pricing pressures, and increased innovation to name but a few. Astute managers respond forcefully to such change triggers.

Premise control concerns the underlying strategic assumptions made in earlier planning efforts regarding internal and external factors (Lampel & Shamsie, 2000; Preble, 1992). During strategy formulation, executives identify critical assumptions underlying their strategy (Lorange, 1988). Once executives identify these assumptions, effective organizations design and implement monitoring systems to ascertain their continued validity. The strength of premise control is its feed forward nature, since it is able to identify potential problems while they are still minor and before they affect an organization's performance (Schreyogg & Steinmann, 1987). Regarding premise control and change triggers, managers will have identified specific assumptions, the falsehood of which would indicate the need for a strategic change.

The third strategic control component, requires monitoring strategy implementation performance, usually through milestones, critical success factors, budgets and thresholds, and takes the form of classic feedback control (Preble, 1992; Schreyogg & Steinmann, 1987). Its purpose is to aid managers in making a determination, based on strategy implementation, whether to alter the basic strategic direction. Managers identify important milestones and set strategic thresholds to assist them in knowing when they should consider a change in strategy.

2.5 Organizational Responses

Interpretation occurs in each of the three content components of the strategic control process, their judgment although in some cases it would seem that analysis would be cut-and-dried: either a milestone was missed or made, a threshold exceeded or not. In practice, managers frequently use discretion in such situations that may require decision making (Finkelstein & Hambrick, 1996).

Researchers in strategic issue management have extensively explored the interpretation of important developments and trends identified in strategic surveillance. Once organizational decision makers have assembled a confluence of related stimuli into a strategic issue (Dutton, 1993), they make various assessments and categorizations. For example, decision-makers may assess the issue as an opportunity or a threat, influencing the organization's response (Denison, et al., 1996). They also assess the issue's urgency, the organization's understanding of the issue, and its capability to respond (Dutton & Duncan, 1987).

The factors affecting data interpretation are important because of the effect interpretation has on organizational responses. Data interpretation can influence the kinds of responses organizations take. Research examining organizational responses

to various issues and events has made extensive use of three particular dimensions: magnitude, the size of response; immediacy, the rapidity of response; and locus, the extent to which the response is outward- or inward-directed (Smith & Grimm, 1991).

2.6 Empirical Studies on Non-technical Losses

According to the World Bank (2009) paper, non-technical losses in the power sector are almost non-existent or negligibly small in developed countries, as most of the population can afford to pay tariffs reflecting costs of supply (even if they are higher than those reflecting optimized performance of the service providers). In contrast, although mixed, the situation tends to be significantly different in developing countries. Many electricity utilities in developing countries succeeded in significantly reducing or eliminating non-technical losses in electricity supply on a sustainable manner, but others continue to show high losses.

High total losses were prevalent in most Latin American countries at the beginning of the 1990s, in a scenario characterized by poor performance of state-owned enterprises (SOEs), poor service quality, and low access rates. From 1985 to 2000, Latin America was the region in the developing world that made the most significant advances in the comprehensive reform of the power sector. In 1982 Chile became the first country to introduce widespread institutional and regulatory reforms in its power sector, aimed at promoting efficiency and sustainability of existing operations and expansion of services. Reforms were initially applied to existing SOEs, but they were fully privatized in the second half of the 1980s as an important means of ensuring efficiency in sector operations within a well defined regulatory framework which was transparently applied and enforced. The results achieved were impressive and the current performance of some Chilean utilities shows higher efficiency levels than

comparable companies in developed countries. In the first phase of reforms Chile was followed by Argentina in the early 1990s and shortly thereafter by Bolivia and Peru, World Bank (2009) paper.

The second phase of reforms included Colombia and Brazil by the mid-1990s and several Central American and Caribbean countries (Dominican Republic, El Salvador, Panama, Guatemala, and Nicaragua) by the end of the decade. In all cases, reform components included unbundling of sector operations, introduction of competition in generation through the creation of electricity wholesale markets (which had mixed results), and privatization of existing companies (predominantly in charge of generation and distribution and retail).

In India, most of distribution activities are carried out by utilities owned by state governments. The exceptions are Reliance and Tata, two private companies serving Mumbai which have always been private. While both Reliance and Tata show total losses of about 11–12 percent, according to Maharashtra Electricity Regulatory Commission (MERC), the performance of state-owned utilities is generally bad, with losses exceeding 30 percent in most cases.

A successful unbundling program from an operational perspective is restructuring of the Andhra Pradesh State Electricity Board (APSEB), a government-owned vertically integrated power utility serving about 12 million customers in the State of Andhra Pradesh in India. According to World Bank report by Bhatia and Gulati (2004), APSEB suffered large and growing financial losses in the 1990s, amounting to Rs40 billion (US\$0.9 billion) by 1997. The utility's operational performance also deteriorated during the same period, adversely affecting the power supply. Power subsidies grew to 1.6 percent of state GDP, while public spending on health and education fell from 4.7 percent of state GDP in 1987 to 3.6 percent in 1998. This

utility has unbundled and corporatized the units in charge of generation, transmission, and distribution, while maintaining state ownership of all entities. One transmission and four distribution companies were created. They managed to reduce transmission and distribution losses from about 38 percent in 1999 to 26 percent in 2003 and less than 20 percent in 2008—in large part through theft control, with the utilities regularizing 2.25 million unauthorized connections, World Bank (2009) paper.

Execution of the plan was closely monitored. All district offices were linked to headquarters through the satellite network for quick transfer of data and district administrators and engineers submitted daily reports on the connections regularized and fees collected. In order to assure sustainability of results, the information system developed to monitor the plan was integrated into the management control systems of the companies, becoming the tool used for regular monitoring.

A draft 2008 World Bank report (AICD Flagship Report) describes the performance of the utilities in Sub-Saharan countries. Only 50 percent of electricity generated is paid for, due to a combination of low percentages of amounts of electricity injected in distribution networks being billed and low rates of collection of the billed amounts. The variation in performance is enormous, with the highest inefficiencies in Nigeria, where the utility is capturing only 25 percent of the revenues owed. Some recent studies have shown that hidden costs of distribution losses in Sub-Saharan Africa are usually more than 0.5 percent of GDP, and may be as large as 1.2 percent of GDP in some countries. The exceptions are the state-owned and operated utilities of Botswana and South Africa. Electricity losses in Botswana are lower than in South Africa, whose power sector is operated by Eskom, one of the largest utilities in the world, with about 15 percent total losses (Eskom Annual Report (2007)).

