

**IMPACT OF OUTSOURCING OPERATIONS AND MAINTENANCE ON
COST OF QUALITY: A CASE STUDY OF MINARA TANZANIA
LIMITED TANZANIA AND ITS SUBCONTRACTORS**

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REQUIREMENTS FOR THE DEGREE OF MASTER OF PROJECT
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CERTIFICATION

The undersigned certifies that he has read and here by recommends for acceptance by The Open University of Tanzania a dissertation entitled; “Impact of Outsourcing Operations and Maintenance in Cost of Quality” in partial fulfillment of the requirements for the award of degree of Masters In Project Management (MPM)

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ABSTRACT

The aim of this study is to explore the if the outsourcing operations and maintenance has the impact in cost of quality whereby it was conducted at Minara Tanzania offices and sites together with its power vendor African Power Machinery and Intelligence Security. The study adopted case study where 78 respondents represent the whole population whereby 32 represent technical team, 20 represent NOC, 6 represent procurement and 20 represent security. Sampling was done randomly using probability sampling technique. Online survey and questionnaire were used to collect data and analyzed by using excel. Data analysis was descriptive whereby graphs and statistical tables were the computation of frequencies and percentages which helps in interpretation and drawing conclusion. The study revealed that outsourcing technical team has a challenges of vendor staff not being trained, poor integrity issues, not qualified for engineering works, have no working tools and they have lack of motivation. Outsourcing NOC has no challenges at all and is very benefit to the organization. Outsourcing procurement has challenges of purchasing poor quality product and not supporting operation teams ties hence affect operation. Outsourcing security has challenges of qualification, training, motivations, and lack of awareness of the equipment's they are taking care of. The recommended that technical team must meet minimum requirements and qualified, must be maintain good integrity and must have several trainings. Procurements must purchase quality spare and support the teams with working tools. Security team must be qualified, trained and given the knowledge of the customer assets and Minara sites must have security guards' shelters. By do doing so recommended, the researcher believes there will be quality deliverables hence reduce operations cost

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ABBREVIATION AND ACRYNONIMS

APM	Africa Power Machinery
CAPEX	Capital Expenditure
CM	Corrective Maintenance
CoQ	Cost of Quality
CV	Corrective Maintenance
DG	Diesel Generator
IBM	International Business Machines
IT	Information Technology
LUKU	Lipa Umeme Kadri Utumiavyo
MNO	Managing Network Operator
NOC	Network Operation Center
OPEX	Operation Expenditure
OSS	Operational Supporting System
PM	Preventive Maintenance
RMS	Remote Monitoring Systems
SLA	Service Level Agreement
TANESCO	Tanzania Electric Supply Company
TOAD	Tanzania Operations Access Database
UK	United Kingdom
US	United States

CHAPTER 1

INTRODUCTION

1.0 Overview

Twin, A. (2023) argued that Outsourcing is the business practice whereby a company hires a third-party outside the company to create goods or perform activities that were previously performed by in-house company owned employees.

1.1 Background of the Study

The study conducted by Osagie, O. E., Emeka, O. F., & Beatrice, E. (2023) about two UK and USA giant jet companies Boeing (U.S.A) and Airbus (U.K) in 1993 shows that Boeing decided to outsource some components from China to reduce operation cost to reduce cost but without disclosing their technology to avoid competitors

As argued by Vizdómine Martorell, M. (2023), KODAK outsource IT business to IBM in 1988 to concentrate in core business of hardware and reduce operational cost

Jack Ma , the founder of Alibaba outsource IT activities from China to United States to seek more coding technology which were not available in China at that time as argued by Schmuck, R., & Benke, M. (2020).

According to Bii, E. C., & Namsonge, M. (2021), outsourcing water service revenue collection and service delivery in Kericho was having a very high efficiency of revenue collection and quality service more than it was before as public service entity.

As argued by Mgonja, M. G., & Poncian, J. (2019), outsourcing parking revenue collection from the Iringa council to private vendor was more efficiency than when collected by council itself

1.2 Problem Statement

Clients are incurring a lot of cost to pay outsourced vendors for products or services they offer on expectation that the vendor will do the quality work as agreed in the contract with a reasonable cost. This is the main motive which pushes the researcher to investigate if the vendors do maintain the integrity on cost and quality to meet the expectation of the clients

The primary objective of a client to outsource the business is to reduce operation cost, quality of the product or service and gain advanced expertise to expand business in high technological ways. Researcher of is interested to analyze the impact of outsourcing business to vendor with respect to the expectation of the client

1.3 General Objectives

To analyze both negative and positive impacts of outsourcing operations and maintenance to vendors in cost of quality to ensure that the cost consumed is reasonable but does not affect the quality of the product or service

1.4 Specific Objectives

The study intends to cover the following:

- (i) To determine the impact of outsourcing technical resources in cost of quality
- (ii) To determine the impact of outsourcing procurement and supply chain in cost of quality
- (iii) To determine the impact of outsourcing NOC in cost of quality
- (iv) To determine the impact of outsourcing site security in cost of quality

1.5 Significance of the Study

The study is expected to bring impact on controlling cost of operations at the same time maintaining the quality of service or products. The study will analyze how procurement can control the quality of the products they purchase and maintaining their suppliers to control quality at the reasonable cost. This is to ensure that the client or vendor is not incurring cost due poor quality of service or products

The study also is expected to bring an impact on network visibility of client business and provide solution on protection of client assets against vandalism and theft cases which might affect the business continuity by increase a lot of running cost on capex redeployment and opex management

1.6 Limitation Study

The study is conducted to only one operations and maintenance vendor, APM whereby currently Minara Tanzania has two operations and maintenance vendors.

Operations and maintenance in telecommunication includes both active and passive infrastructure but this study will concentrate with passive infrastructure only

Minara Tanzania purchase tower from Airtel in 2022, hence will be of 2022/2023 the time of which Minara Tanzania were owning towers since to get previous data owned by Airtel is complicated

1.7 Organization of Proposal

The study will be conducted at Minara Tanzania Limited Tanzania (client) offices, Africa Power Machinery (APM) offices and Intelligence Security offices all available in Dar es Salaam.

At the field level, interview questions will be conducted for security guards onsite and survey will be conducted to all field teams and other supporting departments

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Literature review is academic piece of critical evaluation to demonstrate knowledge about a specific academic topic to be reviewed from different journals, books and scholarly articles

2.1 Conceptual Definition

2.1.1 Impact

Ritter, T., & Pedersen, C. L. (2020) did analysis of impact of coronavirus on business models

Impact is anything that has strongly positive or negative outcome once it occurs

2.1.2 Outsourcing

Pankowska, M. (2019) defined outsourcing as the practice of subcontracting service and manufacturing works to external business units.

Outsourcing is the processing of hiring and contracting a register third-party Company or an individual to perform a particular task on behalf of the principal company while aiming at low cost reduction staffs but competence and expertise of the vendor staff

2.1.3 Operations

Kumar, R. (2022) argued that operation is a combination of various activities performed to transform a set of inputs into useful outputs using a transformation process.

Operations are daily activities that are conducted by a company or organization carries including planning, organizing, directing, coordinating and controlling various aspects or production or services such as procurement, manufacturing, distribution and marketing aiming to control quality and manage cost

2.1.4 Maintenance

As defined by Ferreira, C., Silva, A., De Brito, J., Dias, I. S., & Flores-Colen, I. (2021), maintenance is a set of actions taken in order to keep the components at or above pre-specified service level.

Maintenance is the process of preserving the condition of the product or service delivered to endure that it has more lifespan and do immediate fix before or even after failures occur

2.1.5 Cost of Quality

Laukkanen, P. (2021) argued that companies must widen the scope of quality costing to transform from poor quality to good quality aiming to gain full benefit available.

Cost of quality is the total cost that an organization incurred during designing and implementation its project or operation to ensure that the cost should not compromise with the quality.

2.1.6 Technical Team

As argued by Osiurak, F., & Reynaud, E. (2020), human beings are learning technical issues faster to transform the acquired technique into new technical solution.

Technical team is the one operates at the particular technology field with a specialization set of skills to create a particular product or service at high quality and standard as per organization expectation

2.1.7 Procurement

Sönnichsen, S. D., & Clement, J. (2020) defined procurement as a process whereby organizations meet their needs for goods, services, works and utilities in a way that achieves value for money without affecting environment.

Procurement is a process whereby an organization acquire goods, services and works to achieve the value of money without affecting the environment after evaluation and selection of the supplier

2.1.8 Network Operations Control Center (NOC)

Bordetsky, A., Glose, C., Mullins, S., & Bourakov, E. (2019) argued that NOC are decision makers who do analyze the situation and take appropriate action when there is irregularities in the network.

Network operation Center is the main monitoring and observation network backbone which is used to analyze network irregularities and makes decision on the appropriate action to take against

2.1.9 Security

Xue, M., Yuan, C., Wu, H., Zhang, Y., & Liu, W. (2020) argued that machine is used in most on today world systems but security threats can lead to serious consequences to machine learning systems

From above cases, security is defined as the state of being free from threats or any kind of danger which might bring effects to the people or environment

2.2 Theoretical Literature Review

Theories are systematic examination set of belief and assumptions to understand the subject better. The information available in theories are just investigations that focus on improving the understanding about the particular subject.

Below clarify some of the theories

2.2.1 Transaction Cost Economics Theory (Williamson 1979, 1986)

This theory is formally enacted by Ronald Coase in 1937 later developed by Williamson (1979, 1986) arguing that during exchanging of vendors there must be a cost associated to this

The study conducted by Qi, X., Chan, J. H., Hu, J., & Li, Y. (2020) shows that transaction cost economics theory can be used as selection entry criteria for foreign market since it reduces cost

The strength of this theory is to determine the cost of switch to vendors and selection decision based on nature of contract and vendor capacity

The weakness of this theory is that it considers business faith especially on previous history without considering their capabilities and business dynamics

The contribution of theory to this study is to make decision on the selection of the vendor with low operation cost but having a quality service. Also it will help to analyze the nature of the contracts against the capability of the vendor to execute such a contract

2.2.2 Core Competencies Theory (C.K Prahalad and Gary Hamel, 1990)

Core competency theory describes that firms must play a big role and concentrates to the areas or functions which are of their higher strength. This suggest that the firms must concentrates to their areas of expertise and by providing their knowledge, skills and technological integration

Findikoglu, N. M., Ranganathan, C., & Watson-Manheim, M. B. (2021) argued that small firms must concentrate on their core competence activities due to their limited resources rather that dealing with multiple activities while they don't have resources of such kind of competence

The strength of this theory to outsourcing is that it helps to select the vendor with higher competence in the particular business need to be outsourced among others.

