INTRODUCING VALUE BASED MAINTENANCE MANAGEMENT TO SATISFY BUILDINGS' STAKEHOLDERS IN UGANDA: A CASE STUDY OF PRISONS IN LANGO SUB REGION

BY

OCHEN CEASOR

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DECLARATION

I, Ochen Ceasor, hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree of the university or other institute of higher learning, except where due acknowledgement has been made in the text and reference list.

Signature…… Date…….

APPROVAL

The undersigned certify that they have read and hereby recommend for acceptance by Kyambogo University, a dissertation entitled: ***"Introducing Value Based Maintenance Management to satisfy Buildings' stakeholders in Uganda- A Case Study of Prisons in Lango Subregion"*** in fulfilment of the requirements for the award of a degree of Masters of Science in Construction Technology and Management of Kyambogo University.

Signature…… Date……

Dr. Lawrence Muhwezi (Supervisor)

Signature…… Date……

Eng. Acai Joseph (Supervisor)

DEDICATION

I whole heartily dedicate this work to my mother Mrs. Nora Opio, sisters Kia Concy, Adong Stella, brother Okello Ronald and nephew Nankya Mercy. Thank you all for any kind of support towards me so that this work was a success. God bless you all.

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I almost gave up along the way while undertaking this study, but the encourangement and support I received from the following persons refocused my progress to final completion. First of all, big thanks to my supervisor Eng. Acai Joseph, he was the reason this study was possible, when this study was on the verge of collapse due to the study area being security sensitive and due to corona pandemic, you stood in for me, I remember that lengthy phone conversation you had with the authorities convincing them to allow me go ahead with the study, I appreciate your efforts. In the same vain, sincere gratitude goes to the Commissioner Human Resource -Civilian of the study area, for together with the supervisor you stood in for me to convince the authorities to grant me permission to carry out the study, God bless you. Dr. Muhwezi Lawrence, now the Associate Professor, Kabale University, your continual advice, guidance, comments and time amidst your tight schedule especially during the lock downs was commendable. To Regional Prisons Commander-mid northern, all the Officers in Charge and staff on duty of all the prisons I visited, I was humbled by your co-operation among others in mobilizing other staff to participate, observing the deadlines and relaying suitable information and guidance. Finally, to all my family members in their different capacities, thank you for the emotional, financial, spiritual and all sorts of support you rendered to me for the common cause.

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LIST OF ACRONYMS

CASP:	Cadet Assistant Superintendent of Prisons
CMMS:	Computer Maintenance Management System
CSFs:	Critical Success Factors
CVI:	Content Validity Index
KPI's:	Key Performance Indicators
p.:	Page
Para.:	Paragraph
PM:	Preventive Maintenance
PO1:	Principal Officer 1
Pp.:	Pages
RCM:	Reliability Centred Maintenance
RII:	Relative Importance Index
RM:	Risk Management
TPM:	Total Productive Maintenance
UPS:	Uganda Prisons Service
VE:	Value Engineering
VM:	Value Management

ABSTRACT

A maintenance service is successful if the end users of a building are satisfied with the maintained building. However, the state of the prisons' buildings in Uganda doesn't satisfy the prisons' staff. Therefore, this study explored the use of value-based maintenance management in order to develop a maintenance framework for assessing prisons' stakeholder's satisfaction. Questionnaire surveys and key informants interviews were used to collect data which were quantitatively and qualitatively analysed respectively to deduce inferences. Quantitative analysis was done by relative importance index and multi regression analysis where as qualitative analysis was done by content analysis. Study findings revealed that, among the prisons buildings; maintenance of inmates wards yielded the highest stakeholders' satisfaction. For every element of inmates wards addressed at planning, design and construction stages of maintenance, stakeholders' satisfaction increased by 0.448, 0.360 and 0.568 respectively. Where as considering conditioned based maintenance at design and construction stages of maintenance yielded the highest stakeholders' satisfaction, with increases in satisfaction of 0.583 and 0.468 respectively for every element of conditioned based maintenance considered. As regards risk factors, stakeholders' participation was the most important risk factor; for every improvement in participation by stakeholders at planning, design and construction stages of maintenance, stakeholders' satisfaction increased by 0.619, 0.623 and 0.666 respectively. Therefore, the key components of a maintenance framework for assessing prisons' stakeholders' satisfaction are; prioritising maintaining inmates' wards, developing designs and construction methods after assessing the condition of the wards for fitness for purpose and full participation of all the prisons' stakeholders at all stages of maintenance.

Key words; Stakeholders; Satisfaction; Maintenance service; Value.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Chapter one begins with the background of the study articulating matters related on the study topic at the global, regional, national and local context; problem statement which the study addressed followed the background. After the problem statement are the objectives of the study; from which the subsquent reseach questions were developed. The justification and significancy of the study were discussed after the research questions elaborating the relevancy and importance of the study respectively; in that order. A discussion on the scope of the study followed the significancy. Finally, the conceptual framework concludes chapter one demonstrating the linkage between the independent variables and the dependent variable of the study.

1.2 Background to the study

The United Nations (2015) pointed out that in order to realize an affirmative impact within the prison walls, same to inmates upon release; and in order to carry out the activities of vocational training, work and education, investment may be needed in infrastructure and prison staff. Marayca (2014) pointed out that at the end of the 18th century and beginning of the 19th century, reform-oriented design concepts followed prison reform movements, with the “separate and silent systems”, being the first two architectural displays in which the availability of space and design of the prison buildings turned out to be a factor impacting the reformative potential of the criminals through labor and isolation. While referring to prison facilities, Jerry (2019) points out

that an opportunity for achitects to concider rehabilitation of prisoners and of ensuring that prisons environment is human; presents its self whenever they are designing the prison's facilities, adding on that environment cures behavior. Justice and Series (2017) urgue that in the event of planning, designing and constructing new prison facilities, prison administrations should endeavor that provisions are made for equipments, infrastructure and sufficient physical space which can provide high quality rehabilitation. However, many prison systems struggle to meet basic needs such as shelter in a safe hygienic environment, healthcare, food or even clothing, let alone a rehabilitative-focused regime because of having few resources (Jean-Baptiste, 2020). Therefore, for infrustruture development to effectively compete for the scarce resources, the existing ones need to be first made safe, hygienic and rehabilitative based, before even new infrastructural developments are thought of; so that value of the existing buildings can be realised to convince other stakeholders in investing in infrustrutural developmemts with in prisons. Repair-modernization activities, if properly organized, increases rehabilitation opportunities for prisoners (Justice and Series, 2017).

Apart from the financial constraints global prisons are facing in respect to improving on the existing infrastructure, Marayca (2014) pointed out that the architecture of imprisonment continues to be generally standardized, with maintenance of prison facilities of a "one-size-fits-all" correctional facility, yet prisons' stakeholders in different countries require different maintenance needs or requirements owing to the different geographical locations, political environment, culture and criminological characteristics of inmates with in each particular country. Maintenance management which matches closely as possible what the users need/require, is the best way to achieve excellent maintenance (Marinie and Zawawi, 2010).

Additionally, in developing countries as regards to infrastructure development, some projects directly attract investments like schools or hospitals, and some are less attractive for investment like sewers or prisons (Isabel, 2016). However, as a response to increased prison populations or overcrowding in some African countries, increase in funds for penitentiary systems in those countries was set aside for constructing or expanding prison estates; a case in point was in 2020 where Morocco allocated MAD 160.7 million (EUR €15.2 million) to investments in the prison estate (Jean-Baptiste, 2020). But as expansions are done, existing buildings need also be maintained. Lateef (2010) urged that new buildings also needs maintenance because buildings cannot stay new all over their entire life; infact, maintenance problems begin popping in before completion of a new building, yet rebuilding or replacing all buildings of an organisation at once is an impossibility; for such reasons, its only when maintenance is done on the buildings, otherwise building's value decreases (Lateef, 2010). Therefore, in order to lure improvement strategies when needed, it is required to formulate correct strategies for the building maintenance of particular projects (Kara and Anlar, 2014). Kara and Anlar (2014) added on that professional factors and different user needs must be a basis for choosing building fabrics. Meeting the diverging demands of the building and of the building's users themselves, in an efficient and effective way; is critical in maintenance management (Marinie and Zawawi, 2010). Ajayi et al. (2019) focused on users satisfaction on the performance of prison buildings. However, this study was not specific on which function of a prison from a variety of functions (rehabilitation, safe custody, welfare etc.) was the guiding criteria of user satisfaction- as required by value management.

Government of Uganda (2016) stated three core goals of Uganda Prisons Service (UPS), namely; facilitating reformation and social rehabilitation of inmates through particular educational programs and training of inmates; ensuring that a detainee who is legally in prison, is humanly and safely kept in custody and brought in court as necessary and thirdly helping the re-integration of inmates into their communities upon release. These three goals indicate that; in the invent of value-based maintenance of Uganda's prisons' buildings, satisfaction of stakeholder's needs should be in context of meeting the rehabilitation needs of the stakeholders.

According to Kara and Anlar (2014), maintenance means to protect, keep, hold, preserve or sustain the building to an acceptable standard, thus helping in ensuring a high resale value of the building as possible. It is the act of preserving the proper condition of something (Trojan and Marçal, 2017).

On the otherhand, management is the achievement of the goals of an organization in an efficient and effective way through planning, organizing, directing and controlling resources of the organization (Lateef, 2010). Management is the effecient and effective use of resources with the aim of achieving the set objectives through planning, organizing, directing and controlling the resources of the organization (Lateef, Khamidi and Idrus, 2011).

According to Kamau (2014), maintenance management activities include; planning, organizing, implementing, monitoring and controlling; with an aim of maintaining a certain level of reliability, availability and value of the system and its components (assets) together with its ability to operate to a certain standard level of quality. The components of maintenance management are activity-based budgeting and work

planning which consists of planning, implementing and evaluating the strategies of the maintenance management (Mong, Mohamed and Misnan, 2018). Operation management or maintenance management are functions that convert input including materials, people, technology, energy, and capital into outputs in the name of services and goods (Myeda and Pitt, 2011). Myeda and Pitt (2011) also defined maintenance management as an activity whose goal is of optimizing the reliability and availability of production equipment and preserve its operation ability to a cost level which is acceptable. It is when the operation process is systematically controlled and directed (Myeda and Pitt, 2011).

As regards value, Wiley (2020) describes value from an individual stakeholder's perspective, as the sum of benefits percieved from a project minus the expenses in regards to the resources commited in executing the project. Value management as practiced in value engineering/management, is an examination of pure functional needs to uncover the true values to stakeholders with its different scope (Zhang et al., 2016). Understanding of function paves way for managing value; therefore, identification of function is an essential feature of value management (Male, 2020). The overall performance of facilities is determined by the spaces of critical functions as certain spaces in any facility are significantly more crucial to overall facility performance, such as courtrooms in a courthouse and surgical suites or patient rooms in a hospital (Pati et al., 2010). Therefore, there is little or no value when unwanted functions are provided (Wiley, 2020); meaning that for each organization, the critical function(s) of the organization has to be established, to pave way for knowing the crucial space(s) which support that critical function.

With the above withstanding, there is limited published information on value-based maintenance management in Uganda in general and prisons to be specific. This could be because actual maintenance needs is not considered as the basis of maintenance of facilities, due to the failure of the relevant authorities to provide adequate funding (Ajayi et al., 2019). These obstacles barring the use of value-based maintenance management in Uganda are what this study called 'risk factors'. These are the factors which have to be mitigated so that value-based maintenance succeeds within the context of the Uganda Prisons Service. Thus, exploration of the use of value-based maintenance management in rehabilitation of prisons' buildings in Uganda was the main objective of this study. Value based maintenance management is an approach to maintenance aimed satisfying the needs of stakeholders, after an examination of their pure functional needs to uncover and address the true values to the stakeholders amidst the various value perspectives (Zhang et al., 2016)

1.3 Problem statement

Prison stakeholders in a maintenance service expect to be provided with facilities like good sanitary facilities, good utilities and comfort to inmates and staff. However, the growing prison population has over stretched existing physical facilities and puts pressure on prisons' buildings' structures, leading to unacceptable behaviour from prisons (Government of Uganda, 2016). Due to unfavourable environment for prisoners under rehabilitation, prisoners offend even when still serving their respective sentences. In Rupiny (30th Oct to 5th Nov 2019, p.4.), a prisoner who was serving a sentence of 10 years in Loro Prison for murdering his wife in 2014 in Gulu, hacked a Chief Wardress to death. If nothing is done, these instances may rise. Therefore, it's against this

background that this study sought to explore the use of value-based maintenance management in rehabilitation of prisons' building structures in Uganda, a case study of Lango prisons as a means of creating a suitable enviromment for rehabilitation of prisoners so that such offences with in the prisons circles are avoided or minimised at worst.

1.4 Objectives of the study

1.4.1 Main objective

The main objective of this study was to explore the use of value-based maintenance management in rehabilitation of prisons' buildings' structures in Uganda.

1.4.2 Specific objectives

The specific objectives of this study were:

i. To evaluate the current state of Uganda's prisons' buildings with respect to key performance indicators in satisfying rehabilitation needs of Uganda's prisons' stakeholders.
ii. To establish the maintenance practices used in Uganda's prisons to satisfy rehabilitation needs of Uganda's prisons' stakeholders.
iii. To establish the maintenance risk factors to be mitigated in order to satisfy rehabilitation needs of Uganda's prisons' stakeholders.
iv. To develop a maintenance framework for assessing prisons' stakeholders' satisfaction.

1.5 Research questions

i. What is the current status of prisons' buildings in Uganda?

ii. What are the maintenance practices used in Uganda's prisons?

iii. What are the maintenance risks factors to be mitigated in order to satisfy rehabilitation needs of Uganda's prisons' stakeholders?

iv. What can be done to assess satisfaction of Uganda's prisons' stakeholders?