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section covered the methodology of the research. It is comprised of the following; research design, data collection, and data analysis.

3.2 Research Design

The research design for this study was a case study and focused on the Kenya Power and lighting company ltd. This study aimed at collecting information from respondents on the strategies used by the Kenya Power to reduce non-technical electricity losses. Research design refers to the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in the procedure (Babbie, 2002). In addition Kothari (2004) observed that research design is a blue print which facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible hence yielding maximum information with minimal expenditure of effort, time and money.

The design is deemed appropriate in this study because there's only one organization currently engaged in the distribution of electricity in Kenya. The research design helped the researcher to draw conclusions of the relationship between non- technical electricity losses and the strategic responses by Kenya Power. Kiptoo (2008) asserted that a case study research design is appropriate where a detailed analysis of a single unit is desired as they provide a focused and variable insight into a phenomenon.

3.3 Data Collection

The source of data was both primary and secondary. The instrument used was an interview guide. The tool used in primary data collection was in-depth personal interviews guided by open ended questions in an interview guide (appendix II). The questions were geared to acquire the opinion of the respondent on strategies by Kenya Power in reducing non- technical electricity losses. The study considered nine (9) respondents for an interview: one chief manager, one regional manager; one deputy regional manager; two functional heads; one branch business head; one sectional head; and two field staff. The respondents were expected to give an insight into the strategic control practices in the respective positions. Secondary data was obtained from existing company records.

Open-ended questions were applied to avoid subjectivity that could result from limiting the respondents' answer to the questions. Cooper and Schindler (2008) points out that open ended questions help measure sensitivity or disapproval of behavior and encourage natural modes of expression. Open-ended questions also allow the respondents to include more information, including feeling, attitudes, and understanding of the issues (Bryman & Bell, 2007).

3.4 Data Analysis

Data was analyzed and evaluated using content analysis. The data collected was summarized according to the study objectives being strategies used by Kenya Power to reduce non- technical electricity losses and the factors that influence non-technical losses in Kenya Power. Cooper and Schindler (2008) point out that content analysis measures the semantic content or the 'what' aspect of the message. Its breadth makes it a flexible and wide ranging tool that may be used as a methodology or as a problem

specific technique. He further points out that content analysis guides against selective perception of content and provides for rigorous application of reliability and validity criteria.

Content analysis is a technique for making inferences by systematically and objectively identifying specific characteristics of messages and the relating themes (Ichangi, 2006). This is an appropriate tool for quantifying and analyzing presence, meaning, and relationships of words and concepts within texts. It also allowed inference to be made about messages (Ichangi, 2006 and Kiptoo, 2008).

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents data obtained from the respondents, the analysis, results and discussion. The aim of this study was to establish the strategies used by the Kenya Power and Lighting Company in reducing non technical electricity losses. The objectives were to establish the various strategies used by Kenya Power to reduce non-technical electricity losses and the factors that influence non-technical losses in Kenya Power. This therefore was a case study of the Kenya Power & Lighting Company limited.

An interview schedule was used for an in-depth data gathering. The data obtained was later transcribed, cleaned, organized and presented according to the themes of the study as well as those emerging. The data was further analyzed and findings recorded for use in drawing conclusions and recommendations.

4.2 Causes of Non- Technical Electricity Losses

From a majority of the respondents, there are a number of causes of electricity losses and they include: the high cost of electricity that makes it unaffordable, nonpayment of bills of the already used units, poverty levels and unemployment that lead to vandalism of transformers and theft of copper conductors for sale, and competition in manufacturing and production industries which makes some to minimize their production costs through power theft. There is also the case of some customers reconnecting supplies before clearing their bills and paying the reconnection fees.

Serial bill payment defaulters lead to some huge debts due to unpaid bills and reconnection fees being written-proof.

The rest of the respondents revealed that the lack of adequate mechanism to monitor energy sales vis-à-vis energy dispatches, delayed replacement of faulty meters, lack of supply (loss of opportunity to sell electricity), wrong allocation of meters on site, delays in entering them in the billing system, and delay in metering new customers upon connection to the service lines contribute largely to non-technical electricity losses. Further, a few of the respondents said that falsification of readings, meter tampering, direct connection (hooking up), wrong meter reading, faulty and defective metering practices, poor earthing methods at the metering point, and poor wrong tariff allocation form the other causes of non-technical electricity losses. Integrity and ethics in terms of corruption among KPLC staff, time wasting by staff leading to reduced out-put, wrong billing due to wrong reading of meters, reconnection fees and rebilling, and professional negligence also contribute to non-technical electricity losses.

The above findings reveal that poverty and the high costs of electricity are the major causes of electricity theft which in turn contribute largely to non-technical electricity losses. Poverty due to unemployment makes people to steal electricity since they cannot afford but they need it. They also engage in acts of vandalism where they sell electricity equipments like oil and copper found in the transformers. High electricity costs means that customers end up not paying their bills in time or forfeiting the payment completely leading to huge amounts of uncollected revenues by KPLC. Since they still need power, they engage in meter tampering, reconnecting illegally, and compromising KPLC staff to aid them in all these acts including falsification of meter readings to reduce the billed amount.

4.3 KPLC staff contribution to Non-Technical Electricity Losses

All the respondents pointed out that some KPLC staff do contribute to the non-technical losses of electricity through a number of ways. Majority said that the employees are compromised by customers and aid in either meter-tampering, alter the correct meter readings or falsifying the readings. In other cases, the staff provides fictitious readings to the billing section. In places where electricity has not been supplied, the KPLC staff plays part in the illegal connection of electricity by providing tools and materials for direct connection (or hooking up). In cases where non-technical losses have been noted, some members of staff do not take the initiative to raise alarm or pinpoint such frauds report and when it's reported, they waste time as they take too long to resolve them. On the other hand, ignorance and professional negligence leads to some staff covering the areas under their inspection inadequately. This implies that electricity theft may go on for so long unnoticed. Some staff also conspires with customers to defraud the company through leakage of information and assisting in putting off the lines leading to vandalism of transformers and conductors.