Weakness of this theory is that to have core competence need much investment of time and capital which increase operation cost to a vendor.

The contribution of the theory to this study is to ensure that selected vendor is competent and is experienced in the particular business before outsourcing

2.3 Empirical Literature Review

2.3.1 Impact of Outsourcing Technical Team in Cost of Quality

As explained in the core competency theory, the vendors must concentrate to their areas of expertise by providing their knowledge, skills and technological integration. This means the vendor must hire resources with higher technical capability to meet the requirement of the customer

Popkova, E. G., & Zmiyak, K. V. (2019) argued that technical competence and leadership help the firms to gain business benefits. Further Ismail, A. A., & Hassan, R. (2019), suggested the importance of technical knowledge trainings to fit with the technological changes and is a key for future industrial revolution need high. Technical capability must understand SLA since has financial implication and loss of customer trust as argued by Suleiman, H., & Basir, O. (2021). Technical team is also responsible for quality inspection and preventions to avoid multiple failures

2.3.2 Impact of Outsourcing Network Operation Center (NOC) in Cost of Quality

As defined by Majidha Fathima, K. M. (2021), Network Operation Center (NOC) is the number one technical support for operations and maintenance troubleshooting and implementation of network change management

Network monitoring and updates

Network monitoring software can keep an eye on network traffic through a particular OSS (Operational Support System) by checking if the if critical network components like switch, routers and servers are down. In Network monitoring mostly NOC are concentrating with power outages. The most used tools in Minara site is Huawei I Manager u2000 described as the best tool

Communications management

Communication management is another core of the NOC operator whereby he/she control all communication from the field to all stakeholders and vice versa. NOC act as the first level point of contact to all operations stakeholders.

Performance Analysis and quality reporting

Chakka, R., Van Do, T., & Pandi, Z. (2022) argued that quality network and reporting has two major entities which are network performance analysis and energy serving control. The reports are managed through remote monitoring systems (RMS) and OSS where the quality of the network report can be observed, analyzed and monitored

Infrastructure and Procedural Changes

Chen, Y., Tang, D., Yao, Y., Zha, M., Wang, X., Liu, X., ... & Zhao, D. (2022) argued that change requests (CR) document problems discovered from specifications and the proposed changes. NOC are the one to set procedures and manage these documents and ensure changes are done accordingly

Threat and Risk Monitoring

As defined by Kembuan, E. D., Batmetan, J. R., Daud, M., & Tarandung, I. R. (2022), intruders can be thieves, vandals or security intruders. Generally, intruder is anyone who interferes into the system without the awareness of those who are managing that system. NOC will receive intruder movement alarm to alert that people have accessed the site so NOC have to check if they have a permit to work at the particular site on that date

Incident response

As argued by von Janda, S., Polthier, A., & Kuester, S. (2021), response behavior if not well managed will result into customer complaints and dissatisfaction. Customer complains behavior will result into business losses. Hence NOC has the responsibility to drive the incidence from start to the end with regular updates.

Site Activities Management

All activities done on cell site usually are managed by NOC by ensuring that all access at the site is known including the activities which the person is conducting. Major cell sites activities which are managed by NOC includes preventive maintenance, corrective maintenance, generator service, installation projects and emergency failures

2.3.3 Impact of Outsourcing Procurement in Cost of Quality

Supplier Selection

Taherdoost, H., & Brard, A. (2019) define supplier selection as the process of which a firm identify, evaluate their financial capability and contracting the supplier aiming to reduce purchase. The biggest challenge of supplier selection of the small firm is lack of capital. Lack of capital especially in small business leads to their business failures.

Contract negotiations

Due to competition in the tendering the procurement vendors sometimes do agree terms to ensure they secure the contract. As argued by Tang, Y., Chen, Y., Hua, Y., & Fu, Y. (2020), conflict of cost in negotiations will result into a risk of losing business to a vendor. To ensure there is no any risk in the negotiation there must be a sense of trust among the partners during contract negotiations

Monitoring supplier performance and inventory levels

Zhang, S., Huang, K., & Yuan, Y. (2021) emphasize the importance of inventory level management to reduce downtime during maintenance. Inventory level management is critical due to the fact that some items needs special attention hence it controls suddenly depletion

Supplier performance

Supplier performance aims to increase compliance and profitability by preventing a risk of cost and schedule overruns due to failures in supplier performance.

Suppliers' perception might affect their relationship with the customers hence affect their performance, so it is very important the supplier to understand the rhythm of their client

Cost control

Cost can be controlled by improving the efficiency of the material use, labor productivity and machinery. Much more, to control cost one must have information and data analysis to do market intelligence global price trends as argued by Bag, S., Dhamija, P., Gupta, S., & Sivarajah, U. (2021).

For this case, to reduce the control procurement cost there must be reliable information about global prizes in other markets, however to reduce transaction cost the information must be transparent

Maintain quality standards

Due to growth in technology most of the vendors uses internet to order or procure product online which is good. Most of the challenge is the quality of the product, reputation and trust. As argued by Qazi, A. A., & Appolloni, A. (2022), to maintain the quality of the product ,high quality materials are also required

Generally, standard is a defined level of quality which is used as a benchmark reference for measuring other qualities.

2.3.4 Impact of Outsourcing Site Security in Cost of Quality

Patrol for Intruders

Patrol is very important in security since their movement are not expected by intruders due to their randomly movements. If the movements of the patrollers will be noticed then it will be easier for intruder to invade the location while monitoring the movement of the patrollers

Despite of high technology systems we have in this world, security guard and patrolling are still crucial to address alerts triggered by technology for them to attend physically and resolve the matter at the site and audit and check client assets regularly Security guards must be equipped to identify internal theft that internal theft is a second huge problem in telecom industry due to that this kind of theft is done by trusted authorized employees.

Prevent Theft and Vandalism`

Jansen, G., Dehouche, Z., & Corrigan, H. (2021) argued that in telecom, vandalism affects most diesel, backup batteries and copper wires. In theft cases usually they took client assets without damage others , but in vandalism destroying client assets might be done or both

2.4 Research Gap

The main aim of outsourcing is to reduce operational cost as well as attaining high quality of the product or service. Despite of this expectation still vendors sometimes fails to deliver the quality expected by the client which is against the expectation of the outsourcing. Also vendors are kin to reduce cost at their end too, hence they compromise with quality to minimize their operation cost

The study aims to investigate the impact of the operational cost control which in turn brings an effect on the quality of the product or service. The study will analyze the contribution of each outsourced entity to the cost of quality

2.5 Conceptual Framework

As argued by Wolf, G. I., & De Groot, M. (2020), conceptual framework is used to guide researcher to merge independent and dependent variables to get the desired result. It is used to provide new approach when formulating ideas. Conceptual framework is used for analysis and comparison as well. Generally, conceptual framework is used to dimension cause and the effect

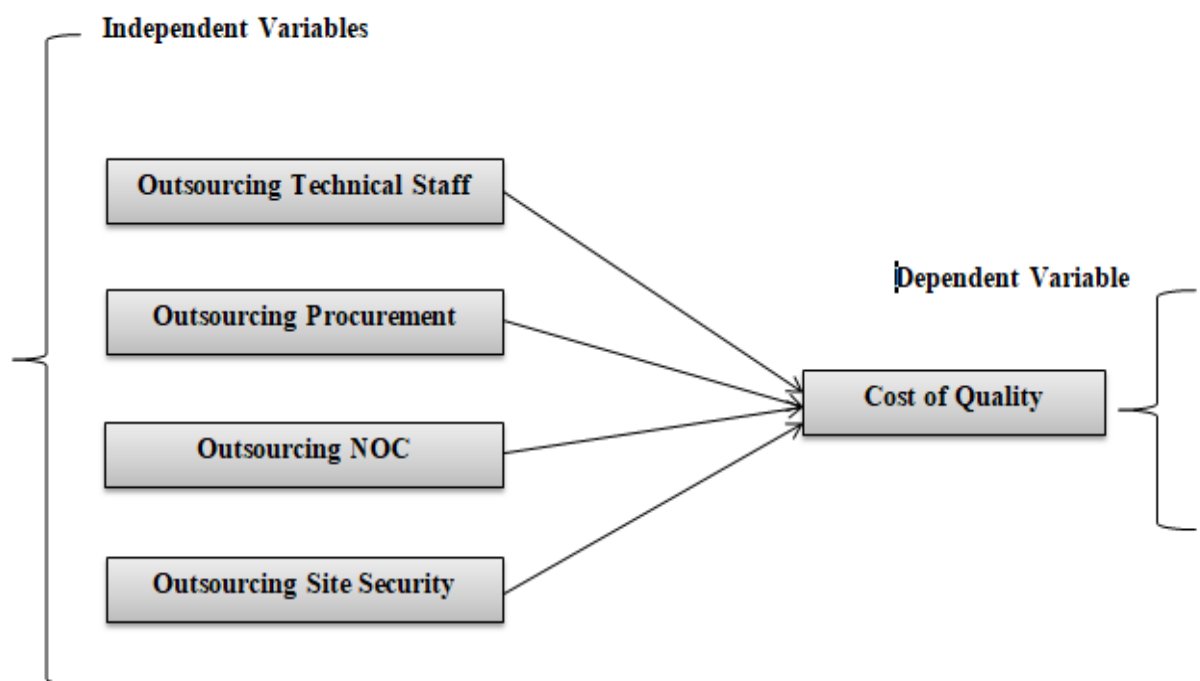


Figure 2.1: Conceptual Framework Diagram

2.5.1 Independent Variables

Rogers, J., & Revesz, A. (2020) define independent variable as the variable of influence. It is expected to bring about variations or changes. In scientific researches these variables are the one which control the experiment

2.5.2 Dependent Variables

Rogers, J., & Revesz, A. (2020) define dependent variable as the one which influenced. It is expected to respond to variations or changes while influenced with. The result of the performance of the vendor will bring the positive or negative impact which depends on the cause.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Overview

3.2 Research Philosophy

Positivism philosophy will be adopted in this study based on scientific belief that scientific knowledge is testable and will require some data collection, data evaluation and analysis to explain and predict hypothesis as argued by Park, Y. S., Konge, L., & Artino, A. R. (2020).