1.6 Justification

Among its recommendations, Government of Uganda (2016) recommended that the development budget of the prisons' service should be increased to enable among others rehabilitation of prisons. This was after observing that there was overcrowding of prisons and poor housing and poor working conditions of both the prison staff and prisoners, thus reducing moral amongst prisoners and staff to carry out prisons' activities; like maintenance of prisons' buildings and rehabilitation, leading to a high attrition rate of 250 staff in the prison per year and re- offending. Rupiny (30th Oct to 5th Nov 2019, p.4) provided a case where a prisoner who was serving a sentence of 10 years in Loro Prison, for murdering his wife in 2014 in Gulu; hacked a Chief Wardress to death. Unfortunately, such cases are happening in Uganda's prisons even with rehabilitation programs. This raises questions as to why Uganda's prisons' rehabilitation programs have failed to reduce crimes even for prisoners who are currently serving their sentences. Maintenance/renovation of prisons' buildings is one area of the programs which has not been given much attention in regards to contributing to effective rehabilitation of prisoners. The negative impacts are persisting because the maintenance/renovation interventions are being done without prioritizing the rehabilitation needs/requirements of the prisons' stakeholders. Due to lack of data to inform prisons' stakeholders and policy

makers, it was necessary for this study to be carried out to explore the use of value-based maintenance management in rehabilitation of prisons' buildings' structures in Uganda.

1.7 Significance

Implementation of the outcome of this study creates an environment inside prisons which depicts an environment outside prisons where the prisoners are to settle upon release. This enhances on the efficiency of rehabilitation programes through preparing inmates for intergration to outside world. The environment created also ensures minimal involvement of prison's staff (instructors) in rehabilitation process as inmates are self driven in carrying out activities within the prison which they are to encounter in outside world; since provisions for such activities is the basis of value based maintenance practice. Facilities maintenance as a tool for inmate rehabilitation is a knowledge contribution in the field of inmate rehabilitation, based on the concept that environment influences behaviour.

1.8 Scope of study

1.8.1 Geographical Scope

The research was carried out in the local government prisons within Lango sub region in the districts of Apac, Kwania, Kole, Oyam and Lira. These specific districts within Lango sub region are considered under the Mid-Northern region in the Uganda Prison Service structure. These are the Lango districts together with Acholi sub region in its North, West and North which were adversely affected by the Lord's Resistance Army insurgency in the north for 10 years, thereby slowing down their facility maintenance programs due to insecurity thus representing the worst scenarios in the country in respect

to the state of the buildings. Acholi subregion wasn't considered due to time limitation; however, being at the boarder to the chosen districts, the results were considered to be the same due to the same geographical location. Consequently, the researcher is employed in Lango region, so a study in Lango would be cost efficient to the researcher as he was funding the study himself. See Appendix.1 in the Appendix for the researcher's study budget estimate.

1.8.2 Content Scope

There are four maintenance value drivers and they are; resource allocation, cost control, asset utilization and health and safety. This study focused on variables which constitute asset utilization. The dependent variable was stakeholder satisfaction. As regards to independent variables, the following were considered while relating to stakeholder s'satisfaction, namely; key performance indicators which has an impact on rehabilitation of prisoners were used to evaluate prison's facilities basing on stakeholder satisfaction, different maintenance practices were explored to determine the one(s) used by Uganda's prisons to satisfy stakeholders in context to rehabilitation needs, then risk factors barring achieving of stakeholders' satisfaction from a maintenance practice were identified and finally a maintenance framework was developed for assessing prisons' stakeholders' satisfaction of a maintenance service.

1.8.3 Time scope

The original time scope for the study was to be with in the academic year calendar of Kyambogo University spanning from June 2019 to August 2020, see Appendix.2 in the Appendix. However, the research was carried out in the academic year calendar of

Kyambogo University spanning from June 2019 to December 2022. This period spanned that much due to the corona pandemic which affected the original period. Therefore, June 2019 to December 2022 was believed to be ample time to enable the process of topic approval, proposal writing, theisis writing and presentation of study findings.

1.9 Conceptual framework

A conceptual framework is an illustration of the relationship between multiple independent variables and a single dependent variable, as presented in Figure 1.1. From the framework in Figure 1.1, this study postulated that ensuring prisons' stakeholder's satisfaction of a maintained building begins with evaluating a building to be maintained to know whether the stakeholders are satisfied with the building against predetermined sets of key performance indicators like general Indicators e.g. hygiene; staff support indicators e.g. staff accommodation; inmates' ward indicators e.g. wards shared by not more than 5 inmates and rehabilitation programs e.g. convenient agricultural area; with an intent of determining gaps to be addressed.

Once the gaps have been identified in context to the stakeholder's requirements, a suitable maintenance strategy from a multitude of known maintenance practices i.e. inspection based, conditioned based, periodic based etc.; has to be identified which when adopted will help in addressing stakeholders' requirements. However, there could be some obstacles which might hinder delivering what the stakeholders require through a chosen maintenance practice, which calls for ways of overcoming such obstacles i.e. risk management, such obstacles could be focus in defining objectives, commitment by stakeholders and availability of finance.

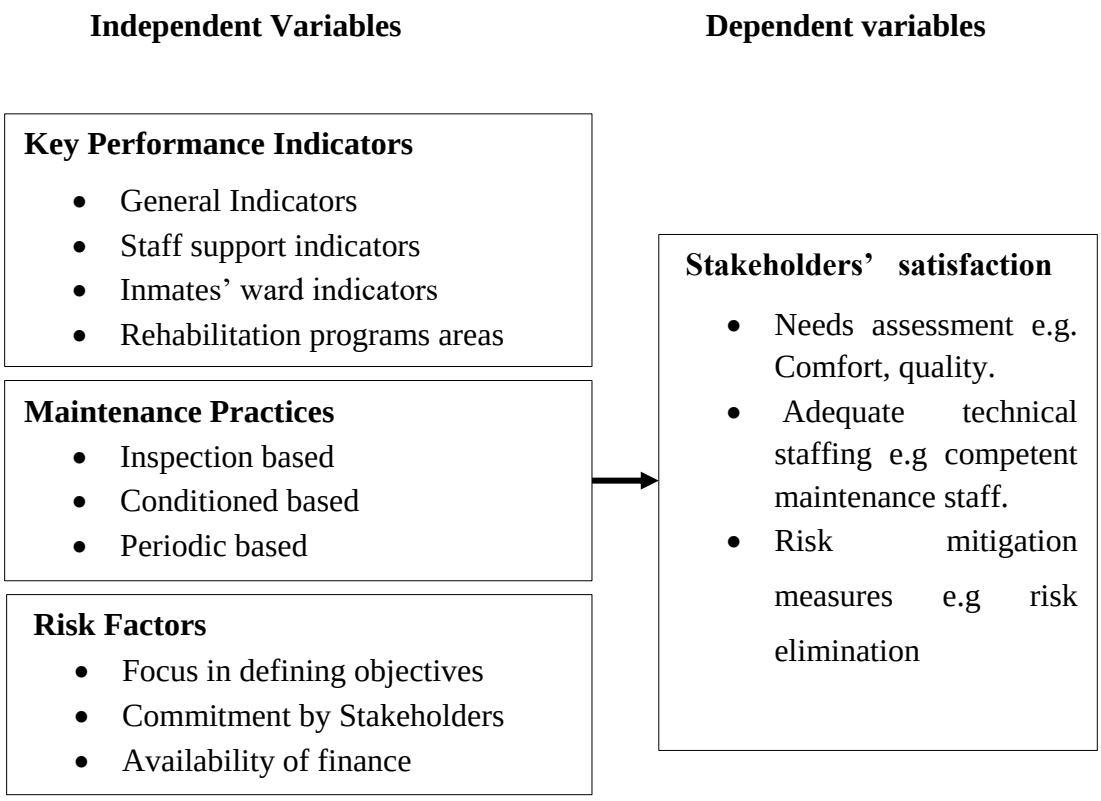

Figure.1.1 Conceptual framework of the study

Once an organisation considers the key performance indicators, maintenance practices and risk factors in the context discussed, then a road map for ensuring stakeholders' satisfaction of a maintained building is achieved, in other words a framework is developed. Stakeholder's satisfaction was operationalized under needs assessments e.g comfort; adequate technical staffings e.g competent maintenance staff and risk mitigation measures e.g risk elimination; to mention but a few.

1.10 Chapter summary

Chapter one gave an overview of the intended research, giving the foundation of the research. This chapter determined which kind of literature to be reviewed basing on the topic and the problem statement. The next chapter presents literature review.

CHAPTER TWO

LITERATUTE REVIEW

2.1 Introduction

This chapter presents the theoretical, conceptual and empirical review of related literature on the current state of Uganda's prisons' buildings in respect to key performance indicators in satisfying rehabilitation needs of Uganda's prisons' stakeholders, the maintenance practices used in Uganda's prisons to satisfy rehabilitation needs of Uganda's prisons' stakeholders, the maintenance risk factors to be mitigated in order to satisfy rehabilitation needs of Uganda's prisons' stakeholders and developing a maintenance framework for assessing prisons' stakeholders' satisfaction.

2.2 Theoretical review

Subjective theory of value by Austrian School of Economics guided this study. According to Stomper (2017), the Austrian School of Economics subjective value theory considers the consumers of a good to be the determinant of the value of the good. Wiley (2020) compliments that value is derived from the significance one perceives a good to be; in helping to achieve the intended end result regardless of the good or labour involved. The researcher elaborates that something is valuable if it is good and that goodness of something is in its ability to yield satisfaction or pleasure to the consumer or the ability of it to generate interest from the consumer. In the context of maintenance, maintenance practices and buildings are of value if stakeholders (who are the buildings' consumers) are interested in the practices and buildings; and vice versa.

With the above withstanding, Stomper (2017) criticised the Austrian School of Economics subjective value theory that it conciders only the demand side of an exchange i.e consumers of a good at a micro economic level, to be the sole determinant of the value of the good disregarding the producers or suppliers of the good. In that regard; Stomper (2017) reported that followers of Austrian school of economics theory based on marginal theory to incorporate the supply side (production) in the value theory; paving way to the use of the theory at a macro economics level. The higher the utility a consumer derived from a unit consumption of a good, the more the good was valuable, thus demanded at a market, hence considered valueable by the producer and high productions made accordingly (Stomper, 2017).

More criticism of the theory was highlighted by Reinecke (2010). He stated that the orthodox in their view also criticized subjective theory of value basing on marginal utility. He ruled out real value existing independently on the market when there is no involvement of the two parties to a transaction i.e producer and consumer. According to him, value exists only when the two sides of the transaction make an exchange.

Reinecke (2010) further added that classical political economy, Marxian economics in particular criticized that the value theory was just a idea which was politically and socially based; used in making essential social declarations on how the economic world is. According to the researcher, Marxian economics concidered that the concept of value explains more that; an exchange of goods and services between two parties is a social idea than it does that value is a casual determinant of prices; as in determining of prices many political, social and ethical importance of goods or services are left out during determining of prices.

Despite such criticisms on subjective theory of value, it held for this study based on its assumption that something good has value and value in value based maintenance management is determined by the end users of a building, in other words the consumers of the building not the maintenance service providers (suppliers or producers). Marinie and Zawawi (2010) cited that the maintenance management which matches closely as possible what the users (who are in this study referred as stakeholders) needs/requires, is the best way to achieve excellent maintenance. The desired ends (e.g. the environment) which the users of a prison (in this case the prison stakeholders) would want to get from a maintenance strategy, is an environment which meets the needs/requirements of the prison's stakeholders e.g. a comfortable environment. Once the maintenance strategy has led to meeting the needs/requirements of the prisons' stakeholders, then that strategy would be considered of value to the prisons' stakeholders, since it would have helped the users of the buildings to achieve the desired ends (e.g. comfort). Additionally, the maintenance strategy that is important in meeting the needs of the users qualifies to be a valuable maintenance strategy. Customer (prison's stakeholder's) satisfaction is the determinant of value (Ajayi et al., 2019).

2.3 Conceptual review

2.3.1 Key Performance Indicators (KPI's) and Stakeholders Satisfaction

Myeda and Pitt (2011) observed that maintenance managers are required to strongly emphasize on users' requirements and needs. Amin (2016) consequently states that key performance indicators should be engaged and agreed on early enough at appropriate levels together with expectation management.

Pati et al. (2010) broadly classifies these indicators into two, namely; hard indicators and then soft indicators. Pati et al. (2010) explained hard indicators as impartial indicators for maintenance strategy budget apportionment and validation. They include; equipping management office with sufficient facilities and maintenance tools, management using the right time to do the right thing, maintenance staff responding to users instantly, individual attention, implementation of safety and security procedure etc.

Pati et al. (2010) described "soft" indicators, as centred on models and theories in the field of behaviour and environment, which Ajayi et al. *(*2019) refered to as quality of space. Myeda and Pitt (2011) subdivided soft indicators into two; firstly as technical elements, which are building maintenance indicators which focuses on property quality i.e. tangible elements incorporated on a building to support the activities carried in and out of the building e.g. sanitary/plumbing, access, lightings, waste removal and comfort level of the building. Myeda and Pitt (2011) second category of soft indicators were image aspect elements i.e. building image; which also focuses on property quality but to differ from technical elements, image aspects zeroes on building beauty, design and identity in reflecting the function of the building e.g. good signage to direct the public, usage of good cleaning reagents, methods and cleaning finishes to maintain and enhance the building appearance, quality of exterior and interior of building and level of cleanliness of prison environment (Myeda and Pitt, 2011).

Pati et al. (2010) stated that there is always that crucial space among several spaces used for performing critical functions for which the building was built for. The performance of such a crucial place determines considerably how the facility performs altogether.

Myeda and Pitt (2011) identified eleven line key performance indicators on which office building's end users are required to rate how their respective building's maintenance management conforms to; in improvising the required indicators during maintenance. The eleven indicators were; access, general maintenance, sanitary and plumbing, mechanical and electrical signage, lift or escalators, landscaping, lightings, air conditioning, cleaning and also parking.