4.4 Factors contributing to non-technical losses

4.4.1 Poverty Levels

Poverty leads to emergence of informal settlement dwellers. Many customers in such areas are hardly on sound installations, and in cases where electricity has been supplied they hardly pay electricity bills. Poverty makes customers and staff to engage in corrupt electricity supplies and hence contributing to non-technical losses. While some respondents suggested that utility assumes that poor people do not need electricity, which results to electricity theft, others claimed electricity is a necessity

for all and those who cannot afford result to stealing. Further, a portion of the respondents said that with high poverty levels, electricity becomes less prioritized by customers meaning that fewer units are sold hence low revenues. The inability to pay the bills leads to customers stealing once they get disconnected. Poverty also leads to fraud and vandalism of transformers and copper conductors for sale. However, although the majority claimed that most Kenyans in informal settlements in urban areas engage in electricity theft due to poverty, a classic example being the expansive Kibera slums, the rest argued that poverty does not contribute to a large extent since the people in the slums can afford other expensive services like mobile phones.

The above findings suggest that poverty and especially in the informal settlement contribute to non-technical losses. In these areas people cannot afford the initial contribution for connection of electricity and settling of bills. However, since it is a necessity, those who cannot afford result to stealing it. It is also clear that poverty leads to KPLC staff engaging in corruption practices to aid customers' access electricity. In this case, the money they collect from the customers in terms of bribes does not reach the company. In either case the company loses revenue which contributes to non-technical electricity losses.

4.4.2 Culture of Impunity

Some respondents claimed that impunity contributes to non-technical losses mainly in informal settlement areas where power is not provided legally. People tap electricity from the nearby lines, disrespecting and disregarding laws. Others said that the laws protect the customer more than the company such that those who interfere with electricity go unpunished and if they are fined, the charges are too low that the offenders do not feel the effect. This is due to the weak laws and legal system loop

holes such that there are no laws punitive enough to prevent stealing of electricity. It also emerged that other electricity users though in affluent settlement areas and with ability to pay for electricity use still engage in fraudulent consumption as a culture of impunity. They imagine they can use power for free since KPLC is a government parastatal.

As shown by the above results, impunity is found to cause non-technical electricity losses in both informal and also affluent settlement areas. In the former it occurs due to the fact that there is political influence in such areas, and the residents feel covered by their political leaders and therefore immune to the laws. They therefore engage in electricity theft without any fear of the consequences. A typical example is the Kibera slum in Nairobi.

In the affluent areas, the findings reveal that customers are more protected by the law as compared to the company. The laws and the legal system are also deemed weak such that charges on culprits are too low for their effects to be felt and KPLC being a government parastatal, they engage in electricity theft because they feel electricity should be free for all irrespective of their status.

4.4.3 Lack of Electricity Supply

A majority of the respondents said that KPLC neglects to supply some areas leading to theft from areas where electricity has already been supplied. This mainly happens in people settlement areas where electricity is needed but unavailable and this force people to hook up from nearby areas. This lack of supply also causes reduction in unit sales hence less revenue while other potential customers lose faith in the company hence do not apply for connection which also leads to less sales.

Some respondents said that in areas where electricity is already supplied, power rationing and planned intervention leads to people hooking up from other areas illegally. Further, revenue is lost when power is off. Frequent lack of power makes customers to resort to other ways of power supply especially large power customers who use solar in flower farms and generators for factories like Mumias Sugar Company.

The findings above reveal that lack of supply leads to non-technical electricity losses in two ways. One, the lack of supply in one area leads to people in that area stealing from the supplied neighborhoods through illegal connection or hooking up especially from the overhead lines. In this case, electricity is used but not paid for. Secondly, when electricity is not supplied, the unit sales fall leading to a decline in revenue. This further scares of potential customers who could have applied for connection because they lose faith in the company. Further, the results show that power disruptions make the customers to seek other alternatives like generators and solar and especially factories like the Mumias Sugar Company.

4.4.4 High cost of electricity

The initial electricity installation cost is too high and unaffordable. This prompts customers either by themselves or by the help of KPLC staffs to hook up from the transformers. This is direct connection which is unmetered and as a result not billed and contributes to non-technical electricity losses. Where the supply is already installed the high cost from electricity bills drives the customers to either: interfere with the meters so as to pay less, not paying the already used units at all even with disconnections, or ceasing to use high consuming appliances which reduce units sold

hence less revenue collection. Further, high monthly bills after disconnections lead to people stealing through tapping or direct connections.

The high cost of electricity makes KPLC to lose opportunity since competition makes the customers to consider using other alternative and much cheaper sources of power like solar especially in sugar and tea firms. It also makes the cost of doing business high for industry owners and other business people hence prompting them to engage in electricity theft.

In the above results, a majority of the respondents revealed that electricity cost is high from the initial connection fee to the bills. This prompts the customers either by themselves or by the help of KPLC staff to hook up power in cases where there is no electricity, or interfere with meters and their readings so as to pay less monthly bills, and forfeit completely from paying for the consumed electricity units. All these amount to considerable non-technical electricity losses. Other respondents revealed that the high monthly electricity bills have forced some customers especially factories to switch to other cheaper alternatives of power including solar so as to cut down on production costs.

4.4.5 Business Competition

The respondents indicated that businesses steal electricity to reduce their cost of production as far as the electricity component is concerned. This is normally aimed at maximizing profits and undercutting competition from other players in the same field by commanding an upper hand on pricing of their products. The culprits in this case are mainly fast food businesses where for instance; the pricing of chips is directly proportional to the cost of electricity.

In other areas, customers resort to other alternative sources of power including solar and generators. For example, solar energy is becoming popular especially in rural areas: other customers are producing their own hydro-power for example in Murang'a District, in Central Province of Kenya.

The above findings reveal that business competition is high and that reducing the operation cost goes a long way in giving any business an upper hand in making profits. One of the components in the operation cost is electricity. Thus, some customers, especially fast food dealer's end up stealing electricity so as to undercut their cost of production, reduce prices of their products, and make more profits compared to their counter-parts. Other customers result to the other cheap sources of power like solar and hydro-power (Murang'a District) in order to beat their business competitors by having low production costs. This implies that the company will sell fewer units due to loss of business opportunity.

4.4.6 Integrity of the Employees

Most of the staff who engages in acts that contribute to non-technical electricity losses are compromised by the customers at a cost so as to interfere with the meter readings or tamper with the meters and installations. A good percentage of this category of staff comprises of the casual workers and other low salaried staff whose loyalty to the company is easily compromised by the financial benefits that they get from such acts.