3.3 Research Approach

A deductive research approach is used in quantitative analysis hence will be used since this study is quantitative as it will required bottom-up approach to collect and analyze data for accepting or rejecting hypothesis

3.4 Research Design and Strategy

Bloomfield, J., & Fisher, M. J. (2019) argued that descriptive method in quantitative design aims to measure variables in a systematic measure, analyze and interpret them hence online survey and questionnaire strategies will be adopted.

3.5 Research Population and Study Area

3.5.1 Research Population

Stratton, S. J. (2021) argued that since population is entire group of which a researcher is interested to make conclusion about a particular population. In this research population will include Minara Tanzania Limited (Client)employees and APM employees as operation and maintenance vendor.

3.5.2 Study Area

Study area will include Minara Tanzania Limited offices, African Power Machinery (PM) offices and Intelligence Security offices where data will be collected from the office and field.

3.6 Sampling Design and Procedure

As argued by Stratton, S. J. (2021) it is not possible to collect data in the whole population hence a particular sample must be chosen. Probability sampling technique will be adopted in this study

3.8 Data Collection

Is the process of gathering information from various consulted sources to get detailed information for analysis about a particular phenomenon. Kara, H. (2023) argued that data collection is the pilot of the research and it is the heart of the research

3.8.1 Primary Data Collection

Primary data collection is the process of gathering information from the accurate live source of data. Online survey method will be used and questionnaire will be used in the areas where there is technology incapability. Data will be collected majorly in technical team, network operation center, procurements and security guards and managers from these units

3.8.2 Secondary Data Collection

These are information's which have already been collected previously like government or organization records or data which have been collected by other researchers whereby in this study data from the Minara software called Tanzania Operations Access Database (TOAD) and NOC will be used

3.9 Variable and Measurement

3.9.1 Dependent Variable Measurement

Dependent variables are response variables which to change when independent variable is manipulated. It creates a particular outcome whenever there is a change in independent variable

For the case of this research the independent variable will be cost of quality where any outsourced factor if changed then the cost of quality also change.

3.9.2 Independent Variable Measurement

Independent Variable is the one which when manipulated it brings a particular effect.

For the case of this research, independent variable will include all factors which when manipulated will affect the cost of quality.

3.9.3 Control Variable

Control variables are the one which are not the interest of the subject but it can influence the outcome to change if not well controlled. For the case of this research control variable is motivation.

3.10 Data Processing and Analysis

3.10.1 Data Processing

Data processing is the art of editing, coding, classifying and tabulating the collected data so that they can be used to show the response of the variables.

3.10.2 Data Analysis

Is a the process of evaluating and examining the collected data in details by breaking from the complex large volume of data to simple presentable way

Statistical tools used are excel where frequencies and percentages were used to describe variables. Quantitative data presentation were done in form of tables and graphs

3.11 Descriptive Statistics Analysis

Generally, this is a sample group used to determine the impact in the population. It is used to describe the data set. It aims to describe details about your sample. Kind of statics to be used here are mean, median,mode and standard deviation

3.12 Inferential Statistics Analysis

These are the result of the analysis which affects the whole population. Is used to make prediction about differences in population. In this research regression analysis will be used since it is used to show the changes of the result with respect to show what cause that changes

3.13 Hypothesis Testing

Rejecting or accepting the hypothesis will depend on the probability error about the population.

If no justification required to prove hypothesis, then it is called Null hypothesis (H0), else it is called alternative hypothesis. To prove alternative hypothesis (H1) significant error (α) must be greater than 0.5 to reject hypothesis else if is less or equal to 0.5 then hypothesis will be accepted

In this study, id the frequency percentage will be more than 0.5(50%) hypothesis will be accepted else below that the hypothesis will be rejected

3.14 Model Specification

Model specification is the process of selecting which variable is suitable to be used in the research model based on the data to be collected. It is the decision making of variable inclusion or omission in the research based on the research consideration.

3.15 Test for Omitted Variables

Omitted Variables are the one which once removed affected the shape of the study if there is a relationship between independent variables themselves and both affects dependent variable.

Considering our regression equation

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Whereby;

Y = Cost of Quality (CoQ), X_1 = Technical Expertise, X_2 = NOC, X_3 = Security, X_4 = Procurement

X_5 = Quality of Service, ϵ = probability error, β_0 = Constant

There is relationship between technical team and NOC in operations

So $X_1 = \alpha X_2$, the whole equation will be affected if you remove X_2 or X_1

$$Y = \beta_0 + \beta_1 X_2 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

$Y = \beta_0 + X_2(\beta_1 + \beta_2) + \beta_3 X_3 + \beta_4 X_4 + \epsilon$, hence X_1 will be displaced

3.16 Validity of Measurements

3.16.1 Construct Validity

This refers to the extent at which the research methodologies intend to measure what is required to be investigated as claimed in the research document.

3.16.2 Internal Validity

In this study the researcher is aiming to show the causal relationship between variables and justify why there is a relationship between them hence to prove the truth between the observed results within a population.

3.16.3 External Validity

External Validity is the measure of the sample result to determine if the result of the examined sample generalized to represents the population.

The study aim to collect a particular sample from s population and make a conclusion of the data obtained from that sample to draw the conclusion about the population

3.17 Reliability of Measurements

3.17.1 Research Bias

Researcher will ensure participant's confidentiality is maintained and no question will be held publicly to avoid participant bias due to fear of people or leaders which can result a respondent to produce false answers

For the same a researcher will ensure there is no researcher bias by avoiding recording the response of his interest rather he will record all the answers from the responded to avoid to trigger the outcome he want and not the outcome of the

3.17.2 Research Errors

Researcher will ensure all the respondents will have the same environment and similar time and duration to respond to questions on survey to avoid participant errors

To ensure there is no researcher error, the researcher will ensure the evaluation will include few participants at a time to avoid a researcher to alter participant interpretation due to fatigue or other factors which might alter researcher interpretation

3.18 Ethical Consideration

3.18.1 Confidentiality

Researcher will ensure the privacy and confidentiality of the respondents are well maintained since the opinions are supposed to be free without any fear to be exposed. The researcher is responsible to maintain individual respondent's privacy and all the documents from offices will be used for this study only without exposing anywhere

3.18.2 Plagiarism

The research is not intending to copy full study from another researcher or copying a particular part without acknowledging a researcher. All the copied articles will be accompanied by acknowledgement of the researcher owning that study. There will be no copying in this study

CHAPTER 4

DATA ANALYSIS AND FINDINGS

4.1 Overview

4.2 Demographic Characteristics of Respondents

In this the researcher will use professional demographic characteristics to determine the characteristics of the respondents as argued by Alves, R., Lopes, T., & Precioso, J. (2021)

4.2.1 Demographic characteristics of the technical team

In this study 48 respondents from technical team were given 30 questions whereby 67% of the respondents were field technician, 23% field supervisors of both client and vendor and 10% operation managers of both client and vendor

Table 4.1: Demographic characteristics of the technical team

Characteristics of Respondents	Group	Validity	Frequency(N)	Validity [%]
Technical Team	Client	Operations Manager	3	6%
		Field Supervisors	7	15%
	Vendor	Operations Manager	2	4%
		Field Supervisors	4	8%
		Field Technician	32	67%
	TOTAL			48

Source: Field Data (2023)

4.2.2 Demographic characteristics of the NOC respondents

20 NOC respondents from both client and vendor were contacted given 19 questions where 35% of the respondents were NOC supervisors, 40% of the respondents were NOC operators, 10% of the respondents were NOC managers, 5% of the respondents were NOC analyst and 10% of the respondents were NOC energy and efficient

Table 4.2: Demographic characteristics of the NOC

Characteristics of Respondents	Group	Validity	Frequency(N)	Validity [%]
NOC	Client	NOC Manager	1	5%
		NOC Supervisor	6	30%
	Vendor	NOC Manager	1	5%
		NOC Supervisor	1	5%
		NOC-Operators	8	40%
		NOC-Energy & Utility	2	10%
		NOC Analyst	1	5%
	TOTAL		20	100%

Source: Field Data (2023)

4.2.3 Demographic characteristics of procurement

6 respondents from procurement were contacted and given 18 questions where 34% of the respondents were procurement managers, 34% of the respondents were procurement assistants and 33% were procurement spare support

Table 4.3: Demographic characteristics of the procurement

Characteristics of Respondents	Group	Validity	Frequency(N)	Validity [%]
Procurement	Client	Procurement Assistant	1	17%
		Procurement Manager	1	17%
	Vendor	Procurement Manager	1	17%
		Procurement Assistant	1	17%
		Spare Support	2	33%
	TOTAL			6

Source: Field Data (2023)

4.2.4 Demographic characteristics of security

35 security respondents were contacted and given 10 questions where 86% of the respondents were security guards, 11% of the respondents were security supervisors and 3% of the respondents were security manager

Table 4.4: Demographic characteristics of the security

Characteristics of Respondents	Group	Validity	Frequency(N)	Validity [%]
Security	Vendor	Security Guards	30	86%
		Security Supervisors	4	11%
		Security Manager	1	3%
		TOTAL	35	100%

Source: Field Data (2023)

4.3 Descriptive Statistics Analysis

4.3.1 Impact of Outsourcing Technical Team in Cost of Quality

4.3.1.1 Impact of Education and Qualification on cost of quality

Minimum entry requirement for Field technician is diploma or degree in electrical or mechanical engineering. Also a candidate must be a certified by Engineering Registration Board(ERB) or Energy and Water Utilities Regulatory Authority(EWURA)

Table 4.5: Education of the Respondents

Education	Category	Frequency	Percentage
What is your highest education level?	Certificate of Vocational Training	20	62.50%
	Certificate of Primary School	1	3.13%
	Certificate of Secondary School	0	0.00%
	College Diploma	8	25.00%
	University Degree	3	9.38%
TOTAL		32	100.00%

Source: Field Data (2023)

Despite of having education, still the respondents have qualified to do the electrical and telecommunication works. Electrical works must be authorized by EWURA or ERB whereby the technical personnel must have a license from these authorities Result of highest education level from the collected data shows that 20(62.5%) of the respondents have vocational training certificate, 8(25.0%) of the respondents have diploma,3(9.38%) of the respondents have bachelor degree and 1(3.13%) of the respondents have primary education.