According to Nelson (2018), during establishing a maintenance plan; the maintenance supervisor works with corrections staff. The plan according to the research group includes a schedule for routine, periodic and preventive inspections and maintenance of systems of a jail in respect to; ventilation and air conditioning systems, fire reporting and suppression systems equipment, closed-circuit television and other control centre equipment, steel grill (bars), walls and other security barrier components, lighting and other electrical systems, air conditioning systems, bunks, repainting or refinishing surfaces as needed to prevent deterioration, tables and other furnishings, locks, doors, heating, plumbing, and windows.

Additionally, Kenis et al. (2010) talks about the 'DCL' model. They stated that the innovation is built on four principles, namely; six-person cells rather than having one prisoner per cell where they stated that six detainees share one cell which is equipped and furnished like a home setting with the detainees doing all the chores. Secondly, a behavioural method is used to impact the prisoners' behaviour through each prisoner being accountable for his behaviour and it is used to confront him. Thirdly, the prisoners put on bracelets which are electronic in nature for a tracing and tracking system which acts; they argue that not only does it act as a device for safety, but also act as a system of

social correcting and the fourth and last principle of the model is that instead of relying on rules, laws, regulations, or procedure; officers in DCL use personal judgement and conscience to make decisions.

2.3.2 Maintenance practices and stakeholder satisfaction

Male (2020) urged that apart from increasing the service life of the asset, maintenance also impacts on production, quality, safety, social and environmental aspects, which emphasizes on making efficient and timely decisions.

The maintenance practices are; conditioned based maintenance, total productive maintenance, reliability centred maintenance, preventive maintenance, schedule maintenance, run to failure maintenance, break down maintenance, predictive maintenance management, imperfect maintenance, redundancy maintenance, scheduled replacement maintenance, quality maintenance, system work orders maintenance and value based maintenance.

Following is the overview of the practices in the order listed above; in relation to stakeholder satisfaction. Maintenance costs can significantly reduce by reducing the number of unnecessary scheduled preventive maintenance operations through an effectively implemented and properly established conditioned based maintenance program (Jin et al., 2016). The two potentially significant benefits of conditioned based maintenance is reducing losses, regarding high production volumes in particular and reducing the probability of maximal damage in production (Rastegari, 2015).

In total productive maintenace, machine users protect and take care of their machines with their own hands, in order to increase the usefulness of the machinery; by reducing disasters arising out of lost times and by reducing maintenance costs (Poo´r, Zˇeni´sˇek and Basl, 2019). In respect to prisons buildings, inmate workers may be used under supervision of corrections staff, to complete maintenance tasks but in a way that would not let them access to or information of confidential procedures or jail security systems (Nelson, 2018).

Trojan and Marçal (2017) stated that the application of reliability centred maintenance is an ongoing process, which has to be frequently re- evaluated as experience is gained; and the functions and performance standards needed for any item in their operating environment defines the objectives of maintenance. The maintenance practice is recognised to be among the most powerful tools a company can use to obtain more value from its physical assets (Sifonte and Reyes-Picknell, 2017). The practice warranties that systems continues undertaking whatever their operator needs in their current functioning setting (Poo´r, Zˇeni´sˇek and Basl, 2019).

Preventive maintenance is the most frequently occurring strategy in selected literarture databases (Gackowiec, 2019). This strategy entails reducing lost production and ensures high quality and also lowers cost (Fridholm, 2018). Greater device proficiency which will be replicated in savings is normally a result of preventive approach (Poo´r, Zˇeni´sˇek and Basl, 2019). Kamau (2014) emphasized that the practice yields reduction in level of breakdowns, increase in asset readiness, upkeep in best efficiency of the equipment and reduction in work load on maintenance staff.

Sequencial maintenance strategy which entails introducing numerous factors into the maintenance model can make scheduled maintenance time more appropriate for the real circumstances; the different performance dilapidations of components at different service stages, to some degree are characterised by factors such as the decreasing age factor and increasing failure rate factor (Bhardwaj et al., 2022).

Making maintenance descisions upon break down of the system or component or equipment is the basis of run to failure maintenance; loss of energy and operartional efficiency, threats to health and safety, environment and occupant comfort are some of the consequences of failure of any system, equipment or component (Besiktepe, Ozbek and Atadero, 2020).

Maintenance where repairs are carried out upon breakdown is called break down maintenance; the unforeseen circumstances of breakdowns yeilds to inefficient use of time, shorter asset life, safety issues and may be costly to address (Poo´r, Z˘eni´s˘ek and Basl, 2019). Other maintenance management practices are cheaper than this practice and the practice jeopardises productivity (Kamau, 2014).

As regards predictive maintenance, measurements conducted when equipment is running enables monitoring of the equipment yielding high avaiability (Trojan and Marçal, 2017). Its usage in non manufacturing industries like building industry is restricted to mechanical components, electrical appliances, and fittings. This maintenance practice presents advantages like prior knowledge of the failure time of the components thus enabling plans for replacement to be made during shutdowns to avoid stoppages of the components and system plus breakdowns during operations (Olanrewaju and Abdul-Aziz, 2015). One can get a saving of 30% to 40% from the maintenance practice; but in

general, savings of 8% to 12% is derived from a maintenance program which is predictive based and well functioning (Poo´r, Zˇeni´sˇek and Basl, 2019). Predictive maintenance practice presents benefits like ultimate increase in customer satisfaction, strengthening the process in the supplier system, improvement in quality and economical deployment of less resources during maintenance together with maximising the operating time of the machine (Basl and Republic, 2019).

Imperfect maintenance model usually find three parameter i.e scale, shape and effectiveness of maintenance (Bhardwaj et al., 2022). As for redundant maintenance, Kamau (2014) states that; in this practice, if a unit fails, the defective machine is repaired while use is made of a stand by machine during repair of the defective machine.

Under scheduled replacement, refurbishment can also be included under maintenance consisting of improving the original design or revamping the main structure to restore the original design and specification; the practice can entail extensions made on an old building plus some additions (Kara and Anlar, 2014).

While referring to quality maintenance, Sullivan et al. (2011) cited that it is hard to apply the technique in construction domain as the construction processes are not repetitive; more so to the whole trade that conveys exceptionally dissimilar products with no clear description of a last product or worth.

In system work orders maintenance, an online computerised maintenance management which is well based gives alternatives to field engineers to use CMMS through internet and local network whose purpose is to aid in analysing equipment and provide maintenance information so as to maximise the management and support the operational, tactical and strategic descisions (Malgorzata, Mariusz and Piotr, 2017). The maintenance

practice is used when the plant is highly complex and with several items which needs maintenance; it presents benefits like permitting right control and monitoring of assets, maintenance resources are well managed and prompts appropriately prioritized tasks (Kamau, 2014).

The final maintenance practice is value based maintenance. Projects fail due to poor understanding of stakeholder values and the key issues in managing projects is to discover basic values that drive planning, design and construction of projects as derived from the varied stakeholder viewpoint (Zhang et al., 2016). Mong, Mohamed and Misnan (2018) urged that stakeholders' satisfaction, organisation's achievement of planned goals pertaining efficient management and reputation are contributed by effective maintenance management. In that regard, putting the anticipated needs of the user at the center stage of maintenance management is the best way to achieve excellent maintenance (Marinie and Zawawi, 2010). It is only through refering to the required functions that satisfaction of need is assessed (Wiley, 2020). Function means a specific action or activity due to which an item is precisely built-for or used, or due to which something occurs (Male, 2020). Value management (VM) is a service that capitalizes on the purposeful worth of a development by managing its progress from idea creation to use by assessing of all resolutions made against an importance criteria derived by the client (Lin et al., 2011). Cost savings of 5-10% arises from the use of VM in construction projects and the management practice increases the value of a project through producing inventive ideas and solutions (Hwang et al., 2015).

With the above withstanding, Hwang et al. (2015) found out that only 18.1% of all the projects in their study implemented value management and Ramly et al. (2015) study

revealed that only 16% of the respondents were sufficiently knowledgeable of VM though 59% of the respondents had taken part in a VM workshop, 14% had carried out a workshop, and 9% had carried out not less than five workshops.

2.3.3 Knowledge of maintenance risk factors and stakeholder satisfaction

Value addition to projects through risk management is ensured by handling problems at their origin before they occur and maximizing opportunities so that value can be added (Hwang et al., 2015). The uncertainity in environment in which large construction projects are exposed to and which leads to the unpredictability of large construction projetcs are; statutory regulations, the economic and political environment, resources (manpower, materials, equipment, and funds) availability, presence of various interest groups (owner, consultants, contractors, suppliers, etc.), planning, design and construction complexity and environmental factors (Nerija et al., 2012). Other factors that contribute to inefficient building maintenance are identified as; insufficient budget/ malpractice in the financial management, insufficient planning and control and substandard execution of work (Soliman, 2018).

2.3.4 Stakeholders' satisfaction factors to consider in developing prisons' maintenance framework

Chances of completing construction projects successfully and of enhancing performamnce of the workshops is realised at the initial stages of planning value management worshops through carefully taking into account the CSFs (Ramly et al., 2015).

Lin et al. (2011) states, in regards to construction projects; that critical success factors (CSF's) are used to forecast that a project is successfully done. Identification of critical success factors helps practitioners in understanding aspects of the activities of value management implementation which is critical for investment and attention (Hwang et al., 2015). Requisite performance, timely completion and specific budget are the factors which determines success of any project (Nerija et al., 2012). The research group emphasizes the need for aligning between project management team's interests and project owners' interests and trusting them; if construction projects are to be a success. Ramly et al. (2015) cited that the importance of client's participating in workshops lies in ensuring that the decisions made in the worshops correlated to the client organizational objectives, thus it's one of the crucial success factors for end-users to participate in workshops. Kara and Anlar (2014) pointed out that professional factors and different user needs must be a basis for choosing building fabrics.

Amin (2016) made two observations, namely; skillset in multidisciplinary management is required because of the complex function maintenance has evolved into. Secondly, the maintenance industry's reputation may be hindered by the uncontinuous improvement in adorpting of the present concepts of engineering and lack of appropriate techniques and innovative tools.

Au-Yong, Ali and Ahmad (2014) made the following revelations; firstly, poor knowledge and labourers' skill is among the obstacles in carrying out an effective maintenance management and thus, the knowledge and extent of labourer skill is considerably linked to the satisfaction of occupants. Secondly, it's a pre requisite to consider the quality of materials and spare parts in extending the life span of the system

and enhancing the operation of the system as they are closely associated to satisfying the occupants. Thirdly, it's a gurantee that the services needed by the users and clients will be provided and above satisfactory level if use is made of an experienced and a skilful building manager. Involvement in the design team of a person with technical knowledge or a maintenance manager helps in avoiding design errors that result to high costs of maintenance (Kara and Anlar, 2014).

As regards green building, the technology encompasses: use of construction materials which are recyclable, renewable, recycled and local processes that yield healthy by-products and reduces waste, interior enviroments which are healthful which enhance productivity, developing sites which encourages extensive transit usage and renewal of land and low resource consumption/ energy buildings (Thigpen, 2011).

2.4 Chapter summary

Pati et al. (2010) stated that there is always that crucial space among several spaces used for performing critical functions for which the building was built for. The performance of such a crucial place determines considerably how the facility performs altogether. Therefore, it means that each building has its own unique sets of key performance indicators different from the other depending on the critical function of that building; hence, different buildings should be treated differently in respect to the key performance indicators.

Scholars across different domains contend that maintenance is done to buildings and equipments to enhance its physical capability in respect to appearance, strength, reliability, minimising chance of failure, safety, productivity, functionality etc. However, the shortfall of the literature reviewed is that most maintenance practices discussed are in

context to the manufacturing industry whose applicability to the construction industry needs also to be assessed.

Additionally, research groups reveal that every construction project is faced with different nature of risks which are human related and others nature based. The literature reviewed shows that these risks impart on time, cost, quality and value of a project and therefore risk management is important. However, perception of value is diverse, varying from person to person and organisation to organisation and therefore each organisation's assessment of maintenance based on the concept of value has to be done differently for the results to be relevant.

In relation to risk management above, literature reviewed reflects that to ensure success of maintenance projects, maintenance teams should ensure that there is a multidisplinary team mix, end users' involvement, technological advancement, capacity building, good materials, skill full and knowledgeable manager/leader to give direction to the team etc. However, since different stages of maintenance have different activities, the satisfaction factors should be aligned to the relevant maintenance stages in which their positive impact is significant so that a framework for assessing stakeholder satisfaction of a maintenance service is effectively developed.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the roadmap for carrying out this study and the reasons for adopting particular method(s) for the study. The chapter consists of research design, study population, sample size, sampling technique, data collection methods, data collection instruments, tests for validity and reliability of the instruments, procedure for data collection and data analysis etc.

3.2 Research design

This study adorpted a mixed method design as the researcher was to consider data from two categories of respondents i.e custodial staff and key informants; data from custodial staff were collected using questionnaires and those from key informants were collected using structured interview questions. Key informants were ten in number and were considered more knowleadgeable than the custodial staff and therefore a holistic response was required from them to get the deep insight on the study; hence, the use of open ended structured interview questions. In contrast, custodial staff constituted a big number of respondents (123 respondents); therefore, there was need to use a data collection tool which was fast enough at collecting data from a large population; hence, the use of questionnaires. The two sets of data were necessary for comparison purposes to set a stage for discusions, interpretations and deducing conclusions.

3.3 Research approach

This study adopted mixed methods approach for data collection and analysis. A quantitative approach of data collection and analysis was used for data obtained from custodial staff where as a qualitative data collection and analysis was used for data from the key informants.

3.4 Area of study

This study was carried out in local government prisons within Lango sub region; from the districts of Apac, Kwania, Kole, Oyam and Lira. These specific districts within Lango sub region are considered under the Mid-Northern region in the Uganda Prison Service structure and are the Lango districts together with Acholi sub region in its north, west and south which were adversely affected by the Lord's Resistance Army insurgency in the north for more than 10 years, which slowed down among other factors the facility maintenance programs due to insecurity. Thus representing the worst scenarios in the country in respect to the state of the prison's buildings.