Other staff are engaged in corrupt practices by accepting bribes (hand-outs) in order to cover up irregularities like meter tampering, direct connections (hook ups), deliberate wrong meter reading, and connecting of supply to over distance customers and even linking customers with brokers who fuel electricity theft. While some employees also advice the customers on methods of stealing electricity and the timing

so as the stealing goes on unnoticed .Others engage in altering the data in the IT system which interferes with proper billing of used electricity units.

The above results show that a majority of the members of staff are compromised by customers consist of the casuals and the low salaried workers with less loyalty to the company. Such staff tampers with meters, falsify meter readings, and assist in hooking up power for customers for bribes. They do not do thorough routine inspection of all installations and meters; neither do they report any defects they come across in the fields. All these result in non-technical electricity losses experienced by KPLC.

4.4.7 Information and Technology systems

A faulty and malfunctioning IT system may result to erroneous bills which in return results to less revenue as compared to the expected level with respect to the consumed units. Insufficient and unreliable IT systems may also affect performance and delays in sensing and responding to non-technical electricity losses issues.

To some extent, the lack of profile protection for the IT systems makes it possible to interfere with data that may lead to alterations in customers' bills leading to losses. Some members of staff defraud the company through their highly developed IT skills by feeding the computers with inaccurate data or even altering correctly entered data at the computer level. This generates erroneous customer bills and as a result not all the supplied electricity gets paid for. There is also a small element of there being poor interface between the IT systems in the company for instance the integrated finance system (IFS) and the integrated customer service (ICS) system. This result in differences between actual bills and the amounts paid.

From the findings, a majority of the respondents said that IT systems that are faulty or malfunctioning results in erroneous billing for customers. If customers are billed less, the company ends up losing some of its revenues. On the other hand, over-billing may discourage the customer from continued use of electricity and even switch to ways of stealing resulting in non-technical electricity losses. The results also show that some members of staff in the IT department enter wrong data or even alter the data in the system due to lack of profile protection. This also leads to error in the billing process and results to non-technical electricity losses.

4.5 Strategies put in place by KPLC for reducing Non-Technical

Losses

The Kenya Power & Lighting Company can formulate and implement different strategies to reduce and eventually curb the various ways through which non-technical losses of electricity occur. Below are the respondents' views on what strategies the company should adopt against meter tampering, direct connection, neutral and partial by-pass, interference with current and voltage transformers, falsification of meter readings, unmetered new connections, meter reading and billing errors and non-payment of bills among others.

4.5.1 Meter Tampering

The company should invest in improved measuring system that are tamper-proof like the smart meters which are sensitive to tampering and also sharpen the ability to detect the tampering and exposing defaulters in electricity bills payment. The company staff should secure meter boards with standard locks that can only be accessed by fellow KPLC staff. Further new metering systems like the Automatic Meter Reading (AMR) should be used for factories and other large power customers

and also be introduced for medium size customers so as to minimize cases of meter tampering and hence reduce non-technical electricity losses. Pole-mounted meters should be used that are completely sealed to avoid tampering. Research on how to develop more tamper-proof meters should also be carried out from time to time so as to stay ahead of those customers who keep engaging in meter tampering and interference.

KPLC should also carry out thorough global sweeps that are focused, educate the customers on dangers of meter tampering and the consequences of the same as far as legal implications are concerned. The Ministry of Energy should come up with tough laws against petty and criminal offenders in electricity theft cases while KPLC should enforce those tough measures to non-cooperative customers in terms of availing the meters for inspections. Proper implementation of the ongoing prepaid metering process will greatly reduce meter tampering since meters will not be easily accessible and this will reduce losses. Regular inspection of meters, ad hoc checks on high risk areas and segmentation of customers to focus on fraud prone areas will also help in reducing meter tampering.

The above results reveal that the company should invest and adopt new measuring systems that are tamper-proof and also sensitive to tampering. These include installation of smart meters and AMRs. In addition, the staff members should secure the meter boxes at all times, use well protected pole-metering especially for factories and companies, and do extensive and routine inspections to detect and attend to any interferences promptly. The results further suggests that global sweeps and customers awareness should be carried out by the company and that it should adopt tough laws against any offenders in electricity theft with liaison with the Ministry of Energy.

4.5.2 Direct Connection

The company should use insulated overhead conductors to avoid hook-ups as well as shortening the service line cables so that they are visible and hence easy to spot any diversions that lead to non-technical electricity losses. Further, there should be prompt metering of new customers by ensuring that metering is done the same time that service lines are connected. This will reduce the metering time and non-technical electricity losses in the long run.

The metering should be done outside the customers' premises or meters placed at the pole like the case of prepaid to minimize tampering and hook ups. The meter boards and boxes should also be secured so that they are completely inaccessible by anyone who wants to steal electricity. The company should also ensure that electricity is available to all informal settlement areas where direct connection (hooking up) is so rampant. These will hugely reduce the non-technical electricity losses that are being experienced by KPLC.

There should also be consistent and routine inspection of all installations to ensure that all are legal, metered and secured. Where a disconnection is made due to nonpayment of bills, prompt reconnection should be made immediately to avoid illegal reconnections. Transformer metering should be adopted so that the company is able to evaluate electricity unit sales vis-à-vis the units dispatched. This will help in identifying areas of any non-technical electricity losses quickly. In addition all materials that are given out for electricity should be accounted for.

In case where the direct connections are discovered, there should severe punishment to all the parties (if any) that could have aided in making such connections. High penalties should be imposed to all culprits to deter and serve as an example to others

with similar intentions. Customers and staff should also be sensitized on the dangers and repercussions of engaging in direct connection of electricity.

The analysis of the above findings reveal that KPLC should use insulated over-head conductors, adopt transformer metering, meter new connections during service line installation. adopt pole-metering (for prepaid customers), shorten the service lines to make them visible, and secure all meter boards and boxes. The company should also avail electricity to all areas where it's needed like in the informal settlement areas. Routine inspection should be intensified and disconnections should be attended to promptly upon payment. They also advice that all transformers should be installed above the high voltage lines and have them secured so that only authorized KPLC personnel can access them. Lastly, staff and customers awareness should be carried out and laws put in place for those found engaging in direct connection of electricity.