Result of the qualification data collected shows that 78.13% of the respondents have taken electrical or mechanical studies. Further result shows that 31.25% are EWURA/ERB registered

Table 4.6: Qualification of the Respondents

Response		Yes		No	
Qualification	Category	Frequency	Percentage	Frequency	Percentage
Did you take electrical or mechanical studies?	Electrical/ Mechanics	25	78.13%	7	21.88%
Have you certified by EWURA or ERB to do electrical/mechanical works?	ERB/EWURA	10	31.25%	22	68.75%

Source: Field Data (2023)

4.3.1.2 Impact of Integrity on cost of quality

Sense of honesty(integrity) is important aspect to ensure that client assets are secured and there is sense of belief between vendor and client

Result of integrity collected data shows that 28(87.50%) of the filed respondents there are various fuel theft cases done by themselves, 30(93.75%) of the field respondents admits field technicians destroy site data logs to steal fuel, 29(90.63%) admits there is a tendency of delivering less fuel and take the remain amount, 26(81.25%) admit field technicians are not doing service taking the oil for their own interest and 1(3.13%)

confirmed he has no idea about any integrity issue which normally done by field technician

Table 4.7: Integrity of the Respondents

Response	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Which is the most common fuel theft case on site?	28	87.50%	4	12.50%
Are you aware some unfaithful Field Technicians destroy site data like data logs intentionally for stealing?	30	93.75%	2	6.25%
Are you aware some unfaithful Field technicians intentionally under delivered fuel?	29	90.63%	3	9.38%
Are you aware some technicians are skipping generator service due to their own interest	26	81.25%	6	18.75%

Source: Field Data (2023)

4.3.1.3 Impact of Working Tools on cost of quality

Working tools is very important to ensure field teams are capable to deliver their task in easy way hence meet the expected required quality. To attain the quality working tools are more important and technical team should be equipped with.

Data collected from the technical team shows that 24(75.00%) of the respondents were not provided with important spare, 23(71.88%) of the respondents are not getting

immediate support once the spare fail onsite, 17(53.13%) of the respondents are not having reliable operational vehicles, 18(56.25%) are not getting support once the vehicle fails and 20(62.50%) are not having reliable toolbox

Table 4.8: Working Tools Response

Response	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Are you provided with all important spares?	8	25.00%	24	75.00%
Are you getting immediate support once you don't have spare?	9	28.13%	23	71.88%
Do you have a reliable operation vehicle?	15	46.88%	17	53.13%
In case your vehicle fail, are you getting immediate support to restored ?	14	43.75%	18	56.25%
Do you have a reliable toolbox ?	12	37.50%	20	62.50%

Source: Field Data (2023)

4.3.1.4 Impact of Motivations and Training on cost of quality

Motivation is important control variable which has impact on quality since it affect working moral of the employees. The researcher is intending to innestigate the Training

expand the knowledge of the employees increase the confidence level to match with the technological changes

Data collected from the respondents shows that 29(90.62%) of the technical respondents have not got any training , 30(93.75%) of the technical respondents have not got any recognition or awards 32(100%) of the respondents selects various behavior which affects their working motivation , 30(93.75%) of the respondents confirmed they have never given any annual leave despite of working more than two years and 30(93.75%) of the respondents are working without another team member to support him in case of sickness or fatigue

Table 4.9: Training and Motivation of the respondents

Response	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Have you got any recently training from your company?	3	9.38%	29	90.62%
Have you got any recognition or awards from your company?	2	6.25%	30	93.75%
Below are some behavior which affect motivations, select the one you been affected with mostly	32	100.00%	0	0.00%
Have you ever got an annual leave since working with this company?	2	6.25%	30	93.75%
Are you working without another team member?	30	93.75%	2	6.25%

Source: Field Data (2023)

4.3.1.5 Impact of quality management on cost of quality

Quality management is a critical responsibility is the technical team to ensure that there is no losses due to defects or any liquidated damages. Technical team must be supported in terms of service consumables, standard spares for emergency failures resolution, materials and tools for corrective maintenance

Researcher is interested to dimension if the technical team is supported enough to deliver the quality work and are satisfied by the quality of the work they do deliver

Data collected from technical respondents shows that 8(25%) of the respondents admitted to be given enough consumables to do quality service where 16(50%) of the respondents they admit not to be given enough consumables for service and 8(25%) of the respondents they are at uncertainty.

Furthermore, data collected shows that 22(68.75%) of the respondents are not satisfied with quality of the generator service and only 10(31.25%) are satisfied with service. Regarding corrective maintenance(CM), 13(40.63%) of the respondents are satisfied with the quality of corrective maintenance while 19(59.38%) of the respondents are not satisfied with the quality of corrective maintenance. On preventive maintenance quality, 19(59.38%) of the respondents are satisfied with the quality of the preventive maintenance while 13(40.63%) of the respondents are not satisfied with the quality of the preventive maintenance. On emergency failures resolution, 18(56.25%) of the respondents are satisfied with the quality of the emergency resolution while 10(31.25%) are not satisfied with the quality of emergency resolution and 4(12.50%) are in uncertainty. On the quality of the spare replacement,

19(59.38%) of the respondents are satisfied with the quality of the spares replaced, 11(34.38%) of the respondents are not satisfied with the quality of the spare replaced and 2(6.25%) of the respondents are in uncertainty. Data collected regarding quality of repairs shows that 11(34.38%) of the respondents are satisfied with the quality of repair works, 16(50.00%) of the respondents are not satisfied with the quality of the repair works and 5(15.63%) of the respondents are in uncertainty. On janitorial cleaning quality, 20(62.25%) of the respondents are satisfied with the quality of the janitorial cleanliness while 10(31.25%) of the respondents are not satisfied with janitorial cleanliness and 2(6.25%) of the respondents are in uncertainty

Table 4.10: Quality management of the respondents

Response	Yes		No		Sometimes	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Are you given enough consumables always to attain quality service?	8	25.00%	16	50.00%	8	25.00%
Are you satisfied with the quality of generator service ?	10	31.25%	22	68.75%	0	0.00%
Are you satisfied with the quality of Corrective Maintenance	13	40.63%	19	59.38%	0	0.00%

(CM) on site ?						
Are you aware doing quality Preventive Maintenance (PM)?	19	59.38%	13	40.63%	0	0.00%
Are you satisfied with emergency failures management and resolutions?	18	56.25%	10	31.25%	4	12.50%
Are you satisfied with the quality of spare replaced onsite?	19	59.38%	11	34.38%	2	6.25%
Are you satisfied with the quality of repairs done onsite?	11	34.38%	16	50.00%	5	15.63%
Are you supported to ensure janitorial is cleaned to meet the quality required?	20	62.50%	10	31.25%	2	6.25%

Source: Field Data(2023)

4.3.1.6 Impact of SLA on cost of quality

Service Level Agreement(SLA) is the legal document within a contract that shows commitment between the vendor and the client. SLA defines penalties and rewards between the client and vendor if the agreed contractual commitment has not met. The researcher is interested to investigate the SLA awareness of the technical team since they drive almost all the penalties in operations and maintenance contract

Data collected from technical respondents shows that 30(93.75%) of the respondents they are not aware about operations and maintenance SLA while only 2(6.25%) of the respondents are aware about the operations SLA. 29(90.63%) of the respondents are not aware about any SLA awards that the company is gaining after good performance and only 3(9.38%) of the respondents are aware of the SLA awards. 28(87.50%) of the respondents are not aware of any SLA penalties which affect company revenue while only 4(12.5%) of the respondents are aware of those penalties. 26(81.25%) of the respondents are not aware about any replacement SLA while only 6(18.75%) of the respondents are aware of the replacement SLA

Table 4.11: SLA awareness of the Respondents

Response	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Are you aware of operations SLA between your organization and client	2	6.25%	30	93.75%
Are you aware about SLA awards?	8	25.00%	24	75.00%
Are you aware about SLA penalties?	4	12.50%	28	87.50%
Are you aware about replacement SLA?	6	18.75%	26	81.25%

Source: Field Data (2023)

4.3.2 Impact of Outsourcing NOC in Cost of Quality

4.3.2.1 Impact of NOC on threat and risk monitoring

Quality is attained if there is a life assurance and NOC is responsible to ensure that before dispatching field team to site there is no threat to life of the particular person and others surrounding him. Those risk if not well monitored can lead to loss of people's life , company to be burned from activities due to safety issues and severe damage of the client or vendor assets.The researcher is interested to know if NOC are aware of such risks and how they control to avoid cost to life and assets

Data collected from NOC respondents shows that 13(65.00%) of the respondents disagree that it is it is allowed to attend island sites during night due to risk associated

in the night while 2(10.00%) agreed that it is allowed to attend island sites during night and 5(25.00%) are in uncertainty. On the same note 14(70.00%) of the respondents disagree that technical team is allowed to attend national park sites during night due to risk while 3(15.00%) agreed that it is allowed technical team to attend national park sites during night and 3(15.00%) are in uncertainty. On emergency escalation NOC respondents agreed by 13(65.00%) that expected time to arrive(ETA) during night and day will be different due to safety reasons while 6(30.00%) disagreed with that idea meaning ETA must be the same and 1(5.00%) of the respondents were in uncertainty. To access the site NOC need to give field team reference once on site but 11(55.00%) of NOC respondents admitted that security guard accessed site without any reference while 5(25.00%) disagree that sites are not accessed by security guards and 4(20.00%) were in uncertainty

Table 4.12: NOC Threat and Risk Monitoring

Respondents	Agree		Disagree		Sometimes	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Threat and Risk Monitoring						
It is allowed Field Technician to attend Island sites during night since there is no any risk associated	2	10.00%	13	65.00%	5	25.00%
Have you ever	3	15.00%	14	70.00%	3	15.00%

instruct FE to attend sites with access restrictions like National Parks during Night ?						
When escalating emergence failure to failure engineer, ETA at night and daytime will be different	13	65.00%	6	30.00%	1	5.00%
Through monitoring, we have some cases where a site was accessed by security guard for power restoration support	11	55.00%	5	25.00%	4	20.00%

Source: Field Data (2023)

4.3.2.2 Impact of NOC on network monitoring and updates

Monitoring power alarms is important since reduces liquidated damages due to power outages, synchronizing the decisions to update clients and concentrating on monitoring depending on the season of the year.