3.5 Study population

The study population comprised of Uganda Prison's Service custodial staff of at least one prison from each of the districts of Lira, Apac, Kwania, Kole and Oyam as indicated in Table 3.1. An ex prisoner from the major prison of Lira, Apac and Oyam also constituted the study population as part of key informants; the other key informants were selected prison's staff. 30 custodial staff were from Atopi prison farm in Apac district, 40 staff were from Lira district men prison farm, 15 staff were from Lira district female prison farm, 30 staff were from Oyam district men prison farm, 13 staff were from Oyam

district female prison farm, 10 staff were from Kwania district prison farm, 11 staff were from Kole district prison farm and 31 staff were from Loro prison farm in Oyam distict; in total 180 custodial staff from the Lango sub region prisons. The custodial staffs were composed of Officers in Charge, Welfare and Rehabilitation Officers, Warders, Wardresses, Principal Officers 1, Assistant Superitendants of Prisons, Matrons and Records Officers.

Table 3.1: Study population distribution across sampled prisons

Prison name	**Number of custodial staff**
Atopi Prison-Apac district	30
Lira district male prison	40
Lira district female prison	15
Oyam district male prison	30
Oyam district female prison	13
Kwania district prison	10
Kole district prison	11
Loro Prison – Oyam district	31
Total population (N)	**180**

3.6 Sample size determination

In this study, all prisons' staff from six prisons of Lango sub region chosen were targeted, from where the sample size was determined using Krejcie & Morgan (1970) table as extracted from Acai (2019); see Table 3.2. As the total custodial staff population for this study was 180 prisons staff; therefore, the sample size which corresponds to this population size; highlighted in Table 3.2 is 123 respondents.

Additionally, the sample size of 123 respondents were distributed among the prisons in direct proportion to the population distributions in the prisons; this was done to ensure that the sample size from each prison was sufficient, depending on the population of the respective prisons; as indicated in Table 3.3:

Table 3.2: Sample size determination

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

Table 3.3: Sample size distribution among prisons

Prison name	**Number of custodial staff (Population)(n)**	**Proportionate population distribution(n^1)= ($^{n}/_{180}$)**	**Sample size distribution(s) (n^1*S)**
Atopi Prison-Apac district	30	0.17	21
Lira district male prison	40	0.22	27
Lira district female prison	15	0.08	10
Oyam district male prison	30	0.17	21
Oyam district female prison	13	0.07	9
Kwania district prison	10	0.06	7
Kole district prison	11	0.06	7
Loro Prison – Oyam district	31	0.17	21
Total	**180**	**1**	**123**

n is the number of custodial staff per prison (population per prison) extracted from Table 3.2, $n^1$is the proportionate population distribution, s is sample size per prison.

Hence,

$n^1 = n/N$…….....(Equation 3.1)

$s = n^1 * S$…….(Equation 3.2)

Where, N is the total population size in all prisons =180 and S is the total sample size of all prisons =123.

3.7 Sampling method

This adopted multi stage sampling technique from which;

At first stage, purposive sampling was used to select the biggest prison station from each district of the study area. Purposive sampling enabled deliberate selection of prison stations as the researcher knew the biggest prison station with in each district of the study area.

At second stage, purposive sampling was maintained to sample prisons' Officers in Charge of each prison and an ex prisoner from the selected prison of three districts of Lira, Apac and Oyam. Purposive sampling was necessary for sampling Officers in-Charge and ex prisoners; since it involved deliberate selection of prisons' Officers in Charge and ex prisoners to provide important information that couldn't be obtained from other prisons' staff and inmates due to lack of in depth awareness of the subject area and restriction to access inmates respectively. Additionally, the study required the researcher to first report to the Officers in Charge before accessing the rest of prisons' custodial staff. The researcher targeted ex prisoners as part of key informants; from only the prisons of Lira, Apac and Oyam because the researcher judged that; being the districts with the biggest prisons, there was a high probability of getting an ex prisoner who has ever served in the district's prisons as opposed to districts of Kwania and Kole which had small prison's units, thus a low probability of getting an ex prisoner from the respective districts.

At third stage, simple random sampling was used to determine the custodial staff to take part in this study. Simple random sampling was used, since it gave all custodial staff equal chances of being sampled for the study, hence it limited bias from the researcher.

3.8 Sources of data

3.8.1 Primary data

Primary data was got from sampled prison staff, purposively chosen staff, ex prisoners and participant and non-participant observations.

3.8.2 Secondary data

Uganda Prisons Service being a security organization, most of its documents are confidential. Therefore efforts for secondary data from direct document review was futile. However, staff were cooperative in verbally sharing non-sensitive data like staff population.

3.9 Data collection methods

3.9.1 Questionnaire survey

Close ended questionnaires were used to collect primary data from the custodial staff because of the speed and ease of using it in collecting data within a short period especially when respondents are able to read and write as opposed to interview method (Acai, 2015).

3.9.2 Interview schedule

Interview method was used for collecting data from ex prisoners and key prisons' staff, of the respective prisons in Lango sub region to get an in-depth view of the study areas and relate them to the data collected using the questionnaire method.

3.9.3 Document reviews

Due to sensitivity of the Prison institution, document review was restricted to data such as demography and type of facilities available for the inmates.

3.10 Data collection instruments

3.10.1 Questionnaire

This was used for collecting primary data from respondents. The questionnaire had sections A and B. Section A aimed at collecting respondents demographic data while section B aimed at collecting data related to the specific objectives (empirical findings) (see Appendix.5 in the Appendix section).

3.10.2 Interview guide

Interview guide contained a list of structured questions arranged according to the study objectives (see Appendix.6 in the Appendix section).

3.11 Procedure for data collection

Upon having the approved questionnaire, an introductory letter from the University's coordinator introducing the researcher to the prison's authorities was submitted to the Uganda Prison Service headquarters, Kampala (see Appendix.8 in the Appendix). The researcher also wrote a letter to the institution requesting for permission to carry out the study (see Appendix.7 in the Appendix). At first the request was not granted citing that the institution was not allowing non-staff civilians access to prisons due to corona virus but after a phone conversation by a supervisor with the prison authorities; that let the researcher strictly observe the standard operating procedures and after the supervisor

emphasizing to the prison authorities that the study is strictly for academic purpose, eventually the prison authorities accepted (see Appendix.9 in the Appendix). Among the standard operating procedures suggested by the supervisor, was that the researcher was not to meander with in the prison premises to distribute questionnaires, but he was to leave the questionnaires with a prison officer to be the one to disseminate questionnaires to the target staff. In that regard, use was made of Officers in Charge of respective prison stations of the study area. Prior introduction, appointments and scheduling time and dates was made with 5 purposively sampled Officers in Charge for key informant's interviews and disseminating questionnaires to staff for filling. The same was done with any 2 of either Welfare and Rehabilitation/Reintergration Officers/ Principal Officer 1/ Assistant Superitendant of Prisons ; as with 3 ex prisoners . The respondents were given a total of four days to fill the questionnaires which were distributed and collected with the help of Officers in Charge. Document review was limited to non security sensitive data such as demographic data of the respondents due to sensitivity of the institution; and participants' progress on the response was monitored by phone calls to the Officers in Charge so that the response rate was high.

3.12 Data Quality Control

This was done to ensure that the instruments for data collection were both reliable and relevant in collecting data concerning the study topic.

3.12.1 Validity

According to Amin (2005), validity of data collection tool refers to the suitability of the tool to measure a construct or variable so that intended results are come up with. The

questionnaires were given to learnt colleagues and ex prison's staff to evaluate each question for relevancy using the Content Validity Index (CVI) given by;

$$CVI = \left\{\frac{Items\ rated\ relevant}{Total\ number\ of\ items\ on\ the\ questionnaire}\right\} \quad \text{.....(Equation 3.3)}$$

For this questionnaire, 54 items were rated relevant out of 64 items in the questionnaire giving CVI of 0.875. Acai (2015) cited that a CVI value is acceptable if it is within the statistical range 0.5 to 1. On top of that, a pilot study was conducted where sample questionnaires were disseminated to experienced and knowledgeable respondents and they were required to respond to the manner in which questions in the questionnaire were posed for efficiency and effectiveness in meeting the study objectives i.e. coverage of the value concepts, question wording, instructions to respondents, response options and evaluation scale, clarity of value concepts, representativeness, familiarity, visual appearance, repetitiveness, classification and redundancy; by carrying out face-to-face interviews with learnt colleagues, Officers in Charge of prisons and ex prison staff (the latter two helped in identifying the technical language used by prisons community as opposed to ones which had been used by the researcher so that the instrument could easily be understood by the local prison staff who were the targeted population).

3.12.2 Reliability

According to Acai (2015), reliability is all about measurement being consistent, or the extent at which an instrument produces the same result when used several times and subjected under the same conditions. For this study, the internal consistency reliability test was used which according to Acai (2015), depicts how items in the instrument thought to be or claimed to measuring the same thing ought to be highly correlated. The

internal consistency was determined by the Cronbach alpha method. It's the most popular method, with the Cronbach reliability coefficient falling between 0 and 1. The higher the value, the more reliable the instrument is. The scale which is internally consisted is considered reliable i.e., do different people experience the same behaviour of the scale when they differently administer them? (Lai and Pang, 2010). This study had four specific objectives, therefore the Cronbach alpha was determined by factor analysis. In factor analysis the Cronbach alpha for the variables in each specific objective is computed independently and then the average for the four specific objective is got as the overall alpha coefficient for the questionnaire. For the variables under each specific objective, runs of the test were done using SPSS Version 25 until a consistent alpha coefficient was achieved. If it so happened that in a run, deleting of a variable(s) resulted into increase of the alpha coefficient at that run, then that/those specific variable(s) was/were deleted from the list. The process was repeated until deleting of any one variable in the list didn't result into increase of the alpha coefficient. And the alpha coefficient at that point was considered as the consistent Cronbach alpha coefficient of the remaining variables of that specific objective. Table 3.4 shows the results of the test with the average Cronbach alpha coefficient for the questionnaire as 0.9405 (See Appendix.3 in the Appendix for details).

Table 3.4 Reliability Test Results for the Questionnaire

Item	**Number of items**	**Cronbach's Alpha coefficient**
Key Performance Indicators	25	0.971
Maintenance Practices	6	0.915
Risk factors	6	0.893
Satisfaction factors	27	0.983
Overall reliability of the instrument	**64**	**0.941**

Key performance indicators had 25 variables with an alpha coefficient of 0.971 , implying that the variables were 97% reliable; maintenance practices had six variables with an alpha coefficient of 0.915, implying that the variables were 91% reliable; risk factors had also six variables with an alpha coefficient of 0.893, implying that the six variables were 89% reliable and finally satisfaction factors had 27 variables with an alpha coefficient of 0.983, showing that the variables were 98% reliable. The overall alpha coefficient for the questionnaire was 0.941, implying that, in general, all the 64 variables in the questionnaire were 94% reliable, which is a high reliability and way above the thresh hold. Reliability coefficient of 0.7 is considered the minimum (Lai and Pang, 2010).

3.13 Data analysis

Every data which was collected from the field was checked for accuracy, relevancy, mistakes and completeness. Both quantitative and qualitative data analysis techniques were used.

3.13.1 Quantitative data analysis

Quantitative data was entered into Ms Excel from where it was exported to Stata for further analysis. Descriptive statistics in form of frequencies formed the basis for analysis. Relative Importance Index (RII) was generated from the frequencies and then regression analysis was carried out using the relative important indices to determine the relation between independent and dependent variables. Relative Importance Index (RII) of key performance indicators, maintenance practices, risk factors and satisfaction factors were found using the formula;

$RII = (W_1+W_2+W_3+\ldots\ldots+Wn)/A*N$……..……..(Equation 3.4)

where W_i= Weight computed for each factor/variable; for a particular point on the likert scale continuum. The weight was got by multiplying the score assigned to the factor/variable by the respondents (it ranges from 1 to 5, where 1 is less significant and 5 is extremely significant) by the frequency of respondents with that particular score. A= the highest point on the likert scale (i.e. 5 in this case) and N= total number of respondents. This helped to identify which factors were relatively more important in affecting stakeholder satisfaction basing on the magnitude of the RII; the higher the value the more important the factor with that value was, hence more satisfying.

For multiple regression analysis, the average of the Relative Importance Indices (RII) of the variables tabulated was computed and only variables with the RII greater than the average RII were considered significant and used for multiple regression analysis, while variables with RII lower than the average RII were not considered for regression analysis. The general regression equation was:

$$Y=\alpha_0+\alpha_1X_1+\alpha_2X_2+\alpha_3X_3+\alpha_4X_4+\mu \quad \text{(Equation3.5)}$$

Regression procedure: significant independent variables (key Performance Indicators, maintenance practices and risk factors) were regressed on the significant dependent variables (satisfaction factors).

Where: Y were satisfaction factors, which were the dependent variable. X were defined as; key Performance indicators, maintenance practices and risk factors.

The independent variables included;

X_1 =Key performance indicator/risk factor/maintenance type one

X_2 = Key performance indicator/risk factor/maintenance type two

X_3 = Key performance indicator/risk factor/maintenance type three

X_4 = Key performance indicator/risk factor/maintenance type four

α_0 is the constant/Y-intercept and the researcher suppressed it to 0 (zero) as by default, the dependent variable (stakeholders' satisfaction) is zero when the independent or predicting variables are zero; α_1, α_2, α_3, and α_4 are the regression coefficients.

μ is an error term, which is normally distributed about the mean of 0 and for purpose of computation, μ is assumed to be 0.