4.5.3 Neutral and Partial By-pass

For partial by-pass, the company staff should seal all meter boxes and ensure that service line cables are visible so that any by-passing is easily noticed and rectified immediately. All electro-mechanical meters should be replaced with electronic ones that are neutral sensitive i.e. the company should ensure that neutral by-pass is eliminated by using electronic meters like star instrument and hexing models that are sensitive to neutral interferences. Smart meters that are able to send a signal when an attempt to interfere is made should be installed to monitor usage of electricity remotely.

The concerned parties and department in the company should regularly organize technical clinics on the various forms and methods of neutral by-pass where technical staff shares ideas on how to counter the same. Further, the company should do regular

inspection and sensitize new connection staff to be vigilant and keen on inspecting new installations.

The Ministry of Energy should come up with tough laws against petty and criminal offenders who are found engaging in neutral and partial by-passing. On the other hand, KPLC should enforce tough measures to non-cooperative customers in terms of availing the meters for monthly reading. Both measures will ensure that appropriate action on all detected cases is taken so as to reduce cases of non-technical electricity losses.

The above results show that while the sealing of meters and installing service lines in easily visible positions will reduce partial by-pass, smart meters that cannot be affected by neutral by-pass should be installed. Technical clinics to brainstorm on forms and methods of neutral and partial by-pass should be held more often to counter the issue and new connection staff briefed on the same. Moreover, KPLC in liaison with the Ministry of Energy should adopt laws to aid in appropriate punishment of the offenders.

4.5.4 Interfering with Current and Voltage Transformers

The company should meter all feeder, air break switches and transformer to identify possible cases of interference by large power customers. This will minimize if not completely stop their interference by customers which will reduce the non-technical electricity losses. The company should make use of factory sealed current and voltage transformers that should then be secured in chambers accessible only by KPLC staff. Moreover, the use of smart meters with alarm signals for real time communication to the call centers in cases of any anomalies and interferences should be adopted. Special teams for large power customers should be formed to respond promptly to cases of

electricity theft. Use of AMRs which can show the variability in consumption should also be put in place.

The company should also initiate intensive, regular and proper inspection and testing when commissioning large power users/customers. Monitoring of consumption change patterns through smart metering system should also be done and inspections to establish the cause of such changes carried out promptly. There should be sensitizing of all staff and customers on the dangers and consequences of interfering with current and voltage transformers. Further, the integrity of technicians and contractors involved in installation of current and voltage transformers should be regularly checked and evaluated.

From the above findings, majority of the respondents say that feeder and transformer metering will reduce the cases of interference of current and voltage transformers. Smart meters that are sensitive to interference could also be installed and have special teams on standby to respond promptly to any anomalies detected. Finally, the company should emphasize on thorough, regular and proper inspection and testing of all new connections and sensitize staff and customers on the dangers and consequences of transformer interferences.

4.5.5 Falsification of Meter Readings

The company should install quality prepaid meters and extensively roll-out AMR so that reading of the meters is done remotely for proper billing and revenue collection from the used units of electricity. Any anomalies should be captured and corrected before the next billing cycle. The use of hand held sets with scanning meter reading devices could also help to improve on the correctness of the bills to be paid by the customers. Further, the company should implement the use electronic meters where

units cannot be interfered with and also do regular audit on the quality of billing and keep track of consumption of individual customers through exception reports.

The company should have technically trained meter readers who can identify anomalies and keep training and sensitizing them on other efficient ways of carrying out their duties. All staff should be educated on the need to obtain correct readings and have a rewarding system for those who provide correct readings all the time. On the other hand, punitive disciplinary action should be taken against any staff that provides wrong readings.

KPLC should also regularly undertake staff rotation to eliminate familiarity that breeds contempt. Apart from just training them on ethics, the terms of meter reading staff should be improved considerably so as to make them more responsible in their work. Customers should also be educated on the importance of correct meter readings and recordings. The company should come up with tough rules against petty and criminal offenders in the falsification of meter readings. KPLC should as well enforce tough measures to non-cooperative customers in terms of availing the meters for monthly reading.

From the above results, majority of the respondents said that quality prepaid meters and AMRs should be rolled out, hand-held scanners for meter reading should be put in place, and that only technically trained meter reading staff is given the responsibility of meter reading. They further suggested that all staff should be educated on correct meter reading and recording and have those who provide correct readings consistently rewarded.

The rest of the respondents suggested that the company should practice staff rotation, educate the customers on the need for correct reading and adopt laws to help discourage staff and customers from falsifying the meter readings.

4.5.6 Unmetered New Connections

The company should always ensure swift connection of meters once the service cable is installed followed by immediate updating of all the new meters in the billing system. This means that the service line should not be connected at the pole if the meter is not to be installed at the same time. The procurement and supply section should always ensure meters are always available in the store, while the human resource department should increase capacity for new connection staff for prompt metering immediately the service lines are installed. Alternatively, the company should empower the construction teams to also carry out the metering so that no connection is unmetered at any time.

From the above results, many of the respondents suggested that the company should always have swift connection of meters along with the installation of the service cable by ensuring that enough equipment for metering are procured and supplied promptly and that there is enough staff for new meter connection. The other respondents suggested that the construction teams tasked with installation of service lines should also be given the responsibility of metering all the connections they carry out. This will reduce unmetered connection to a great extent.

4.5.7 Meter Reading and Billing Errors

The company should adopt and enhance the use of hand-held sets for meter reading, install quality prepaid meters, and use AMRs. The reading percentages should also be made more realistic to avoid cheating by meter readers. Where billing errors

inevitably occurs, they should be resolved promptly and corrected before the next billing cycle.

The customer service department should provide and verify customer billing tariffs appropriately according to either their geographical location (urban, rural, or informal settlement areas) or their way of power consumption (commercial or domestic). The construction staff should consider standard meter board height when installing meters for easy access of readings to avoid making mistakes. All the meter boards and boxes should be positioned outside the house and in a well lit area. KPLC should take the responsibility of sensitizing its staff on the need for correct reading, the effects of wrong meter reading and billing errors, and also do the same to sensitize customers on the need for correct meter reading especially self readers and those who lock their premises or deny access to KPLC staff meter readers. The integrity of IT staff and the accuracy by employees involved in meter reading should be emphasized such that stern disciplinary measures are taken against employees who contravene the laid down procedures and regulations.