Network monitoring is very important since the revenue of the MNOs depends on the stability of the network which means there should be no failures else very minimum failures should be counted. NOC have the responsibility to ensure network monitoring, updates and analysis is done is daily basis, weekly and monthly.

The reseacher is intended to investigate the necessity of NOC monitoring and updates in daily basis if has the impact in cost and quality

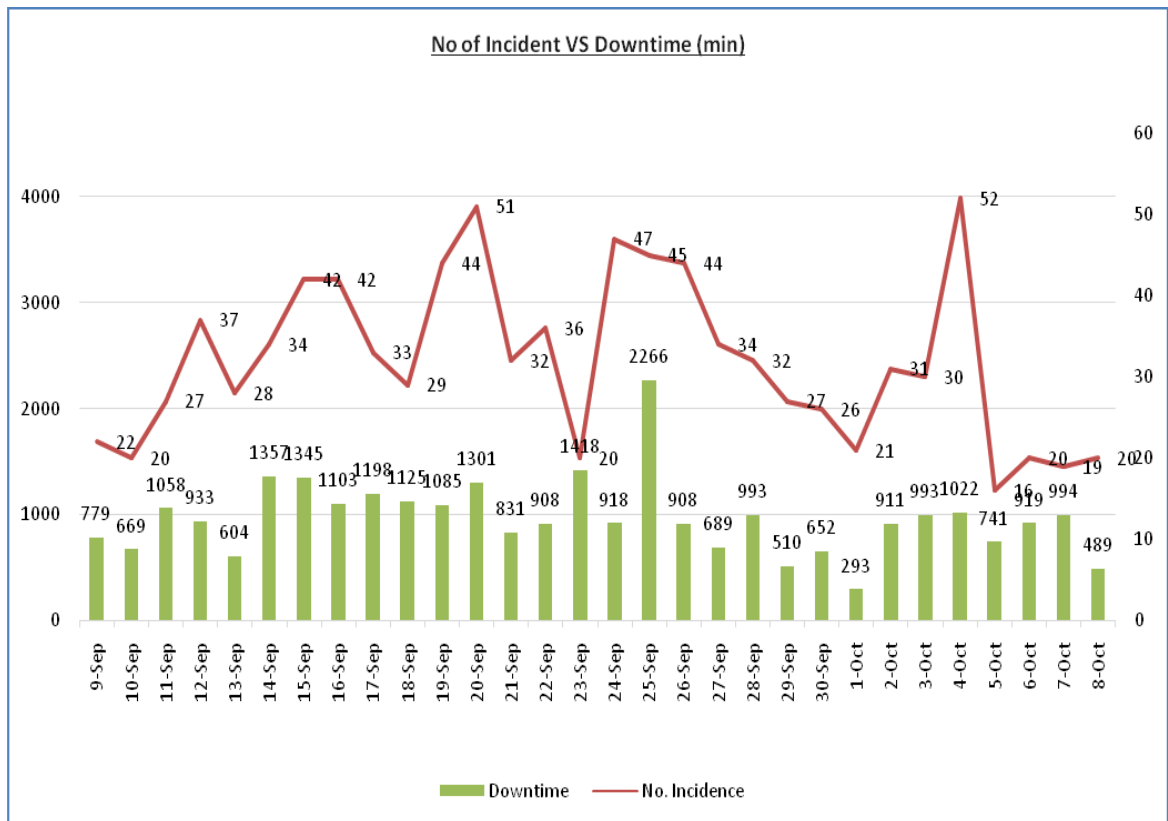


Figure 4.1: Monthly Network Analysis

Source: Minara TOAD (2023)

Data collected showed that 13(65.00%) agreed that during night shift if NOC can miss to escalate power alarm which might result into liquidated damage while 6(30.00%) disagreed that during night shift NOC might not miss alarms hence cannot cause

liquidated damages and 1(5.00%) remain in uncertainty. On the same note NOC respondents agreed by 10(50.00%) that it is easy to miss alarm during night due to fatigue and sleepy. Decision making on customer escalation is essential to involve managers where 20(100.00%) of the NOC respondents agreed that during night some managers in the escalation matrix are not responding to these decision calls which affect the decision making to client updates. 10(50.00%) of the NOC respondents agreed that it is not customer must be updated regularly in case of network failure and it is not a disturbance while 8(40.00%) disagreed that it is disturbance to update client regularly if the issue is not resolved and 2(10.00%) of the respondents remained in uncertainty

Table 4.13: NOC Network Monitoring and Updates

Respondents	Agree		Disagree		Sometimes	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Network Monitoring and Updates						
It happens NOC missed alarms in the OSS especially during night which can result into liquidated damage	13	65.00%	6	30.00%	1	5.00%
Sometimes during night shift , some people in the escalation Matrix are not	20	100.00%	0	0.00%	0	0.00%

responding to calls which affect updates to client						
Due to sleepy and fatigue , it is easy to miss power alarm in the monitoring system	10	50.00%	8	40.00%	2	10.00%
Failures of managers in the escalation matrix to respond to call from NOC affects decision making during updates to customers	20	100.00%	0	0.00%	0	0.00%
It is not disturbance to update customer frequently while failure has not been resolved	10	50.00%	6	30.00%	4	20.00%
Monitoring Network during rain season is more complicated than in dry season	12	60.00%	5	25.00%	3	15.00%

Source: Field Data (2023)

4.3.2.3 Impact of NOC on site activity control

NOC controls all the activities which are to take place at that which has financial impact to both client and vendor. Site activities is the one which needs to have quality to avoid any damage to client assets and also is a revenue to the vendor doing those activities

Data collected from NOC respondents showed that 20(100.00%) of them disagreed that sites cannot be accessed by anybody, that means must be an authorized person only. Furthermore 20(100.00%) agreed that to access the site NOC must assign the mission to the person accessing the site. While a person is working at the site NOC is responsible to take control of those activities where 20(100.00%) of the respondents agreed that if there will be any person working and there is an alarm then NOC must inform the same person just for awareness. To show further power control, 20(100.00%) of the NOC respondents agreed that after completion of the activity the person should not leave the site until NOC is informed and confirmed there is no power alarm then it is where the permission to log out will be released

Table 4.14: NOC activity control

Respondents	Agree		Disagree		Sometimes	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Minara sites can be accessed with anybody	0	0.00%	20	100%	0	0.00%
To access a site there must be	20	100%	0	0.00%	0	0.00%

an assigned activity/mission						
When someone is working on site and power alarm pop, no need for NOC to inform the one onsite since there is a log in report	0	0.00%	20	100%	0	0.00%
After finishing an activity you can leave the site without informing NOC	0	0.00%	20	100%	0	0.00%

Source: Field Data (2023)

4.3.2.4 Impact of NOC on infrastructural change request

Infrastructure change request must be managed by NOC to ensure that to maintain cost and quality it is done by qualified and authorized person, managing power outage duration as per agreed time, avoiding risk of financial loss and managing risk of sites with access restrictions during infrastructural changes

Data collected from the respondents showed that 12(60.00%) of the respondents agreed that change request can be requested anytime while 5(25.00%) of the respondents disagreed that it should not requested anytime and 3(15.00%) remained in uncertainty. Furthermore 15(75.00%) of the respondents agreed that downtime depends on the nature of the work while 5(25.00%) of the respondents disagreed that it is not depending on the nature of the work. 13(65.00%) of the respondents agreed that change request(CR) is proposed by client and 7(35.00%) agreed that its should be proposed by field team. 16(80.00%) of the respondents agreed that change request must be done at night to avoid huge financial losses due to large number of users at night compared to daytime while 4(20.00%) of the respondents disagreed. 20(100.00%) of the respondents agreed that change request for the restricted areas must be done in the daytime to avoid risk at night due to the nature of those areas being threat to human life and assets

Table 4.15: NOC change request

Respondents	Agree		Disagree		Sometimes	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Change request can be requested anytime	12	60.00%	5	25.00%	3	15.00%
Approved downtime depends on nature of work	15	75.00%	5	25.00%	0	0.00%
CR downtime is usually proposed by	13	65.00%	7	35.00%	0	0.00%
There is high risk	4	20.00%	16	80.00%	0	0.00%

of financial loss to approve CR downtime at midnight rather than approve in the daytime						
CR for sites with access restrictions(Islands, hijacking areas, national parks etc) must be issued at the daytime for security reasons	20	100.00%	0	0.00%	0	0.00%

Source: Field Data (2023)

4.3.3 Impact of Outsourcing Procurement in Cost of Quality

4.3.3.1 Impact of outsourcing procurement on supplier selection

Supplier selection is one of the important aspect to control quality since the supplier must be have financial capability to ensure that operations is not affected due to financial crisis. Futhermore the selected supplier must be authorized by government authorities or boards to prove the competency of the supplier to carry those task

The researcher is in this study is interered to find if the vendors have qualified suppliers which are confident to run the business

From the collected data, 6(100%) of the respondents admitted that suppliers are qualified and registered to do procurement business. Furthermore 6(100%) of the procurement respondents admitted that they do evaluate the vendor by verifying their financial statement to prove that they are capable to run the business

Table 4.16: Procurement supplier selection

Response		Selection	
Supplier Selection	Category	Frequency	Percentage
How do you select your vendor?	Qualified Registered Vendor	6	100.00%
	Any Vendor	0	0.00%
	Anyone Interested to Supply	0	0.00%
How do you evaluate vendor capacity?	Through History	0	0.00%
	Verify financial statement	6	100.00%
	Depend on how they express themselves	0	0.00%

Source: Field Data (2023)

4.3.3.2 Impact of outsourcing procurement on contract negotiations

Contract negotiation is important to ensure the vendor meets the requirements of the contract, to check the mutual benefit of both counterparties, checking risk and liabilities and weighing requirements of different procurement vendors if it is cost effectively while maintaining quality