3.13.2 Qualitative data analysis

Under specific objective one, the categories were General indicators, Staff support indicators, Inmates' ward indicators and Rehabilitation programs indicators. The six variables under specific objective 2 were considered as standalone variables, thus each being a category of its own, so do the six variables in specific objective 3, the variables in specific objective 4 were categorized under Planning stage, Design stage, Construction stage and Commissioning stage. From the sorted-out data, transforming was done for

each variable to determine the number of respondents with similar responses in regard to each point on the Likert scale. This formed a basis for greater understanding of respondents' opinions on the variables by deriving it from the number of respondents each point on the Likert scale registered for a particular variable and then comparison was made across the variables basing on the numbers generated. This formed a basis for weighting, for computing relative important index during quantitative analysis discussed in the preceding subsection.

Qualitative analysis involved a three-content analysis i.e. examination of previous research, frequent debriefing sessions and reflective commentary. The objective of the three analysis according to Zhang et al. (2016) are as follows; frequent debriefing sessions are to broaden the knowledge of the researcher in the subject area through interactions between the researcher and a supervisor. Meanwhile in reflective commentary, the researcher stimulates the brain by studying the pattern of processed/summarised data, predict interim findings and make interim inferences as the study envolves to give an insight of end result. The examination of previous research is done to contexualize the study findings with the existing body of knowledge.

3.14 Measurement of Variables

Variables are the elements that the researcher measures, controls and manipulates (Acai, 2015). The kind of data collected were data which was capable to be modelled using statistical models; the statistical models bear the capability to include data at interval, ordinal and categorical levels of measurements (Pati et al., 2010). Table 3.5 shows the variables used in the study, their categories and the associated measurement scales.

Table 3.5 Variables, categories and measurement scales

Variable	Categories	Measurement scale
Key performance Indicators	General indicators Staff support indicators Inmates ward indicator Rehabilitation programs	Ordinal
Knowledge of maintenance types	Conditioned based Total productive Reliability centred Predictive Perfect	Ordinal
Knowledge of maintenance risk factors	Focus in defining objectives Commitment by Stakeholders Availability of finance	Ordinal
Satisfaction factors	Planning stage Design stage Construction stage	Ordinal
Gender	Male Female	Nominal
Education level	PHD Advanced degree First degree Diploma Certificate	Ordinal

	UACE UCE	
Age	18-30 31-40 41-50 51-60	Interval
Experience	<5 years 6-15 years 16-25 years 26-35 years >35 years	Interval

The Likert Scale was used to quantify the ordinal responses gathered during empirical surveys and was designed on different basis as follows: To evaluate the state of Uganda's prisons' buildings in respect to key performance indicators, 1= highly dissatisfied, 2= dissatisfied, 3= partially satisfied, 4= satisfied and 5= highly satisfied. To know the maintenance practices used in Uganda's prisons, 1= very low, 2= low, 3= moderate, 4= high and 5= very high. To know maintenance risk factors to be mitigated, 1= rarely, 2= somewhat likely, 3= likely, 4= very likely and 5= almost definite and finally to know the advantage of satisfaction factors for developing a maintenance framework for assessing prisons' stakeholders' satisfaction, 1= very low, 2= low, 3= moderately high, 4= high and 5= very high.

3.15 Ethical issues

The identity of study population was protected and all information outside the study topic got from prisons was confidential. Data collected and the drafted report was shared with the Officers in Charge and Commissioner in charge of Research and Training to verify for authenticity before submission.

3.16 Achievement of specific objectives

3.16.1 Objective 1 Evaluating the current state of Uganda's prisons' buildings in respect to key performance indicators in satisfying rehabilitation needs of Uganda's prisons' stakeholders.

The performance of prison facilities was assessed based on prisons' staff satisfaction ratings using maintenance performance criteria (Ajayi et al, 2018). Likert scales of; 1= Highly dissatisfied; 2= Dissatisfied; 3= Partially satisfied; 4= Satisfied; 5= Highly satisfied were used to rate the performance of prison's buildings in regards to predetermined key performance indicators identified from literature review. The Relative Importance Index (RII) of each performance indicator was computed and then the performance indicators were then ranked in ascending order basing on the relative importance index. Key performance indicators with RII greater than average RII were considered for multivariate regression analysis. Multivariate regression analysis was carried out to validate questionnaire results about the impact of key performance indicators in satisfying Uganda's prisons' stakeholders' needs.

3.16.2 Objective 2 Knowledge of maintenance/renovation types used in Uganda's prisons' to satisfy rehabilitation needs of prisons stakeholders

Likert scales of; 5= Very high; 4= high; 3= Moderately high; 2= Low; 1= Very low were used to know the level of use of maintenance types in maintaining prisons' buildings. The relative Importance Index (RII) of each variable was computed and a ranking was done in ascending order basing on the RII. Average RII of all maintenance/rehabilitation types was later on calculated. Maintenance types with RII greater than average RII were considered for multivariate regression analysis. Multivariate regression analysis was carried out to validate questionnaire results about the impact of maintenance types in satisfying Uganda's prisons' stakeholder needs.

3.16.3 Objective 3 Knowledge of the maintenance/renovation risk factors to be mitigated in order to satisfy rehabilitation needs of Uganda's prisons' stakeholders

Likert scale of: 1= Rarely, 2= Somewhat likely, 3= Likely, 4= Very likely and 5= Almost definite was used to know the level of occurrence of the maintenance risk factors during maintenance of prisons' buildings, which should be mitigated in order to satisfy rehabilitation needs of Uganda's prisons' stakeholders. The likelihood of occurrence of the risk factor signified the importance of the risk factor. The Relative Importance Index (RII) of each risk factor was computed and a ranking was done in ascending order basing on the RII; the average RII was later on computed. Then risk factors with RII greater than average RII were considered for multivariate regression analysis. Regression analysis was used to validate questionnaire results about the impact of the maintenance risk factors in satisfying the rehabilitation needs of Uganda's prisons' stakeholders.

3.16.4 Objective 4 Developing a maintenance framework for assessing prisons' stake holders' satisfaction

After validating the questionnaire results about impact of key performance indicators, maintenance/renovation types and maintenance/renovation risk factors in satisfying rehabilitation needs of Uganda's prisons' stakeholders; those key performance indicators, maintenance types and risk factors which significantly impacted on stakeholder's satisfaction were used to develop value - based maintenance management framework. Stakeholders' satisfaction was operationalised under various satisfaction factors whose advantage in ensuring stakeholders' satisfaction was rated on Likert scales of 1= Very low, 2= Low, 3= Moderately high, 4= High and 5= Very high.

3.17 Chapter summary

This chapter was all about the roadmap for going through the research process and the ethical issues to be addressed which lead to results, discussions and conclusions in chapters four and five.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSION OF FINDINGS

4.1 Introduction

This chapter presents the response rate, normality test for data, demographic presentations and analysis, respondent's knowledge of value management concept and empirical presentations, analysis and discussion of findings obtained from the field. Response rate and demographic analysis were presented using descriptive statistics. Then relative importance index and multivariate regression analysis were used for empirical analysis; guided by the study objectives.

4.2 Response rate

The response rate indicates the questionnaire and interview guide return rate after conducting the field study. It is presented in Table 4.1:

Table 4.1 Response rate

Respondents category	Administered questionnaires and interview guides	Retrieved questionnaires and interview guides	Percentage response
Prison's staff and ex prisoners	133	131	98%

All the 123 respondents (custodial staff) who were randomly sampled for questionnaire responses successfully took part in the study, where as 8 of the 10 purposively sampled key informants who were to provide information that supplemented that from the questionnaires successfully took part in this study. This implied that there was a combined total of 133 sampled respondents (randomly sampled and purposively

sampled), of which 131 successfully responded; translating to 98% response rate. This high response rate is explained by the nature of study population i.e. prisons' community being a security organisation, subordinates are considered to be so loyal to superiors. The Officers in Charge helped the researcher to administer questionnaires and instruct the custodial prisons' staff to fill the questionnaires; therefore, custodial staff overwhelmly responded to their respective Officers in Charge's instructions to fill the questionnaires.The Officers in Charge also overwhelmly responded to the Regional Prisons' Commander's instructions to help the researcher in among others responding to interview guides. In return, the regional prisons' commander also overwhelmly responded to the Commissioner General of Prisons' instructions as regards guiding the researcher; hence the 98% response rate. Therefore, this was a good percentage response rate for meaningful study findings. The researcher targeted a response rate of at least 80% as recommended by Lai and Pang (2010); to enable statistical analysis.

4.3 Socio-demographic analysis of the study population

This involved analysis of the socio-demographic characteristics of the study population as stated and responded to on the questionnaire and interview guide. Table 4.2 presents the socio demographic statistics:

Table 4.2 socio-demographics of the respondents

Gender	Frequency	Percentage (%)
Male	84	68
Female	39	32
Age of the respondent		
18-30 years	41	33
31-40 years	46	37
41-50 years	17	14
51-60 years	19	15
Period in service		
<5 years	47	38
6-15 years	42	34
16-25 years	12	10
26-35 years	22	18
Level of education		
PHD	0	0
Master Degree	1	1
First Degree	11	9
Diploma	28	23
Certificate	21	17
UACE	27	22
UCE	35	28

This study comprised of 68% male prison staff and 32% female staff, hence both male and female opinions were considered in the findings, thus representative findings to all gender. 33% of prison's staff were in the age group of 18 to 30 years, a majority (37%) were 31 to 40 years , only 14% were 41 to 50 years and 15% were 51 to 60 years; hence, most of the prison staff (70%) were at their youthful age of 18 to 40 years, owing to the continuous recruitment being done over the years by the prisons service. Having youths constituting most of the study population also explained the 98% response rate as youths are considered newer recruits compared to their counter parts in the advanced age . Thus, were and are more loyal, honest, active and willing to obey their respective Officers in Charge's instructions to fill the questionnaires. Most of the prison's staff, 38%, who took part in this study had spent less than 5 years in prison service, 34% had spent 6 to 15

years, only 10% had spent between 16 to 25 years and 18% had spent 26 to 35 years. Only 28% had spent more than 16 years in the service. This is due to high attrition rate at prison service of 250 staff in prison per year (Government of Uganda, 2016), thus the respondents were not experienced enough to representatively respond to all the study questions; hence, limitation in findings. Most of the respondents, 28%, had attained Uganda Certificate of Education (UCE), 23% attained diplomas, 22% attained Uganda Advanced Certificate of Education (UACE) and the least percentage of prison staff had attained first degree (9%) and advanced degree (1%). This therefore implied that the study population was knowledgeable to read, interpret and respond to the study questions as the least educated had Uganda Certificate of Education, hence would lead to meaningful findings. As for the three purposively sampled ex prisoners, all were in the prison for the past 10 years and no significant improvements in the prisons' buildings were observeable with in the purposively chosen prisons in the last 10 years; hence, the point in time of which the ex prisoners were imprisoned was valid for achieving of an up to date information from the ex prisoners.

4. 4 Normality tests of data set

Conformance to normality was determined basing on Shapiro-Wilk criteria. According to Shapiro-Wilk criteria, the data set is considered normally distributed when the probability of significance (Sigma value, α) is greater than the level of significance (0.05 for this study). To obtain the sigma value, the relative importance indices of the variables under each item was entered in to SPSS version 25 and steps for determining normality using the SPSS software was followed. The result of the test produces Shapiro-Wilk

sigma value, among others. Table 4.3 shows the test results and Appendix.4 in the Appendix shows the detailed normality test statistics.

Table 4.3 Normality test results for data set

Item	**Number of Items**	**Shapiro-Wilk Sigma value, α**
Key Performance Indicators	25	0.160
Maintenance Practices	6	0.899
Risk Factors	6	0.936
Satisfaction Factors	27	0.103

In respect to the data on key performance indicators, since the sigma value (0.160) is greater than the level of significance (0.05), then the data set on key performance indicators was normally distributed. As for data on maintenance practices, since the sigma value (0.899) is greater than the level of significance (0.05), then the data set on maintenance practices was also normally distributed. For risk factors, since the sigma value (0.936) is greater than the significance level (0.05), then the data set on risk factors was normally distributed. Finally, for satisfaction factors; since the sigma value (0.103) was greater than the level of significance (0.05), then the data set on satisfaction factors was normally distributed. Since all the data especially that of the dependent variable i.e. satisfaction factors were normally distributed then statistical analysis like multivariate regression analysis could be carried out.

4.5 Knowledge of concept of Value Based Maintenance Management

This study sought to establish respondents' knowledge of the concept of value-based maintenance management. The findings are presented in Table 4.4:

Table 4.4 Respondents' knowledge on value management concept

Received Value Engineering Training	**Frequency**	**Percentage (%)**
Yes	20	16
No	103	84
Participation in Value Engineering Workshop		
Yes	19	15
No	104	85
Rating of Knowledge of VMC		
Very good	1	5
Good	15	71
Moderately good	5	24

Only 16% of prisons' staff had trained in value engineering, 15% attended value engineering workshop and when it reached the general rating of their knowledge on value maintenance concept only 21(17%) out of the 123 randomly sampled respondents responded. Of the 21 who responded, 71% rated their knowledge of value maintenance concept as good. Hence, most of the 21 respondents who responded were knowledgeable of the concept of value-based maintenance management. When key informants were interviewed whether they had an idea on value based maintenance, 5 out of the 8 key informants (63%) gave a feed back which reflects that they had an idea on the concept .This result is in tanderm to questionnaire survey results basing on the fact that all are above average on a continuous scale i.e above 50%; signifying that, generally the stakeholders were knowledgeable about the concept of value based maintenance. This differs with Ramly et al. (2015) finding as the knowledge of the respondents in their

study on value management was rated at only 16%. However, this difference could be because in this study, only 17% of the respondents rated their knowledge of value management concept, the rest didn't rate; 83% of the questionnaire respondents did not rate their knowledge on the concept of value maintenance, thus a limitation in study findings. Ramly et al. (2015) also reported that 59% of their respondents had taken part in a VM workshop, as opposed to 15% for this study.