The findings above reveal that a majority of the respondents suggested that KPLC should adopt and enhance the use of hand-held sets with scanners for meter-reading, install quality prepaid meters and introduce AMRs for all the large power customers. Meters that are installed at a standard height and in a well lit place will enable the meter readers read and record readings correctly. This will provide quality meter readings and reduce billing errors that contribute to non-technical electricity losses to a large extent. Further, the making of the reading percentage realistic will ensure that forced attainment of high percentages which leads to false readings and billing errors is avoided. A few of the respondents suggested that the company should check and

ensure that customers are billed appropriately so that they pay the appropriate bills according to their domestic or commercial consumption.

4.5.8 Non-payment of Bills

The customer service department should avail scanned copy bills to large power customers whose bills delay in being delivered which is somehow claimed to be a cause to the nonpayment of electricity bills. The company should consider having a larger percentage of customers on pre-paid metering, or have them put up a deposit equivalent to six month's consumption. Where non payments are prevalent, prompt disconnections to avoid accumulation of unpaid bills should be done and a follow-up made to ensure that the relevant full payments are done before any reconnections. The company could even strategize to use more professional debt collection agents to help reach every unpaid debt. Further, the company should continue liaising with other stakeholders to make electricity payments easy like it is doing with Safaricom (M-pesa), Airtel (Zap), banks and other easy pay options.

In areas where customers reconnect the power by themselves upon disconnection by KPLC staff, heavy penalties should be applied, including permanent disconnection from the power lines. The company could also penalize recurrent poor paying customers by changing the laws or surcharging them similar to what the banks do to loan defaulters. By changing customers on post paid to prepaid, this will eliminate issues of non-payment of bills completely.

Proper management of customer contacts should be enhanced so that they are easily accessed in cases of debt recovery. Giving credit extension arrangements to deserving customers who have no past or pending cases of electricity theft in situations where the customers are unable to pay their bills will also assist in reducing debts. In the

event of such credit extension arrangements, proper follow up should be done to ensure that all the debts are recovered.

From the results above, majority of the respondents suggested that non-payment of bills could be solved by having the company staff servicing the large power customers with scanned copies of their bills. The company could also have the post-paid customers increase accounts deposit to six times their monthly consumption. This will help the company to obtain bill payments from such deposits in case of defaulting. They also said that the company should carry out prompt disconnection of unpaid meters and follow up the uncollected revenues through professional debt collectors.

The rest of the respondents advised that the company should ease payments of bills by working closely with other stakeholders like banks and mobile service provider pay options like M-Pesa and Zap. This will encourage the customers to pay their bills promptly. Further, they suggested that the company should adopt laws that will help penalize nonpayment of bills through surcharging the way banks do for their loan defaulting clients. Other respondents advised that the customer service department should maintain clear records with all the customer contacts so that defaulters can be reached easily for revenue collection of their unpaid bills. These records could also be used in appraising customers who require credit facilities who at times find themselves unable to pay their bills.

4.5.9 Other Strategies for reducing Non-technical Electricity Losses

The respondents suggested that the company should intensively train its staff on whistle blowing on cases of electricity theft without any hesitations. It should also formulate an appropriate way of rewarding those who report. All the casual workers whose loyalty to the company can be easily compromised should be given permanent

employment so as to take responsibility of their tasks more seriously. Contractors who undertake electricity installation and connection should be thoroughly vetted and the qualified ones should work under strict supervision. Benchmarking with other power utilities and adopt best practices and carrying out smart sweeps based on observed differences between energy purchased and the sales will also reduce non-technical electricity losses.

The company should also provide power to the informal settlement areas to reduce temptations to stealing. It should improve on the quality and clarity of bills so that customers pay their bills promptly without complaints. Customers that do not pay their bills should be arraigned in court and appropriate judgment made with the aim of having such customers pay for their bills. Minimization of interruptions of power and reviewing of the tariff to be unique to different geographical areas can also help.

The above findings from the respondents suggested that the company should do the following: train its staff intensively to enhance vigilant routine inspection; formulate logistics on rewarding those who report all cases of electricity theft in their areas; transform all the casual workers to permanent to win their loyalty; and provide power to all informal settlement areas at an affordable tariff. Further, all the contractors who undertake installations should be vetted thoroughly and be made to work under strict supervision as per laid down terms so as to prevent any opportunities of electricity theft.

4.6 Structures that KPLC has put in place to reduce Non-technical Electricity Losses

KPLC has put in place a number of structures to counter and reduce non-technical electricity losses. These include among them: automatic meter reading (AMRs),

prepaid metering, and use dry type transformers in the most vulnerable areas or setting the transformers high up and above the high voltage lines especially in the informal settlement areas to prevent direct connections (hooking up). The company has also implemented feeder metering and ring fencing to determine possible areas where electricity losses occur. They are also securing meters and transformers from interference and tampering. Direct connection is being reduced through prompt installation of meters immediately the service lines are constructed. Exceptional reports are now regularly availed to help evaluate the levels of non-technical electricity losses in efforts to reduce them and eventually put an end to electricity theft completely in the future. KPLC has also engaged in employment of more skilled personnel and increased the training of the other staff members on issues of electricity theft and how to counter it.

Massive slum and rural electrification will be embarked on to reduce the illegal tapping of power from already legitimately connected lines. There is also the intensive sensitization of the community on the effects of electricity theft and the need to immediately report any cases on the same. The security department that deals with electricity theft is currently working with police in their operations and raids especially in the informal settlement areas like Kibera and Mathare. This is boosted by both global sweeps and engagement of the Kenya Anti Corruption Commission in fighting impunity.

The above findings reveal that KPLC has put in place numerous structures to reduce the non technical losses of electricity. They include among them adoption of AMRs for large power customers to prevent interference, prepaid metering to counter the nonpayment of bills, smart metering to ensure correct meter readings and hence correct billing, and setting up of transformers high up to counter direct connections

(hooking up). The company is also implementing the use of dry type transformers where their vandalism for oil and copper is rampant. The company is ensuring that installation of service lines and metering of connections on the lines are done concurrently to reduce cases of unmetered customers.

The availing of exceptional reports regularly to evaluate the levels of non-technical electricity losses is also helping the company to come up with ways of reducing these losses as well as training and employing more skilled personnel. Further, the company has engaged in massive rural and informal settlement areas electrification to reduce hooking up and reach out to other customers who may be thinking of other sources of power. This is aimed at increasing the sales in units to counter the non-technical electricity losses due to the lack of supply of electricity.