The researcher is interested to investigate if contract negotiations will result into cost reduction

Data collected from procurement respondents shows that 6(100%) of the procurement respondents agreed that it is important to assess vendor services if meets contract

requirements. 6(100%) of the procurement respondents agreed that contract negotiations is necessary to check the mutual benefit between the vendor and the client. 6(100%) of the procurement respondents agreed that contract negotiation must mitigate risk and liabilities of both parties within the contract. 5(83.33%) of the respondents agreed that it is important to have more than one vendor in contract negotiation which makes easy to weigh the cost and requirements of each vendor

Table 4.17: Procurement contract negotiations

Response	Agree		Disagree	
	Frequency	Percentage	Frequency	Percentage
Before negotiating contract, the assessment of vendor services to meet contract requirement must be done	6	100.00%	0	0.00%
Is it necessary to mutual benefit between vendor and client while negotiating contract?	6	100.00%	0	0.00%
In contract negotiation , risk and liabilities must be outlined	6	100.00%	0	0.00%
Is it important to negotiate contract with more than one vendor ?	5	83.33%	1	16.67%

Source: Field Data (2023)

4.3.3.3 Impact of outsourcing procurement on cost control

Cost control is the aspect of any organization. The aim of the researcher is to investigate procurement cost control and cost saving by forecasting inventory levels, streamline processes, supplier development programs, discounts and having more than one supplier

Data collected from procurement respondents shows that 4(66.67%) of the procurement respondents agreed that forecasting on controlling inventory level reduce cost while 2(33.33%) disagree with that idea. 4(66.67%) of the procurement respondents agreed that streamlining procurement processes will reduce cost as well while 2(33.33%) are against that idea. 5(83.33%) of the procurement respondents agreed that supplier development programs will help to control cost while 1(16.67%) disagree with that idea. 3(50%) of the procurement respondents agreed that discount from the supplier is one of the cost control initiatives while 3(50%) they dont agree with the idea of discounts. 3(50%) of the procurement respondents believed that trust is a key parameter to control cost while 3(50%) of the procurement respondents they dont agree with the idea of trust. 4(66.67%) of the procurement respondents agreed that having many suppliers will help to reduce cost while 2(33.33%) disagree with the idea of having many suppliers

Table 4.18: Procurement cost control

Response	Agree		Disagree	
	Frequency	Percentage	Frequency	Percentage
Forecasting demand controls inventory level hence control cost inflation	4	66.67%	2	33.33%
Streamlining procurement process is one of the initiative of cost saving	4	66.67%	2	33.33%
Supplier development programs is important in cost control	5	83.33%	1	16.67%
Discounts from supplier is one of the initiatives of cost control	3	50.00%	3	50.00%
In cost control , trust between vendor and supplier is one of the key parameters	3	50.00%	3	60.00%
Using more than one supplier can reduce cost	4	66.67%	2	33.33%

Source: Field Data (2023)

4.3.3.4 Impact of outsourcing procurement on quality control

Procurement quality control is key for all materials purchased and supplied to different regions for installations. All activities which needs repair works, dealing with scraps and replacements to have quality so that it can last for long time within and out of warranty time if possible but not below warranty time.

Researcher is interested to investigate supplier compliance, defect rate, manufacturer warranty card and the quality of the working tools since this department is responsible with the quality of the technical/field teams due to tools and spares they purchased

Data collected from procurement respondents shows that 5(83.33%) of the procurement respondents agreed that supplier compliance is a must to control quality while 1(16.67%) disagree with compliance as a key to quality control. 6(100%) of the procurement respondents agreed that defect rate determine the quality of the purchased products if is good or not. 6(100%) of the procurement respondents agreed that every product must have manufacturer warranty card to determine the lifetime of the product. 3(50%) of the procurement respondents agreed that operation teams they don't have reliable vehicles, 1(16.67%) of the respondents agreed they have a reliable vehicle and 2(33.33%) of the respondents they are in uncertainty. On the quality of the toolbox purchased by procurement as working tool, 4(66.67%) of the procurement respondents agreed that they have not supplied quality toolbox to the field teams, 1(16.67%) of the respondents agreed they have supplied quality toolbox and 1(16.67%) of the respondents are in uncertainty. 6(100%) of the procurement respondents agreed that they have supplied enough consumables to the field teams

Table 4.19: Procurement quality control

Response	Agree		Disagree		Sometimes	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Supplier compliance is not important in quality control	1	16.67%	5	83.33%	0	0.00%
Defect rate determine the quality of the purchased product	6	100.00%	0	0.00%	0	0.00%
Quality product must be accompanied with manufacturer warranty card	6	100.00%	0	0.00%	0	0.00%
Are your operation teams having quality and reliable vehicles ?	1	16.67%	3	50.00%	2	33.33%
Have you supplied your team with quality and	1	16.67%	4	66.67%	1	16.67%

reliable toolbox						
Are you supplied your team with enough service consumables	6	100.00%	0	0.00%	0	0.00%

Source: Field Data (2023)

4.3.4 Impact of Outsourcing Security in Cost of Quality

4.3.4.1 Lack of Client Assets Knowledge in Cost of Quality

Security guards must be aware on the client assets by quantity and if is within their capability they must know the assets by names so that they can be aware in case anything missing

Data collected from the security respondents showed that 18(90.00%) of the security respondents guards are not aware of the names and quantity of the client assets and 2(10.00%) were aware of the client assents in the site as per table shown below

4.3.4.2 Impact of Security Guards Qualification in Cost of Quality

According to government guidelines, security guards must at least pass militiamen training to other country security levels like police, Jeshi la Kujenga Taifa(JKT) and Jeshi la Wananchi wa Tanzania(JWTZ)

Data collected from security guards respondents showed that 17(85.00%) of the respondents have never attended any security course to qualify to be security guards.

4.3.4.3 Impact of Security Guards Training in Cost of Quality

Security technologies and defensive techniques are changing regularly hence it is important to train security guards to improve their defensive skills and to match with the technological changes

Data collected from the security respondents showed that 16(80.00%) of the respondents have never got any training and only 4(20.00%) have got defensive training techniques

4.3.4.4 Impact of Security guards motivations in cost of quality

Motivation is important to ensure security guards feel comfortable and being valued by getting their right and not favor as per country guidelines. The researcher is interested to investigate if the security guards are getting their normal rights like annual leaves, toilets and resting huts to cover them during sunny or rain.

Data collected showed that 20(100.00%) of the security respondents have never got annual leave despite of 17(85.00%) of them to agree that they have more than one year. Furthermore 18(90.00%) of the security respondents agreed that they have neither security resting hut nor toilets which force them to go out of station to find for these services

4.2.4.5 Impact of Security Guard to operate site equipment's in cost of quality

Security guards and other non-authorized people are not supposed to enter cell sites and touch anything without the presence of the qualified engineer

Data collected from the security respondents showed that 13(65.00%) of the security respondents admitted they have already got into site under the instruction of the site

engineer to start generator resolve such issues while on call with field engineer while 7(35.00%) they have not got into site to assist field technician

Table 4.20: Security guards responses

Response	Ndiyo		Hapana	
	Frequency	Percentage	Frequency	Percentage
Unafahamu kwa idadi na majina vitu vyote vilivyopo ndani ya mnara unaolinda ?	2	10.00%	18	90.00%
Umeshawahi kupitia jeshi la mgambo , JKT, polisi au jeshi la kujenga taifa ?	3	15.00%	17	85.00%
Umeshawahi kupata mafunzo yoyote ya ulinzi ukiwa kazini kuhusu mbinu za kujilinda ?	4	40.00%	16	60.00%
Umeshawahi kupata likizo ya siku 28 kwa mwaka ?	0	0.00%	20	100.00%
Umefanya kazi na kampuni ya Intelligence security zaidi ya mwaka mmoja ?	17	85.00%	3	15.00%
Umewahi kuingia ndani ya mnara kumsaidia fundi kuwasha kuangalia kama kuna shida ?	13	65.00%	7	35.00%
Kuna choo na kibanda cha mlinzi kwenye eneo lako la mnara unaolinda ?	18	90.00%	2	10.00%

Source: Field Data (2023)

Researcher also use the security file records from Minara Tanzania and below was the result of the losses which Minara has incurred during the year 2023 only by selecting

only the items which are most frequently stolen between the sites which has security guards and sites with no security guards

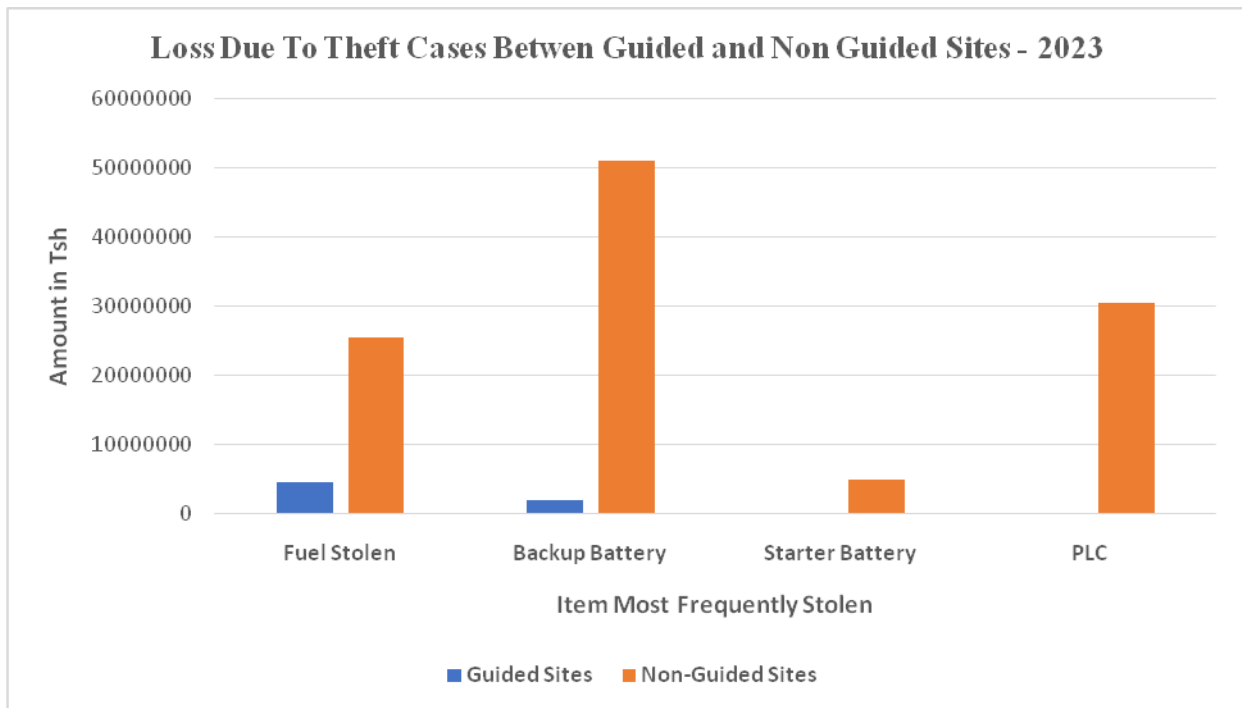


Figure 4.2: Theft cases between guided and non guided site

Source: Minara Database (2023)