With the above withstanding, to know whether value based maintenance management is practiced in prisons, key informants were interviewed as to whether the staff or inmates are involved in maintenance of prisons buildings right from planning to completion of maintenance works; as required by the concept of value based maintenance. Four out of the 8 key informats (50%) stated that they were not involved and also 4 key informants (50%) stated that they were involved. However, of those who stated that they were involved, they pointed out that staff were involved only at construction/implementation stage of maintenance through escorting skilled and unskilled inmates who participate in the construction works and renovations.

Involvement of staff and inmates only at construction stage of maintenance signified that they implemented plans and designs which they didn't participate in developing and thus doesn't address their needs. This is against the concept of value based maintenance management as the concept requires stakeholder involvement right from planning stage to implementation/construction stage. More so, staff involvement through escorting inmates is not substantial to the value based maintenance management concept.

Therefore, much as the study findings indicated that prisons' staff are knowleageable on the concept of value based maintenance management, the concept is not practised in the maintenance management of prisons' buildings.

4.6 Empirical Findings

4.6.1 The current state of Uganda's prisons' buildings in respect to key performance indicators in satisfying rehabilitation needs of Uganda's prisons' stakeholders

This study evaluated the current state of Uganda's prisons' buildings based on the key performance indicators as ranked in Table 4.5:

Table 4.5 Ranking of key performance indicators which satisfies rehabilitation needs of Uganda's prisons' stakeholders

Key performance Indicators	HD	D	PS	S	HS	W1	W2	W3	W4	W5	A	T1	T2	A*T1	RII	Ranks	KPIC
Peeping openings on doors of wards	16	10	20	48	29	16	20	60	192	145	5	123	433	615	0.7041	1	SS
Open space around the perimeter fencing	19	11	19	47	27	19	22	57	188	135	5	123	421	615	0.6846	2	GI
Hygiene in prison	15	8	43	30	27	15	16	129	120	135	5	123	415	615	0.6748	3	GI
Convenient dedicated area for agriculture	19	12	26	37	29	19	24	78	148	145	5	123	414	615	0.6732	4	RP
Adequate treatment centers	11	19	40	32	21	11	38	120	128	105	5	123	402	615	0.6537	5	IW
Working environment for staff	12	17	37	40	17	12	34	111	160	85	5	123	402	615	0.6537	6	SS
Proximity of staff deployed from administrators	12	21	30	45	15	12	42	90	180	75	5	123	399	615	0.6488	7	SS
Sanitary facilities and services	11	20	42	34	16	11	40	126	136	80	5	123	393	615	0.6390	8	IW
Separation within prison	11	20	42	34	16	11	40	126	136	80	5	123	393	615	0.6390	9	IW
Agate with agateroom	26	14	29	39	15	26	28	87	156	75	5	123	372	615	0.6049	10	RP
Wards shared by not more than five inmates	23	27	23	31	19	23	54	69	124	95	5	123	365	615	0.5935	11	IW
Quality of interior	26	17	42	28	10	26	34	126	112	50	5	123	348	615	0.5659	12	GI
Proximity of wards from staff quarters	22	23	40	31	7	22	46	120	124	35	5	123	347	615	0.5642	13	SS
Steel mesh perimeter fencing	32	15	35	27	14	32	30	105	108	70	5	123	345	615	0.5610	14	GI
Special rooms	26	31	26	26	14	26	62	78	104	70	5	123	340	615	0.5528	15	IW
Communication	33	19	28	31	12	33	38	84	124	60	5	123	339	615	0.5512	16	GI
Steel mesh fenced walkways	32	27	31	20	13	32	54	93	80	65	5	123	324	615	0.5268	17	GI
Provision for a shop	33	30	21	29	10	33	60	63	116	50	5	123	322	615	0.5236	18	IW
convinient dedicated place for recreation	33	27	28	27	8	33	54	84	108	40	5	123	319	615	0.5187	19	RP
Adequate staff accommodation and welfare	30	29	36	25	3	30	58	108	100	15	5	123	311	615	0.5057	20	SS
Adequate space for meeting visitors	28	34	34	22	5	28	68	102	88	25	5	123	311	615	0.5057	21	IW
Sound insulation	33	31	34	17	8	33	62	102	68	40	5	123	305	615	0.4959	22	GI
Security	54	24	24	14	7	54	48	72	56	35	5	123	265	615	0.4309	23	GI
Provision for rest rooms	65	30	13	8	7	65	60	39	32	35	5	123	231	615	0.3756	24	IW
Wards with all domestic rooms	70	26	20	3	4	70	52	60	12	20	5	123	214	615	0.3480	25	IW
Average															**0.568**		

HD=Highly Disatisfied, D=Dissatisfied, PS=Patially Satisfied, S=Satisfied, HS=Highly Satisfied, W_1*=Weight*$_1$*,* W_2*=Weight*$_2$*,* W_3*=Weigh*$_3$*,* W_4*=Weight*$_4$*,* W_5*=Weight*$_5$*,* T_2*=Sum of weights(*$W_1+W_2+W_3+W_4+W_5$*), A=Highest score of the scale,* T_1*=Total number of questionnaire respondents, RII=Relative Importance Index, KPIC= Key performance indicators categories, GI= General Indicators, SS= Staff Support, IW= Inmates' ward, RP= Rehabilitation Programes.*

Table 4.5 presents questionnaire's findings of key performance indicators for satisfying rehabilitation needs of Uganda's prisons' stakeholders, basing on their relative importance indices. The higher the RII, the more respondents were satisfied with the indicator and vice versa. The average RII was 0.568; thus, the indicators whose relative importance indices were above the average value were the indicators which were concidered to be satisfying the rehabilitaion needs of the stakeholders. Results of interviews held with 8 Key informants in the capacity of Officers in Charge,Welfare and Rehabilitation/Reintergration Officers/ Principal Officer 1/ Assistant Superitendant of Prisons and ex prisoners aided in comparisons with the questionnaire results. This gave a deep insight on the state of affairs in prisons regarding the key performance indicators. Below were the findings.

Peeping openings on doors of wards was the highest satisfying indicator with RII=0.7041, followed by open space around the perimeter fencing (RII=0.6846); out of the 8 key informants, its only the ARRO of lira women prison who revealed that the prison's environment is a small (no gardens) space for expansion. Hygiene in prisons was the third relative important (RII=0.6748) indicator, this was also echoed by the ex prisoners from Lira central prison and Atopi prison in Apac district; citing that prison

wards needs to be fumigated against lice and bed bugs and poor housing condition respectively, then convenient dedicated area for agriculture (RII=0.6732) came fourth. Adequate treatment centres (RII=0.6537) was the fifth; however, the Rehabilitation and Reintergration Officer of Apac prison stated that there was no sick bay to help monitor very well the sick while the ex prisoner from Lira stated that response to medical needs of prisoners is poor. Working environment for staff (RII=0.6537) was the sixth; with only the Rehabilitation and Reintergration Officer of Apac prison stating that office structures are a problem except for a few shared uniports. Proximity of staff deployed from administrators (RII=0.6488) was the seventh relatively important key performance indicator. The eighth relatively important key performance indicator was sanitary facilities and services (RII=0.6390). It is only the ARRO of Lira women prison who pointed out that toilets and bathrooms should be many in inmates' wards such that when inmates are locked, they don't struggle for bathing. She also emphasized that pit latrines be constructed to help incase of water shortage in dry seasons.

Separation within prison was the ninth relatively important key performance indicator (RII=0.6390); with divergence coming from the PO1 of Oyam district prison who cited no separation rooms for categorizing inmates and no rehabilitation rooms. This is the cause of some of the re -offending in prisons as it was reported in Rupiny (30th Oct - 5th Nov 2019, p4), in Oyam district its self; mixing inmates of different criminological characteristic is jeopardising the rehabilitation efficiency of rehabilitation programmes.

A gate with a gate room (RII=0.6.49) was the tenth relatively important key performance indicator in satisfying rehabilitation needs of Uganda's prisons' stakeholders. Wards not shared by not more than 5 inmates (RII=0.5935) was the last performance indicator

which ranked above average RII(RII=0.568), thus satisfied stakeholders. This contradicted with the interview results of four of the key informants ; The ex prisoner from Atopi prison in Apac district revealed that there is poor housing condition for inmates. The Rehabilitation and Reintergration Officer of Apac prison stated that the wards are too small and narrow to accommodate inmates and the ex prisoner from Lira prison echoed this concern when he stated that there is congestion in wards which discomforts inmates. The CASP of Apac district prison also re -asserted this concern stating that prisoners' wards need to be improved and more constructed to enhance rehabilitation of prisoners and curb congestion.

Provision of rest rooms (RII=0.3756) and wards with all domestic rooms (RII=0.3480) were the second last and last important key performance indicators respectively in satisfying rehabilitation needs of Uganda's prisons' stakeholders; implying that, they were the indicators the prisons' staff were least satisfied with. The lack of wards with all domestic rooms was backed up by the interview with the CASP of Apac district prison who stated that the prison's wards need to be improved. The Welfare and Rehabilitation Officer at Oyam district male prison stated that in most cases the buildings reminds the inmates of being offenders which jeopardises their rehabilitation efficiency as the environment doesn't depict life outside; which new prisons innovations are advocating for, as environment cues behaviour. In that regard, the Welfare and Rehabilitation Officer at Oyam district male prison stated that the sleeping accommodation should be the one which meets all the requirements of health, climatic conditions and flow of air, minimum space, lighting, heating and ventilation. Failure to recognise the importance of having wards with domestic rooms is making prisons to miss some important rehabilitation element; Kenis et al. (2010) pointed out that one expectation from this

setting, is of ensuring that fewer officers are needed in monitoring and supporting inmates; as when the inmates are accommodated in a group of six, they socialize positively and help each other.

Other key performance indicators whose relative importance indices were below average and were areas of concern from interviews with key informants are: sound insulation and convenient dedicated place for recreation. The ARRO of Lira district women prison cited noise pollution from ambulances, promotions, parties, elections etc because of the prisons being located in a city. As regards to recreation area, the Rehabilitation and Reintergration Officer of Apac district prison pointed out that inside boma the compound is very squeezed to allow recreational activities espencially football. She also recommended for many trees to be planted where inmates can sit, conduct song practices, pray e.t.c which helps them to relax and be stress free. From the ex prisoners' perspective, the ex prisoner from Lira men prison singled out that the kitchen and ward's floors needs to be improved and a wall fence built to replace the existing chain link fence for security purpose where as the ex prisoner from Atopi prison in Apac district pointed out that the toilets are the ones which needs urgent improvement.

4.6.2 The maintenance practices used in Uganda's prisons to satisfy rehabilitation needs of Uganda's prisons' stakeholders

This study established the maintenance practices used in Uganda's prisons to satisfy rehabilitation needs of the stakeholders as indicated in Table 4.6:

Table 4.6 Ranking of maintenance practices used in Uganda's prisons

Maintenance types	VH	H	MH	L	VL	W5	W4	W3	W2	W1	A	T1	T2	A*T1	RII	Ranks
Total productive maintenance	32	34	24	24	9	160	136	72	48	9	5	123	425	615	0.691	1
Preventive maintenance	22	27	29	28	17	110	108	87	56	17	5	123	378	615	0.615	2
Conditioned based maintenance	21	17	44	24	17	105	68	132	48	17	5	123	370	615	0.602	3
Predictive maintenance	23	16	27	33	24	115	64	81	66	24	5	123	350	615	0.569	4
Perfect maintenance	13	22	34	38	16	65	88	102	76	16	5	123	347	615	0.564	5
Reliability centred maintenance	11	14	26	40	32	55	56	78	80	32	5	123	301	615	0.489	6
Average															**0.588**	

VH=Very High, H=High, MH=Moderately High, L=Low, VL=Very Low, W_1=Weight$_1$, W_2=Weight$_2$, W_3=Weigh$_3$, W_4=Weight$_4$, W_5=Weight$_5$, T_2=Sum of weights ($W_1+W_2+W_3+W_4+W_5$), A=Highest score of the scale, T_1=Total number of respondents, RII=Relative Importance Index.

The study findings in Table 4.6 indicates maintenance practices in a pecking order based on their relatively important maintenance practice and thus the most used maintenance practice. The maintenance practices whose RII ranked above average RII (0.588) were total productive maintenance, preventive maintenance and conditioned based maintenance with RII = 0.691, 0.615 and 0.602 respectively. Implying that, in the pecking order they were the mostly practiced maintenance practice used in prisons.

The result of the questionnaire survey in respect to conditioned based maintenance being one of the mostly used maintenance practice agreed with the results from the key informants' interviews conducted. The ARRO of Lira district women prison looked at maintenace in respect to physical state of the building. She stated that maintenance are done basing on the general physical condition of the houses in respect to cracks, leakages, old ironsheets, washed off paints, broken glasess etc. While the PO1 of Oyam

district women prison stated that beside the state of a structure at a particular time being a basis for maintenance descisions, maintenance needs in prisons is also assessed in terms of population increase in the prisons and time spent without renovation works.

The Rehabilitation and Reintergration Officer of Apac district prison wasn't sure, though in her own words, she states; 'I think they involve the planner/engineer who goes to assess the situation or the needs that he gives the report to the higher authority'. Her version of condition was in respect with the needs of the end users of the buildings. The Welfare and Rehabilitation Officer of Oyam district male prison, the ex prisoner from Lira male prison and CASP of Apac district prison were specific on the needs. They cited majorly security needs and building safety to inmates or staff as the basis for determining maintenance descisions. The ex prisoner high lighted also disease control as the basis for maintenance. On another note, the ex prisoner from Atopi prison cited maintenance to depend on financial availability. All the insights given by the different key informants about maintenance in prisons are aspects of conditioned based maintenance; thus backing up the results from the questionnaire surveys.