Finally, KPLC has embarked on creation of awareness among the staff and customers on the effects of electricity theft so that any cases that are found are promptly reported. On the other hand, operations and raids in the informal settlement areas like Kibera and Mathare by the security department in conjunction with the local leaders and police is helping in identifying and unearthing direct connections. This is also leading to arrests of the culprits who are charged and punished so as to deter other customers who may be thinking of engaging in similar acts of electricity theft.

4.7 Adopting New Technologies to reduce Non-technical Losses

All the respondents agreed that KPLC had and was still adopting new technologies and ways aimed at reducing non-technical electricity losses. These include among them installation of electronic post paid meters, prepaid meters, automatic meter reading for large users, and use of smart grid and meters. In areas where non-technical electricity losses has been caused by vandalism of transformers, the company has

been installing dry type transformers, or installing the normal transformers (non dry) in areas where security of the same can be provided by customers. As far as meter reading is concerned, the use of hand held sets in meter reading for accurate billing and effective revenue collection has been put in practice while the acquisition of power analyzers has helped in evaluating the unit sales in comparison to the dispatched units. The adoption of other ways of making bills payments e.g. M-pesa, Zap, and Easy Pay has also helped the customers to pay their bills promptly without having to make long queues at KPLC payment halls.

From the above results, all the correspondents agreed that KPLC was making an effort to adopt new technologies with the aim of reducing the non technical electricity losses. Among the new technologies are electronic post-paid meters (tamper-proof), prepaid meters (to counter nonpayment of bills), AMRs (for larger power users), dry type transformers that are not prone to vandalism, hand-held sets with scanners for accurate meter readings and adoption of efficient ways of paying bills i.e. through M-Pesa, Zap and Easy Pay.

4.8 Monitoring and Evaluation of KPLC's Strategies to reduce Non-Technical Electricity Losses

Monitoring of newly connected customers or those coming for connection and evaluating the number of units sold vis-à-vis the bought units from the generating companies helps the company realize whether there is non-technical electricity losses or not. Installation of check meters against tampered meters where analysis is done and accounts debited appropriately is a way of monitoring and evaluating the losses. Doing monthly analysis of non-technical electricity losses can help evaluate and know whether there is a positive result on the strategies that have been put in place or

not. This way, the company is able to decide whether to improve on these strategies, formulate others, or develop new implementation ways of the formulated strategies.

In cases of the prepaid customers, there is monitoring of token bought per account while for the postpaid ones all meters with nil consumption are extracted as an exceptional report which is used for picking cases that require site visits and establish the cause. All large power accounts with reduced consumption are visited and meters tested to establish the cause of reduction. Through analysis of debit targets against actual debits achieved, the company is also able to know whether its strategy for recovery of lost units is successful. Global sweeps that are carried out can be periodically evaluated to establish their impact on reducing non-technical electricity losses.

Routine inspection that leads to generation of periodic reports will assist in monitoring and evaluating accounts with fraud activities. Through analyzing and monitoring of periodic reports i.e. weekly, monthly, quarterly, half-yearly or annually reports on inspections and the number of supplies metered against the those in the billing system also helps to establish the extent of the non-technical electricity losses..

The results above suggest that monitoring and evaluation are important in reducing the non-technical electricity losses by KPLC. This is because through monitoring and evaluation, the company is in a position to know the levels on non-technical electricity losses and see whether they are increasing, decreasing, or neither upon the implementation of the strategies formulated. The findings suggest that monitoring should be applied to both old and the newly connected customers so that the company is able to evaluate sales vis-à-vis units bought from the generating companies. This way any losses can be easily traced and appropriate strategies can then be formulated

to reduce the same. Further, the findings suggest that periodic analysis of exceptional reports on non-technical electricity losses will give the company the knowledge as to whether the formulated strategies are giving positive or negative improvement. This way, the company can take appropriate measures to achieve its aim of reducing the non technical electricity losses.

4.9 Bulk Metering in informal Settlement Areas

The company should provide power to the poor in slum areas cheaply to reduce non-technical losses of electricity or change the legislation for KPLC to be allowed to have bulk metering, where independent groups will sell to the individuals in the informal settlement areas. Moreover, it should lower the tariffs of low income earners to make electricity affordable to them. KPLC should work hand in hand with the Ministry of Energy to formulate laws against offenders and make these offences criminal. Those laws should be enforced strictly to make customers keen and more careful and desist from interfering with power. It should then push for regulation to reduce the high cost of electricity through development of more cost effective power generation methods so as to make this utility more affordable by most of the consumers. If need be, the company could lobby the government for harsher penalties for electricity theft cases and for KPLC security officers to have prosecutorial powers.

The findings suggest that the company can improve power supply in the informal settlement areas by adopting a legislation that will allow bulk metering in such areas. This will largely reduce direct connection as well as meter tampering as other players will be more vigilant on their unit sales. Upon supply of power, the results suggest that tariffs in these areas should also be low enough to be affordable by the customers. Customers should then be educated on all the dangers of stealing electricity.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a synthesis of the entire study. It contains a summary of research findings, conclusions and recommendations made based on the same.

5.2 Summary of Findings

The analysis of the findings shows that there are various factors that influence non-technical losses of electricity in Kenya Power and Lighting Company among them poverty, high costs of electricity, integrity of the members of staff as well as faultiness in the Information Communication system of the company. As a result, the company has formulated strategies to counter and help in the reduction of these losses. The strategies consist of both the adoption of new technologies and operational methods to prevent, detect, and report any interference in the supply of electricity that leads to non-technical losses. The strategies are being implemented largely by the company although other stakeholders like the customers, the government through the Ministry of Energy and administrative leaders should form part of the team to ensure effectiveness and efficiency in the war to reduce non-technical electricity losses

5.3 Conclusions

From the study, Kenya Power & Lighting Company has been and is experiencing non-technical losses of electricity due to forces from both within and without itself. As a result, the company has formulated strategies including the adoption of new technologies and efficient operations to reduce these losses while maintaining continuous supply of this necessary utility to the customers. The company is able to

render more reliable and responsive services to customers and to sustain its good financial performance through improving the system efficiency by reducing the non-technical electricity losses.

To effectively collect revenue while providing efficient and high quality customer services, the company has fully and expansively embarked on Automatic Meter Reading (AMR) project. It has also started converting customers from post paid to prepaid meters especially those in low and medium level areas. It is also ensuring that all new customers are metered promptly. As the company works on improving power to the informal settlement areas, it is also implementing feeder metering and transformer ring fencing to guide and monitor the non-technical loss campaigns.