CHAPTER 5
DISCUSSION OF THE FINDINGS CONCLUSION AND
RECOMMENDATIONS

5.1 Introduction

In this chapter the researcher presents the summary of the findings from the collected and analyzed data , draw conclusion based on the findings and the recommendation for the future based on the literature review from this study

5.2 Discussion of the findings

The study aims to investigate the impact of outsourcing operations and maintenance on cost of quality as the general question . To answer the question the researcher set four specific objectives namely impact of outsourcing technical team in cost of quality, impact of outsourcing NOC in cost of quality, impact of outsourcing procurement in cost of quality and impact of outsourcing security in cost of quality. These are mainly four units which works directly between vendor and client and usually carries almost the whole running cost of the operations and maintenance

5.2.1 Impact of Outsourcing technical team in cost of quality

Job advertisement by APM as per attached appendix III showed that education minimum entry requirement for the position of the field technician is diploma.

Study showed that 65.63% are not qualified in terms of minimum education entry requirements

The electricity act CAP 131 section 8(3), 45 and 46 clarify that for anyone to do electrical works he/she must have working license from EWURA with minimum of class D as attached in appendix II

Study showed that 68.75% have no electrical licenses which means are disqualified to do electrical works according to the country laws

Lack of competency and qualification to many of the field technicians result into poor quality of work which later results into financial penalties where Minara Tanzania is penalized with managing network operators (MNOs) majorly Vodacom, Tigo and Airtel due to poor network availability

Further the study revealed that field technicians are fully aware of all techniques of stealing fuel by either delivering less amount than expected or deliver then syphon. Likewise, they have admitted sometimes they are not doing service hence collect that engine oil for their own benefit. This increases a huge cost to client due to poor quality of service in terms of engine failures rate and increase operation expenditure due to frequently fuel purchasing.

The study showed that field teams are not supported with working tools which means their ability to resolve issues on time with high quality will be low. Due to this poor quality of working tools will increase the cost by being penalized due to delay of restoring power just in case there is a failure

The study further revealed that field teams have no annual leave and they are supposed to work 24/7 on call and site as well. This will result into severe fatigue and reduce their quality of performance. Reducing their performance will result into poor quality of work which increase the cost to vendor of multiple revisit and penalties from clients in case there are failures

This study showed that even if technical team are committed to deliver still they are not supported in terms of consumable materials, financial support and spares. This affects the quality of work and brings a huge impact on clients machine failures due to lack of service hence increase cost by increasing operation expenditure of buying other engines due to poor handling.

Technical team are the one dealing with implementing SLA in their daily activities, but the study showed that they are not aware of those SLA. Poor knowledge of SLA will result into many penalties since there will be a lot of negligence's whereby if they could have an awareness about SLA some penalties could be avoided

5.2.2 Impact of outsourcing NOC in cost of quality

The study showed NOC is very essential to monitor and control power alarms notification to reduce failures. Despite of fatigue and sleepy but still NOC remain to be important since they have to control network availability 24/7 without a single rest. This increase the quality of network availability hence increase revenue to MNOs and reduce penalties to Minara due to good network availability

The study showed that NOC control the threats and risk to human life by controlling the movement of the field teams to access the sites with high life risk like national parks, islands and excessive poor road access areas by not allowing them to attend during night. On the same role NOC has to defend all the penalties from MNOs for areas with such risk cases that so that Minara company should not be penalized if there was a failure during night

The study shows that NOC plays a huge role in controlling site activities which later reduce the penalties due to failures, limit the site intruders by providing the site access

only for genuine reasons. This helps to increase quality, control intruder theft cases and reduce failures penalties since all activities are monitored from NOC from a person log in until he is out of the site

Study showed that NOC it is important to ensure that all procedure during any equipment changes are adhered and no penalties are uncounted during the activity. NOC provide the proposed time by the client to the activity implementer and makes follow-up to ensure that agreed time is time is managed to avoid penalties from the client

5.2.3 Impact of outsourcing procurement in cost of quality

The study showed that it is important for procurement to select a qualified registered vendor and evaluate the vendors based on verification of financial statement to avoid later business collapse due to financial crisis of the supplier vendor hence increase the cost to find the replacements in hurry to cope with the operations. Finding another supplier in urgency might result into huge cost and poor quality since there will be a poor evaluation time

Likewise, the study showed that it is important before procurement negotiating contract they must analyze if the supplier is dealing with the items that is intended to bid for. This is to ensure the supply is experience with such type of business hence will supply the quality requirements and reduce the cost of warranty failures. The study revealed that it is important for procurement to ensure there is a mutual benefit in procurement contract, risk and liability analysis and should negotiate with many vendors to have many options during vendor selection. Lack of experience supplier might result into poor quality product hence increase the cost

Study reveals that to control cost procurement must forecast demand and control inventory level, create cost saving initiatives, control trust between vendor and supplier and having many suppliers which is easy to choose the best price among the suppliers. Lack of demand forecasting, trust and depending on one supplier will increase the cost once the demand is huge

The study also showed that it is important for procurement to control quality of the purchased products controlling defect rates and warranty cards which will monitor the manufacturer expected failure lifetime of the item. Controlling defect rate and warranty card will reduce the cost since failed items within warranty will be returned to the supplier

The study showed that procurement admitted they have not supplied reliable vehicles and reliable toolbox to the field teams which will affect the quality of their work. In this case procurement is contributing to increase operation cost due to poor quality of the vehicles and working tools

5.2.4 Impact of outsourcing security in cost of quality

The study showed that security guard are not aware about the names and quantity of the items and equipment's inside the site. Lack of quality of this information might result into loss since items can be stolen and security guard cannot be aware.

Study showed that security guards are not qualified as per minimum requirements for someone to be a security guards and they have no training for improving their capabilities.

Study showed that there is a high risk to life for the security guards since they are accessing telecommunication power equipment's and assist field teams to reset in case there is failures while they are fully unqualified to touch these equipment's. This also might cause damage to MNOs and Minara Tanzania as well since they can damage the equipment or cause fire since they are electrical equipment's

Study showed that there is huge difference in theft incidences between the guided sites and non-guided sites. Although all sites can have theft cases, but guided sites have less incidences compared to non-guided sites. The study showed that security guards have neither toilet nor resting huts hence sometimes they might move out of the site find toilets from neighbors. The researcher suspects that this is the point where the guided sites items are stolen either internally or externally

5.3 Conclusion

Most of the field teams are does not meet minimum entry requirements and not allowed to do electrical works as stipulated by the country law. The employer must adhere with the country law by employing staffs who meets atleast minimum requirements and have license to do the electrical works. This will increase the quality of work hence reduce the operation cost by reducing unnecessary failures.

Integrity or sense of honesty is very important to a business to ensure that there is sense of trust between the client and a vendor. It is important that teams must have a very good integrity to ensure that customer is confidence that his assets will be safe and there will be no losses due to theft cases or any kind of subbotage. Vendor must ensure there is a serious consequence to the team having poor integrity issues since it brings loss to a client and damage the reputation of the company

Training is important to ensure the team is equipped with technological changes and give them confidence to solve issues. Vendor must have a training program which must be audited by client to ensure vendor does not skip training to teams. Training involves cost and consume time of the employer hence client must monitor this to ensure vendor is not skipping mandatory training. The researcher believes that training also is a part of motivation hence should be well monitored. The organization must have other ways of motivations to ensure that the staff are working in comfortable environment and sense of being valued.

Management must extend their support to the technical team to ensure they deliver the quality work hence reduce the cost. The mandatory support which affects the quality and increase operational cost includes financial support, materials and spares which if all available it is promising to deliver quality works. Lack of quality supports increase a lot of failures hence increase operational cost

Penalties and rewards service level agreement awareness should be clear to all of the technical teams since they are the one running operation and maintenance business at the ground. Lack of SLA awareness always result into issuing false information to avoid penalties which later cause huge damage to equipments. Generally the quality of work should be very high to ensure there is no penalties since the amount of penalty is less than the cost of the damage which might occur to the equipment's failures resulting from any poor handling

Outsourcing NOC is even more important since there is a huge impact of the monitoring and updates network availability, controls all sites activities and controlling all human threats and risk to life. The study itself showed that NOC is the

center of information to client, vendor and MNOs since all the information regarding network are managed by NOC

Procurement is even more important to since quality of material purchased are the one to determine the quality of the services. The more the quality material is the more the strength of the network since there will be less failures and less the operation cost since due to high quality. Procurement has to ensure that inventory stock level is managed from the suppliers to avoid the surprise of low inventory level hence populate high demand abruptly. Since the aim of outsourcing is cost saving as well then procurements plays a big role to manage quality hence reduce failures and increase profit.

The study showed that most of the stolen sites are the one without security guards although some sites with security guards also stolen. This stress the necessity to deploy the security guards to avoid these theft cases that usually happens. There is no security guards toilets and resting huts to avoid hence sometimes security guards goes out of the site during rains else will go to find toilet from the nearby areas

5.4 Recommendations

It is very important that all vendors to abide with laws by recontruiting the resources that are licennced to do eletrical works as per ERB or EWURA directives to avoid risking life by using unqualified resources and avoid risking the assets of the clients. This has been observed through this study since a large number of employees are doing these works while they have no qualification to do so. Likewise, security staffs must use the qualified staff as per minimum requirements and avoid the tendency of chosing cheap and unqualified staffs.