4.6.3 The maintenance risk factors to be mitigated in order to satisfy rehabilitation needs of Uganda's prisons' stakeholders

This study established the following list of maintenance management risk factors to be mitigated in order to satisfy rehabilitation needs of Uganda's prisons' stakeholders as indicated in Table 4.7:

Table 4.7 Ranking of risk factors preventing satisfying rehabilitation needs of Uganda's prisons' stakeholders

Risk factors	AD	VL	L	SWL	R	W5	W4	W3	W2	W1	A	T1	T2	A*T1	RII	Ranks
Not sticking to project plans	14	22	25	20	42	70	88	75	40	42	5	123	315	615	0.512	1
Low participation rate	9	16	35	30	33	45	64	105	60	33	5	123	307	615	0.499	2
Stakeholders' lack of knowledge	13	15	30	23	42	65	60	90	46	42	5	123	303	615	0.493	3
Lack of documentation	21	9	25	14	54	105	36	75	28	54	5	123	298	615	0.485	4
Poor communication	11	12	36	21	43	55	48	108	42	43	5	123	296	615	0.481	5
No commitment of project parties	8	14	33	19	49	40	56	99	38	49	5	123	282	615	0.459	6
Average															**0.488**	

AD=Almost Definite, VL=Very Likely, L=Likely, SWL=Some What Likely, R=Rarely, W_1=Weight$_1$, W_2=Weight$_2$, W_3=Weigh$_3$, W_4=Weight$_4$, W_5=Weight$_5$, T_2=Sum of weights ($W_1+W_2+W_3+W_4+W_5$), A=Highest score of the scale, T_1=Total number of respondents, RII=Relative Importance Index.

Not sticking to project plans and decisions made, low participation rate by stakeholders and lack of knowledge and inexperience on stakeholder needs with RII= 0.512, 0.499 and 0.493 respectively were the riskfactors whose RII ranked above the average RII(0.488). Therefore, they were the factors of which the results of the questionnaire survey showed as the most important risk factors the prisons' maintenance management should mitigate so that prisons' stakeholders get satisfied by a maintenance service.

Not sticking to project plans and decisions made emerged to be the most relatively important risk factor (RII= 0.512) to be mitigated. This could be due to the fact that contractors do shoddy works to maximize profits as it was evident to ceilings across most prisons' buildings where staff complained that all are sagging and on a verge of collapsing. The ceilings are in that state because the plans were not stuck to at the time of implementation. Low participation rate by stakeholders was the second relatively

important risk factor (RII= 0.499), then the third relatively important risk factor (RII= 0.493) was stakeholders' lack of knowledge and inexperience on stakeholder needs . The third finding is in line with Ramly, Shen and Yu (2015) finding, who reported facilitators experience in facilitating the VM workshop to be one of the critical success factors with a low score.

In context to the interviews conducted with the key informants, ex prisoners from the districts of Apac and Lira stated that prisons' buildings were not maintained satifactorily because staff and inmates are not involved during renovation works. The PO1 of Oyam district women prison together with the Rehabilitation and Reintergration Officer of Apac district prison stated delays in plan implementations as another risk factor; which is in line with not sticking to project plans and descisions made revealed from the questionnaire results.

4.6.4 Stakeholders satisfaction factors for developing maintenance framework

This study evaluated the factors which must be considered at different stages of maintenance management i.e planning stage, design stage, construction stage and commissioning stage; which would lead to stakeholder satisfaction during evaluation of key performance indicators, during implementation of maintenance practices and during addressing risk factors as indicated in Table 4.8:

Table 4.8 Ranking of satisfaction factors at different stages of maintenance management

Satisfaction factors	VH	H	MH	L	VL	W5	W4	W3	W2	W1	A	T1	T2	A*T1	RII	Ranks	MS
Division of responsibilities and roles	46	30	29	12	6	230	120	87	24	6	5	123	467	615	0.759	1	CS
Preparation and understanding of what to be discussed during meetings	45	28	31	14	5	225	112	93	28	5	5	123	463	615	0.753	2	PS
Having a structure which can be repaired by available local labour and materials	34	40	32	13	4	170	160	96	26	4	5	123	456	615	0.741	3	CS
Good involvement and commitment of project stakeholders	33	41	23	16	10	165	164	69	32	10	5	123	440	615	0.715	4	PS
Good workmanship	36	27	39	13	8	180	108	117	26	8	5	123	439	615	0.714	5	CS
Making descisions aiming at addressing priority needs	30	48	16	19	10	150	192	48	38	10	5	123	438	615	0.712	6	PS
Sticking to resolved action plan and descision(s) made	32	34	32	19	6	160	136	96	38	6	5	123	436	615	0.709	7	PS
Knowledge and experience by stakeholders on the method of determining priority needs	30	41	25	18	9	150	164	75	36	9	5	123	434	615	0.706	8	PS
Knowing what stakeholders want	35	29	35	13	11	175	116	105	26	11	5	123	433	615	0.704	9	DS
Knowing what stakeholders want	40	25	26	22	10	200	100	78	44	10	5	123	432	615	0.702	10	PS
Documentation of existing prison construction and infrustructure	27	40	35	10	11	135	160	105	20	11	5	123	431	615	0.701	11	DS
Adequate technical staffing at prisons to guide design team	29	41	22	23	8	145	164	66	46	8	5	123	429	615	0.698	12	DS
Clear responsibilities and roles of participants/stakeholders	31	36	29	15	12	155	144	87	30	12	5	123	428	615	0.696	13	PS
Professional training	35	31	26	19	12	175	124	78	38	12	5	123	427	615	0.694	14	CS
Techniques and working methods in line with stakeholder's satisfaction	27	39	29	18	10	135	156	87	36	10	5	123	424	615	0.689	15	CS
Ability to adapt to changes	26	39	28	23	7	130	156	84	46	7	5	123	423	615	0.688	16	CS
Having risk control measures	28	33	29	21	12	140	132	87	42	12	5	123	413	615	0.672	17	CS
Adequate technical staffing levels at construction	29	29	35	16	14	145	116	105	32	14	5	123	412	615	0.670	18	CS
Good involvement and commitment of project stakeholders	27	32	32	20	12	135	128	96	40	12	5	123	411	615	0.668	19	DS
Timely approval of plans and permits	25	28	35	23	12	125	112	105	46	12	5	123	400	615	0.650	20	CS
Venue of commisioning	19	37	28	24	15	95	148	84	48	15	5	123	390	615	0.634	21	CM
Knowing available funds for renovation works	22	30	22	35	14	110	120	66	70	14	5	123	380	615	0.618	22	DS
No budget overruns	19	29	30	31	14	95	116	90	62	14	5	123	377	615	0.613	23	CS
Availabiity of finance	22	25	32	24	20	110	100	96	48	20	5	123	374	615	0.608	24	Cs
Support from Non Government sector	24	28	19	30	22	120	112	57	60	22	5	123	371	615	0.603	25	CS
Timely construction	20	21	41	19	22	100	84	123	38	22	5	123	367	615	0.597	26	CS
Appropriate resource allocation	15	28	30	26	24	75	112	90	52	24	5	123	353	615	0.574	27	CS
Average															**0.677**		

VH=Very High, H=High, MH=Moderately High, VL=Very Low, L=Low, W_1=Weight$_1$, W_2=Weight$_2$, W_3=Weigh$_3$, W_4=Weight$_4$, W_5=Weight$_5$, T_2=Sum of weights($W_1+W_2+W_3+W_4+W_5$), A=Highest score of the scale, T_1=Total number of

questionnaire respondents, RII=Relative Importance Index,MS= Maintenance Stages PS= Planning Stage, DS= Design Stage, CS= Construction Stage, CM= Comisioning Stage

From Table 4.8, the satisfaction factor under the planning stage of maintenance with the highest RII above the average RII of 0.6774 was preparation and understanding of what to be discussed during meetings with RII=0.753. Signifying that it was the most important satisfaction factor during the planning stage of maintenance, followed by good involvement and commitment of project stakeholders (RII=0.715); this was backed by the PO1 of Oyam district women prison who recommended involvement of most stakeholders in planning. Making descisions aiming at addressing priority need was the third relative important (RII=0.712) factor. Stiking to resolved action plan and descision(s) made (RII=0.709) came fourth; which would be among the satisfaction factors which when considered would prevent delays in plan implementations cited by the PO1 of Oyam district women prison and the Rehabilitation and Reintergration Officer of Apac district prison. Knowledge and experience by stakeholders on the method of determining priority needs (RII=0.706) was fifth. Knowing what stakeholders want (RII=0.702) was the sixth relatively important satisfaction factor. Clear responsibilities and roles of participants/stakeholders (RII=0.696) was the seventh and last satisfaction factor which ranked above average under the planning stage of maintenance.

The satisfaction factor under the design stage of maintenance with highest RII above the average RII of 0.6774 was knowing what stakeholders want during design stage with RII=0.704. It signified that it was the most important satisfaction factor during the

design stage of maintenance; steming from the fact that the CASP of Apac district prison specified the gap in stakeholders' participation to be limited consultation from the real beneficiaries of the buildings which deprives the maintenance managers to know what the stakeholders want to be incorporated in the buildings' design. Documentation of existing prisons construction and infrustructure (RII=0.701) was the second satisfaction factor, then adequate technical staffing at prison to guide design team (RII=0.698) was the third and the last important satisfaction factor at design stage of maintenance.

The satisfaction factor under the construction stage of maintenance with the highest RII above the average RII of 0.6774 was division of responsibilities and roles with RII=0.759. It was the most important satisfaction factor during the construction stage of maintenance, followed by having a structure which can be repaired by available local labour and materials (RII=0.741); this would mean that labour and material would be easily accessible and cheap thus preventing delays in plan implementations cited by the PO1 of Oyam district women prison and the Rehabilitation and Reintergration Officer of Apac district prison. Good workmanship was the third relative important (RII=0.714) satisfaction factor, which when considered would address the concerns arising from the interview with the Rehabilitation and Reintergration Officer of Apac district prison and the ARRO of lira district women prison. They pointed out the use of inexperienced casual labourers (cheap labour) and incompetent labour (inadequate skilled man power) respectively in executing construction activities in prisons. Professional training (RII=0.694) was the fifth important satisfaction factor. Techniques and working methods in line with stakeholders satisfaction(RII=0.689) was the sixth relatively important satisfaction factor, ability to adapt to changes during construction (RII=0.688) was the seventh and last satisfaction which ranked above average RII under the construction

stage of maintenance. As for the commisioning stage, the only satisfaction factor which was considered in the study i.e venue of commissioning, had a relative importance index below average i.e (RII=0.634), implying that commisioning doesn't contribute to stakeholfer satisfaction.

Similarly, all the factors in all the stages of maintenance whose RII were below the average RII don't contribute to stakeholders' satisfaction. Of special interest is "availability of funds"; in the ranking it was the fourth last satisfaction factor implying that custodial staff disregarded availability of finance to be a determinant of stakeholder' satisfaction of a maintenance service. The explanation of this was given by the interviewed ex prisoners as they cited corruption and embezzlement tendicies as a hindering factor to maintenance interventions to stakeholders' satisfaction. In a nut shell, funds are availed by government but not efficiently used. In that respect, the ex prisoners from Lira and Apac suggested strict measures to be put in place against corruption and a routine follow by commissioner of prisons on funds released to prisons to curb the mismanagement of availed funds for maintenance of prisons' buildings. Hence, important satisfaction factors. All in all, the results of interviews conducted with the key informants are in tanderm with the questionnaire survey results.

4.7 Regression analysis

Regression analysis was done to validate the results obtained after analysing the data obtained from questionnaires and interview guide. The analysis was done only when the model was of good fit. Measure of good fit depends on R-sq values of the model and the significancy of the independent variables (p values). Generally, in studies which involves human perception such as it was in this study, a model is a good fit with a root

square value (R-sq) as low as 50%; meaning that a low variation in dependent variable as low as 50% being explained by the independent variable still reflects a good fit model. But as the number of independent variables increases, the R-sq value also increases even if the model its self is not good fit. Thus a model can still be of not good fit with a high R-sq value.

Conversely, a model with a high R-sq value and with a high number of independent variables is usually of good fit if the independent variables are statisticaly significant ($p<0.05$). But in instances where there exists variables which are insignificant, the tendency is that the insignificant variables reduces the significancy of the significant variables with in the group, thus reducing the overall significancy power of the group. So insignificancy of any one variable in a group doesn't disqualify a R-sq value in reflecting that a model is good fit for as long as the R-sq value is above 50%. The point to note is that for studies involving human opinion/perception, a group with only significant variables ($p<0.05$) always has a higher R-sq value, which value keeps on reducing as insignificant variables ($p>0.05$) are introduced with in the group and model ceases to be of good fit if the R-sq drops below 50%. On the other when independent variables are few, the high R-sq signifies a model of goot fit.

4.7.1 Key performance indicators on satisfaction factors

Table 4.9 Regression model 1, key performance indicators on satisfaction factors

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. mvreg SPS SDS SCS = GIs SSIs IWIs RPIs, noconstant cformat(%9.3f) pformat(%5.
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Equation	Obs	Parms	RMSE	"R-sq"	F	P
SPS	123	4	.9981626	0.9301	395.7356	0.0000
SDS	123	4	1.105313	0.9123	309.5265	0.0000
SCS	123	4	.9590854	0.9322	409.0414	0.0000

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SPS						
GIs	-0.015	0.119	-0.130	0.897	-0.251	0.220
SSIs	0.381	0.132	2.877	0.005	0.119	0.643
IWIs	0.448	0.145	3.083	0.003	0.160	0.736
RPIs	0.318	0.108	2.949	0.004	0.105	0.532
SDS						
GIs	0.087	0.132	0.658	0.512	-0.174	0.347
SSIs	0.303	0.147	2.064	0.041	0.012	0.593
IWIs	0.360	0.161	2.239	0.027	0.042	0.679
RPIs	0.345	0.120	2.890	0.005	0.109	0.582
SCS						
GIs	0.077	0.114	0.677	0.500	-0.149	0.303
SSIs	0.239	0.127	1.882	0.062	-0.012	0.491
IWIs	0.568	0.140	4.067	0.000	0.291	0.844
RPIs	0.240	0.104	2.315	0.022	0.035	0.445

SPS=Satisfaction at Planning Stage, SDS=Satisfaction at Design Stage, SCS=Satisfaction at Construction Stage, GIs=General Indicators, SSIs= Support staff Indicators, IWIs= Inmates Ward Indicators, RPI= Rehabilitation Programmes Indicators

Regression model 1 summary findings from Table 4.9 above indicates that the model is a good fit.