The company is therefore trying to make the best out of its strengths i.e. its providing an essential service that is high in demand, it is present in all the counties, and it has the ability to readily adapt to an ever changing operating environment. Service delivery innovations like the expanded options for payment of electricity bills at commercial banks, post offices, through M-Pesa and Zap is also assisting in ensuring that there is prompt payment of consumed power.

5.3 Limitations of the Study

This research faced a number of limitations. One of the limitations is that the study area covered was only Nairobi area yet the issue on non-technical losses is experienced in all areas where electricity is being supplied throughout the country. Thus, the views from other areas on the factors affecting non-technical losses and the strategies put in places to counter the same have not been considered. The research has also not put into consideration the view of the customers on the problem of non-technical losses. This is in spite of the fact that these are the users of the electricity.

Furthermore, they are the key players in the factors that contribute to non-technical losses and could therefore help in reducing these losses if their views are considered.

The views of other major stakeholders in the power industry were also not considered. These include Ministry of Energy, Energy Regulatory Commission, Rural Electrification Authority, Kengen and Independent Power Producers. They are interested parties and they could offer suggestion on strategies that can be used in reducing non-technical losses. Moreover, there was very little time to get more information especially from the senior managers. This is because these managers had very tight schedules and could only be available for a very short time for the interview.

5.4 Suggestion for Further Research

This study only focused only on one player in the industry, the KPLC and also covered only one area, Nairobi. The study also focused only on strategies that KPLC is and has been adopting to reduce non-technical losses. It is therefore suggested that further studies be done to involve other stakeholders in the power industry including the Ministry of Energy, Energy Regulatory Commission, Rural Electrification Authority, and Independent Power Producers and get their views on the reduction of non-technical electricity losses.

Further studies could also be carried out that cover the rest of the country. This will avail information and views from all parts of the country for a more conclusive solution to the problem of non-technical electricity losses. Finally, other scholars can consider researching on the most recent technologies that can effectively aid in reducing if not curbing the problem of non-technical electricity losses.

5.5 Recommendations

The government should create employment opportunities to check the high level of poverty and also formulate harsh laws to curb impunity. The Kenya Power & Lighting Company should engage in massive electrification projects and supply power to all areas with need as a matter of urgency. At the same time, the company should ensure that electricity is affordable by lobbying for reviewing of the tariffs to suite different cadres of customers from time to time. This will also go a long way in ensuring that business competition does not play a part as far as electricity theft is concerned due to the fact that the production costs will remain considerably low.

The integrity of the employees should be checked by the company through training to ensure that only those who reach the set threshold on integrity are work for the company. Harsh penalties and disciplinary actions should be imposed on those that get compromised to engage in acts that lead to non-technical electricity losses. The training should also aim at enhancing the skills of the employees to empower them in fighting the menace of non-technical electricity losses. The company should keep adopting more secure and efficient Information Communication system and technologies so as to keep ahead of the new ways of electricity supply interferences. Smart metering for domestic and small commercial customers should also be adopted. The company should engage intensively in sensitization of the public on the dangers of electricity supply interference and theft through public meetings.

The company should also improve its relationship with other industry players like the Ministry of Energy, Energy Regulatory Commission, Rural Electrification Authority, and Independent Power Producers. These will help in enforcing regulations, approving power purchase agreements, reviewing of tariffs, implementation of rural

electrification program, and ensure that the company has enough power to meet the increasing demand.

For the informal settlement areas, the company should consider bulk metering for individual or group investors to supply these areas and then bill the customers. This will require changes in the regulations to accommodate bulk metering. These investors will ensure that no electricity is stolen since they will be careful in order for them to maximize on their profit.

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made at the World Bank by José María Calvo-Sotelo, Endesa Latin

America, Washington DC, February 24th, 2009.

APPENDICES

APPENDIX I: LETTER OF INTRODUCTION

The Respondent,

Dear Sir/Madam,

Re: Request for Research Data

I am a Postgraduate student at the University of Nairobi pursuing a Master of Business Administration (MBA) program. My research project topic is “Strategies Used by Kenya Power and Lighting Company Ltd to Reduce Non-technical Electricity Losses”.

In order to carry out the research, you have been selected to form part of those to provide the necessary data. The data will be gathered through personal interview with the undersigned. You are therefore kindly requested to assist by granting an opportunity for the interview at your convenient when contacted for an appointment.

The information you provide will be treated in strict confidence and is purely for academic purpose. In no way will your name appear in the final research report.

A copy of sample question to assist in preparation is attached. Your assistance and cooperation will be highly appreciated.

Yours sincerely,

Student

Peter Waweru Njenga

Supervisor

Dr. John Yabs

APPENDIX II: INTERVIEW GUIDE

The interview will seek to achieve the following objectives

- i) To establish the various strategies used by Kenya Power to reduce non-technical electricity losses.
- ii) To establish the factors that influence non-technical losses in Kenya Power.

Section I: Demographic Information

1. Which Division/Department/Section of Kenya Power do you work in?
2. What is your position (Designation) in Kenya Power?
3. For how long have you worked in that position?

Section II: Causes of Non-technical electricity losses

1. From your work experience, what are the causes of non-technical losses in Kenya Power?
2. What is your comment on whether or not the Kenya Power employees contribute to non-technical electricity losses?

Section III: Factors Contributing to Non-technical Electricity losses

4. What is your comment on the following as factors that contribute to non-technical electricity losses in Kenya Power?
 - i) Poverty
 - ii) Impunity
 - iii) Lack of supply

- iv) High cost of electricity
- v) Business competition
- vi) Integrity of the employees
- vii) IT systems

Section IV: Strategies for reducing Non-technical electricity Losses

5. What can the company do to the following to reduce non-technical electricity losses?

- i) Meter tampering
- ii) Direct Connection
- iii) Neutral and partial by-pass
- iv) Interfering with current and voltage transformers
- v) Falsification of meter readings
- vi) Unmetered new connections
- vii) Meter-reading and billing errors
- viii) Non-payment of bills
- ix) Others (specify)

6. What structures has Kenya Power put in place to control non-technical electricity losses?

7. Is there a deliberate move by Kenya Power to adopt new technology that would minimize non-technical electricity losses? Please give examples.

8. In your own experience, how are the strategies for reducing non-technical electricity losses monitored and evaluated?
9. What else do you suggest that Kenya Power should do to reduce non-technical electricity losses and why?

Thank you very much.