Clients must ensure that vendors are giving their staffs annual leave since it the requirements of the labor law and it brings comfortable, reduce excessive fatigue and brings the sense of being valued. As well, clients must ensure vendors staff are given mandatory trainings to boost their knowledge level since technology is changing gradually hence the team must be dynamic with changes as well

The use of technology might reduce the cost of the security companies to deploy security guards in each sites. The use of surveillance cameras and alarms are one of the best methods to deploy in Minara sites to reduce cost and increase the quality of safety. This means the security company will deploy cameras to monitor intruders, alarms and security operations control(SOC) who will monitor all the intruder movements and inform the patrol if there is a need of physical intervention

TowerCo companies must think of start using gas generators in future since gas is free from theft cases, free from noise and cheap in terms of cost compared to diesel. Diesel generators does not need consumables like filters so it is cost effective hence more profitable to organization

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APPENDICES

Appendix I: Survey Questions

Part I: Impact of outsourcing Technical Team in cost of quality

Section A: Education & Qualifications

1. What is your highest education level?
 - a) Primary
 - b) Secondary
 - c) VETA
 - d) University/College
2. What education qualification have you attained?
 - a) Certificate
 - b) Diploma
 - c) Degree
 - d) Masters
3. Did you take electrical or mechanical studies?
 - a) Yes
 - b) No
4. Have you certified by EWURA or ERB to do electrical or mechanical works?
 - a) Yes
 - b) No

Section B: Integrity Issues 1

1. Which is the most common fuel theft case on site?
 - a) Yes
 - b) No
2. Are you aware some unfaithful Field Technicians destroy site data like data logs intentionally for stealing?

a) Yes

b) No

3. Are you aware some unfaithful Field technicians intentionally underdelivered fuel ?

a) Yes

b) No

4. Are you aware some technicians are skipping generator service due to their own interest

a) Yes

b) No

Section C: Working Tools

1. Are you provided with all important spares?

a) Yes

b) No

2. Are you getting immediate support once you don't have spare?

a) Yes

b) No

3. Do you have a reliable operation vehicle?

a) Yes

b) No

4. In case your vehicle fail, are you getting immediate support to restored?

a) Yes

b) No

5. Do you have a reliable toolbox?

a) Yes

b) No

Section D: Training and Motivations

1. Have you got any recently training from your company?
 - a) Yes
 - b) No
2. Have you got any recognition or awards from your company ?
 - a) Yes
 - b) No
3. Below are some behavior which affect motivations, select the one you been affected with mostly
 - a) Yes
 - b) No
5. Have you ever got an annual leave since working with this company?
 - a) Yes
 - b) No
6. Are you working without another team member?
 - a) Yes
 - b) No

Section E: Quality Management

1. Are you given enough consumables always to attain quality service?
 - a) Yes
 - b) No
2. Are you satisfied with the quality of generator service?
 - a) Yes
 - b) No
3. Are you satisfied with the quality of Corrective Maintenance (CM) on site?
 - a) Yes

b) No

4. Are you aware doing quality Preventive Maintenance (PM)?

a) Yes

b) No

5. Are you satisfied with emergency failures management and resolutions ?

a) Yes

b) No

6. Are you satisfied with the quality of spare replaced onsite ?

a) Yes

b) No

7. Are you satisfied with the quality of repairs done onsite?

a) Yes

b) No

8. Are you supported to ensure janitorial is cleaned to meet the quality required?

a) Yes

b) No

Section F: Contractual SLA Awareness

1. Are you aware of operations SLA between your organization and client

a) Yes

b) No

2. Are you aware about SLA awards ?

a) Yes

b) No

3. Are you aware about SLA penalties ?

a) Yes

b) No

4. Are you aware about replacement SLA ?

a) Yes

b) No

Part II: Impact of Outsourcing Network Operation Control(NOC) in cost of quality

Section A: Threat and Risk Monitoring

1. It is allowed Field Technician to attend Island sites during night since there is no any risk associated

a)Yes

b)No

2. Have you ever instruct FE to attend sites with access restrictions like National Parks during Night ?

a)Yes

b)No

3. When escalating emergence failure to failure engineer, ETA at night and daytime will be different

a)Yes

b)No

4. Through monitoring, we have some cases where a site was accessed by security guard for power restoration support

a)Yes

b)No

Section B: Network Monitoring and Updates

1. It happens NOC missed alarms in the OSS especially during night which can result into liquidated damage

a)Yes

b)No

2. Sometimes during night shift , some people in the escalation Matrix are not responding to calls which affect updates to client

a)Yes

b)No

3. Due to sleepy and fatigue , it is easy to miss power alarm in the monitoring system

a)Yes

b)No

4. Failures of managers in the escalation matrix to respond to call from NOC affects decision making during updates to customers

a)Yes

b)No

5. It is disturbance to update customer frequently while failure has not been resolved

a)Yes

b)No

6. Monitoring Network during rain season is more complicated than in dry season

a)Yes

b)No

Section C: Mission Control

1. Minara sites can be accessed with anybody

a)Yes

b)No

2. To access a site there must be an assigned activity/mission

a)Yes

b)No

3. When someone is working on site and power alarm pop, no need for NOC to inform the one onsite since there is a log in report

a)Yes

b)No

4. After finishing an activity you can leave the site without informing NOC

a)Yes

b)No

Section D: Infrastructural Change Request

1. Change request can be requested anytime

a)Yes

b)No

2. Approved downtime depends on nature of work

a)Yes

b)No

3. CR downtime is usually proposed by

a)Yes

b)No

4. There is high risk of financial loss to approve CR downtime at midnight rather than approve in the daytime

a)Yes

b)No

5. CR for sites with access restrictions (Islands, hijacking areas, national parks etc) must be issued at the daytime for security reasons

a)Yes

b) No

Part III: Impact of Outsourcing Procurement in cost of quality

Section A: Supplier Selection

1. How do you select your vendor?

a) Yes

b) No

2. How do you evaluate vendor capacity

a) Yes

b) No

Section B: Contract Negotiation

1. Before negotiating contract , the assessment of vendor services to meet contract requirement must be done

a) Yes

b) No

2. Is it necessary to mutual benefit between vendor and client while negotiating contract ?

a) Yes

b) No

3. In contract negotiation , risk and liabilities must be outlined

a) Yes

b) No

4. Is it important to negotiate contract with more than one vendor ?

a) Yes

b) No

Section C: Cost Control

1. Forecasting demand controls inventory level hence control cost inflation

a) Yes

b) No

2. Streamlining procurement process is on of the initiative of cost saving

a) Yes

b) No

3. Supplier development programs is important in cost control

a) Yes

b) No

4. Discounts from supplier is one of the initiatives of cost control

a) Yes

b) No

5. In cost control, trust between vendor and supplier is one of the key parameters

a) Yes

b) No

6. Using more than one supplier can reduce cost

a) Yes

b) No

Section D: Procurement Quality Control

1. Supplier compliance is not important in quality control

a) Yes

b) No

2. Defect rate determine the quality of the purchased product

a) Yes

b) No

3. Quality product must be accompanied with manufacturer warranty card

a) Yes

b) No

4. Are your operation teams having quality and reliable vehicles ?

a) Yes

b) No

5. Have you supplied your team with quality and reliable toolbox

a) Yes

b) No

6. Are you supplied your team with enough service consumables

a) Yes

b) No

Part IV: Impact of outsourcing Security in cost of quality

Section A: Security Guards

1. Unafahamu kwa idadi na majina vitu vyote vilivyopo ndani ya mnara unaolinda ?

a)Yes

b)No

2. Umeshawahi kupitia jeshi la mgambo , JKT, polisi au jeshi la kujenga taifa ?

a)Yes

b)No

3. Umeshawahi kupata mafunzo yoyote ya ulinzi ukiwa kazini kuhusu mbinu za kujilinda ?

a)Yes

b)No

4. Umeshawahi kupata likizo ya siku 28 kwa mwaka ?

a)Yes

b)No

5. Umefanya kazi na kampuni ya Intelligence security zaidi ya mwaka mmoja ?

a)Yes

b)No

6. Umewahi kuingia ndani ya mnara kumsaidia fundi kuwasha kuangalia kama kuna shida ?

a)Yes

b)No

7. Kuna choo na kibanda cha mlinzi kwenye eneo lako la mnara unaolinda ?

a)Yes

b)No

Appendix II: EWURA announcement on Electrical works qualification

The Electricity (Electrical Installation Services)

GOVERNMENT NOTICE No.382.Published On 10/5/2019

THE ELECTRICITY ACT (CAP 131)

RULES

(Made under sections 8(3), 45 and 46)

THE ELECTRICITY (ELECTRICAL INSTALLATION SERVICES) RULES, 2019

ARRANGEMENT OF RULES

Section Title

PART I PRELIMINARY PROVISIONS

Appendix III: Minimum requirements for Field Technician



JOB ADVERT – EXTERNAL

FEBRUARY 2021

To: All employees
From: HR Department
Date: 24th February 2021
Re: VACANCY ANNOUNCEMENT.

1. POSITION: Fixed Asset Assistant

2. JOB SUMMARY

To accurately record through payables accounting module entries to establish liabilities as approved and assist to process payments in a timely manner.

KEY RESULT AREAS

	Priority % of Time
Invoicing and Payments	40%
Reconciliation	30%
Expense Accruals	20%
Withholding Tax	10%

4. QUALIFICATIONS (Know how)

- A) Education / Training**
Diploma/Bachelor's Degree in Accounting with partial professional qualification in accounting
- B) Experience**
At least 1-year commercial experience
- C) Technical Skills**
Good computer skills
- D) Competencies**
Respect, Integrity, Accountability, Collaboration

APPROVAL PAGE

Name of Supervisor: **Dr. Dionis Ndolage**

Comments of the supervisor The Dissertation is ready for Defence

Signature :

A small, square image showing a handwritten signature in blue ink on a light-colored background. The signature is cursive and appears to read 'Dionis Ndolage'.

Date: 20/10/2023