Under the planning stage, staff support indicators, inmates' wards indicators and rehabilitation program areas with p=0.005, p=0.003 and p=0.004 respectively all are statistically significant ($p<0.05$), with only general indicators with p=0.897 not statistically significant ($p>0.05$). Implying that general indicators as an independent variable does not contribute to achievemnent of dependent variable and therefore, the high R-sq values at the planning (0.9301) reflects a good fit because of the high significancy of staff support indicators, inmates ward indicators and rehabilitation programs indicators. In other words, staff support indicators, inmates ward indicators and rehabilitation programs indicators explained 93% of the variation in satisfying rehabilitation needs of Uganda's prisons' stakeholders at planning stage.

The significancy of staff support indicators, inmates ward indicators and rehabilitation programs indicators at planning stage of maintenance management implied that the use of the indicators enabled realistic stakeholder satisfaction. This finding agrees with Myeda et al. (2011) where there were eleven-line key performance indicators on which maintenance managers performance were assessed i.e. access, general maintenance, sanitary and plumbing, mechanical and electrical, signage, lift or escalators, landscaping, lightings, air conditioning , cleaning and also parking. Among the 11 indicators from which the performance of maintenance managers were assessed only 2 were general indicators i.e. cleaning and general maintenance. General indicators had no significant ($p>0.05$) effect on satisfaction of the rehabilitation needs of Uganda's prisons' stakeholders at planning stage; implying that considering general indicators during planning stage of maintenance didn't yield realistic impact in satisfying prisons' stakeholders.

SPS=0.381SSIs+0.448IWIs+0.318RPIs-0.015GIs……..(Equation 4.1)

Model equation 4.1 indicates that a unit increase in general indicators on average led to 0.015 decrease in stakeholders' satisfaction at planning stage, confirming the insignificancy of general indicators while planning. Whereas a unit increase in staff support, inmates ward and rehabilitation programs indicators on average led to 0.381, 0.448 and 0.318 increases respectively in stakeholders' satisfaction at planning stage, confirming their significance during planning. Therefore, if prisons maintenance team are evaluating its buildings prior to maintenance, emphasis should be on staff support areas e.g. accommodation, inmates ward areas e.g. capacity of cells and rehabilitation areas e.g. recreational areas.

Under the design stage, staff support indicators, inmates' wards indicators and rehabilitation program indicators with p=0.041, p=0.027 and p=0.005 respectively all are statistically significant ($p<0.05$), with only general indicators with p=0.512 not statistically significant ($p>0.05$). Implying that general indicators as an independent variable does not contribute to achievemnent of dependent variable and therefore, the high R-sq values at the design (0.9123) reflects a good fit because of the high significancy of staff support indicators, inmates ward indicators and rehabilitation programs indicators. In other words, staff support indicators, inmates' ward indicators and rehabilitation programs indicators explained 91% of the variation in satisfying rehabilitation needs of Uganda's prisons' stakeholders at design stage.

The significancy of staff support indicators, inmates' ward indicators and rehabilitation programs indicators in satisfying the rehabilitation needs of Uganda's prisons' stakeholders at design stage implied that the use of the indicators led to a realistic

impact in satisfying rehabilitation needs of Uganda's prisons' stakeholders at design stage. This finding correlates with Nelson (2018). The reseracher stated that in the event of carrying out inspections prior to maintenance works, maintenance supervisor works with corrections staff in inspections of jail systems using the following performance indicators; ventilation and air conditioning systems, fire reporting and suppression systems equipment, closed-circuit television and other control centre equipment, steel grill (bars), walls and other security barrier components, lighting and other electrical systems, air conditioning systems, bunks, repainting or refinishing surfaces as needed to prevent deterioration, tables and other furnishings, locks, doors, heating, plumbing, and windows. These indicators fall under staff support, inmates' ward and rehabilitation programs indicators.

However, general indicators had no significant ($p>0.05$) impact in satisfying the rehabilitation needs of Uganda's prisons' stakeholders at design stage. This implied that maintenance designs developed with consideration of general indicators like steel mesh fencings did not lead to a realistic impact in satisfying rehabilitation needs of Uganda's prisons' stakeholders at design stage; hence, agreeing with Myeda et al. (2011) as only cleaning and general maintenance were the only general indicators out of the 11 indicators used for assessing the performance of maintenance managers.

$$SDS=0.087GIs+0.303SSIs+0.360IWIs+0.345RPIs \quad \text{(Equation 4.2)}$$

Model equation 4.2 indicates that a unit increase in general indicators on average led to only 0.087 increase in stakeholders' satisfaction at design stage which is a lowest value among the four independent variables, hence confirming the insignificance of general indicators in guiding maintenance designs. Where as a unit increase in staff support,

inmates' ward and rehabilitation programs on average led to higher increases i.e 0.303, 0.360 and 0.345 respectively in stakeholders' satisfaction at the design stage. This was an implication/confirmation that use of staff support, inmates' ward and rehabilitation programs indicators to develop buildings' designs for maintenance led to a realistic significant positive or high impact in satisfying rehabilitation needs of Uganda's prisons' stakeholders at design stage. This is still in line with Nelson (2018) study as all the indicators in his study fall under staff support, inmates' ward and rehabilitation programs indicators.

Under the construction stage, inmates' wards indicators and rehabilitation programs indicators with $p=0.000$ and $p=0.022$ respectively are statistically significant ($p<0.05$) and general indicators and staff support indicators with $p=0.500$ and $p=0.062$ respectively are not statistically significant ($p>0.05$). Implying that general indicators and staff support indicators as independent variables do not contribute to achievemnent of dependent variable and therefore, the high R-sq values at the construction stage (0.9322) reflects a good fit because of the high significancy of inmates' ward indicators and rehabilitation programs indicators. In other words, inmates' ward indicators and rehabilitation programs indicators explained 93% of the variation in satisfying rehabilitation needs of Uganda's prisons' stakeholders at construction stage of maintenance.

The significancy of inmates' ward and rehabilitation programs indicators implied that efficiently and effectively executing inmates' ward and rehabilitation programs areas at construction stage of maintenance had a realistic impact in satisfying stakeholders' needs. This is in context to Myeda et al. (2011) and Nelson (2018) studies as seven out

of the eleven indicators used by Myeda et al. (2011) in assessing performance of maintenance managers fall under inmates ward indicators and rehabilitation programs indicators. And all indicators in Nelson (2018) study has a bearing on inmates' ward indicators and rehabilitation programs indicators. However, general and staff support indicators did not significantly ($p>0.05$) satisfy the rehabilitation needs of Uganda's prisons' stakeholders at construction stage. Meaning that emphasizing on general and staff support indicators during construction phase of maintenance had no realistic impact on satisfying rehabilitation needs of prisons' buildings' stakeholders. Myeda et al. (2011) didn't also prioritise general indicators in their study as only two of the total of eleven indicators they examined were general indicators i.e general maintenance and cleaning. On the contrary, this study found staff support indicators to be insignificant during construction stage yet a total of nine indicators out of the eleven indicators examined by Myeda et al. (2011) and all the indicators by Nelson (2018); are related to staff support, thus contradiction between the study finding and those of the research group.

SCS = 0.077GIs+0.239SSIs+0.568IWIs+0.240RPIs……(Equation 4.3)

Model equation 4.3 indicates that a unit increase in general indicators on average led to only 0.077 increase in stakeholders' satisfaction at construction stage and a unit increase in staff support indicators on average led to only 0.239 increase in stakeholders' satisfaction at construction stage. Thus confirms the least importance of dwelling on general indicators like open space around prisons and staff support indicators e.g proximity of staff deployed from administrators during construction phase of maintenance.

However, a unit increase in inmates' ward and rehabilitation programs indicators on average led to 0.568 and 0.240 increases respectively in stakeholders' satisfaction at the construction stage. Signifying that inmates' ward indicators and rehabilitation programmes indicators are the two indicators whose unit increases derives highest stakeholders' satisfaction during construction stage. In other words, they are the areas where concentration should be for effectiveness and efficiency of maintenance service. Implying that if all the indicators yielding satisfaction in the preceding stages of planning and designing cannot be achieved during construction stage may be due to financial constraint, technological constraints etc., at least inmates' wards and rehabilitation program indicators should be addressed during construction stage. When this is done, stakeholders will still be satisfied of the maintenance service irrespective of the failure to address the ones under planning and design stages.

4.7.2 Maintenance practices on satisfaction factors

Table 4.10 Regression model 2: Maintenance practices on satisfaction factors

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. mvreg SPS SDS SCS = TPM PM CBM, noconstant cformat(%9.3f) pformat(%5.3f) sfor
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Equation	Obs	Parms	RMSE	"R-sq"	F	P
SPS	123	3	1.326438	0.8755	281.2567	0.0000
SDS	123	3	1.261442	0.8848	307.3194	0.0000
SCS	123	3	1.249871	0.8839	304.4936	0.0000

		Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SPS							
	TPM	0.199	0.113	1.762	0.081	-0.025	0.424
	PM	0.438	0.109	4.005	0.000	0.221	0.654
	CBM	0.415	0.125	3.313	0.001	0.167	0.664
SDS							
	TPM	0.212	0.108	1.969	0.051	-0.001	0.425
	PM	0.253	0.104	2.438	0.016	0.048	0.459
	CBM	0.581	0.119	4.877	0.000	0.345	0.817
SCS							
	TPM	0.171	0.107	1.605	0.111	-0.040	0.382
	PM	0.396	0.103	3.846	0.000	0.192	0.600
	CBM	0.468	0.118	3.963	0.000	0.234	0.702

SPS=Satisfaction at Planning Stage, SDS=Satisfaction at Design Stage, SCS=Satisfaction at Construction Stage, TPM=Total Productive Maintenance, PM= Preventive Maintenance and CBM= Conditioned Based Maintenance.

Regression model 2 summary findings from Table 4.10 above indicates that the model is a good fit. The high value of the R-sq at the planning, design and construction stages of maintenance reflects that the model is a good fit irrespective of the insignificancy of one of the independent variable i.e total productive maintenance. When independent variables considered for regression analysis are few, the high R-sq values reflects that the model is a good fit irrespective of the insignificancy of any one of the independent variable. The one variable which is insignificant i.e total productive maintenance across

all the stages of maintenance just tells us that the maintenance practice does not contribute to the dependent variable (stakeholder satisfaction). In other words, had it been that total productive maintenance is significant, the R-sq value would be higher. Therefore, the presence of an insignificant variable reduces the R-sq value but the model is maintained as a good fit for as long as the value hasn't dropped below 50%.

Under the planning stage, preventive maintenance and conditioned based maintenance with $p=0.000$ and $p=0.001$ are statistically significant ($p<0.05$), with only total productive maintenance with $p=0.081$, not statistically significant ($p>0.05$). Implying that total productive maintenance as an independent variable does not contribute to achievemnent of the dependent variable and therefore, the high R-sq values at the planning stage (0.88) reflects a good fit because of the high significancy of preventive maintenance and condition based maitenance. In other words, preventive maintenance and conditioned based maintenance explained 88% of the variation in satisfying rehabilitation needs of Uganda's prisons' stakeholders at planning stage.

The significancy of preventive maintenance and conditioned based maintenance on satisfaction of the rehabilitation needs of Uganda's prisons' stakeholders at planning stage of maintenance. implied that there was a realistic effect of the satisfaction brought to prisons' stakeholders by preventive and conditioned based maintenance practices at planning stage of maintenance of prisons' buildings.

On the other hand, total productive maintenance had no significant effect ($p>0.05$) on satisfaction of the rehabilitation needs of Uganda's prisons' stakeholders at planning stage of maintenance. This implied that there was no realistic positive effect of total

productive maintenance on satisfaction of the rehabilitation needs of Uganda's prisons' stakeholders at planning stage of maintenance.

SPS = 0.199TPM+0.438PM+0.415CBM…...…….(Equation 4.4)

From model equation 4.4, a unit increase in total productive maintenance on average led to only 0.1994 increase in stakeholders' satisfaction at the planning stage. A unit increase in preventive and conditioned based maintenance practices on average led to 0.438 and 0.415 increases respectively in stakeholders' satisfaction at planning stage.

Under the design stage, preventive maintenance and conditioned based maintenance with p=0.016 and p=0.000 are statistically significant ($p<0.05$), with only total productive maintenance with p=0.051, not statistically significant ($p>0.05$). Implying that total productive maintenance as an independent variable does not contribute to achievemnent of dependent variable and therefore, the high R-sq values at the design stage (0.88) reflects a good fit because of the high significancy of preventive maintenance and condition based maitenance. In other words, preventive maintenance and conditioned based maintenance explained 88% of the variation in satisfying rehabilitation needs of Uganda's prisons' stakeholders at design stage.

The significancy of preventive maintenance and conditioned based maintenance on satisfaction of the rehabilitation needs of Uganda's prisons' stakeholders at design stage of maintenance implied that there was a realistic effect of the satisfaction brought to prisons' stakeholders by preventive and conditioned based maintenance practices at design stage of maintenance of prisons' buildings. On the other hand, total productive maintenance had no significant effect ($p>0.05$) on satisfaction of the rehabilitation needs of Uganda's prisons' stakeholders at design stage of maintenance. This implied that

there was no realistic positive effect of total productive maintenance on satisfaction of the rehabilitation needs of Uganda's prisons' stakeholders at design stage of maintenance.

SDS = 0.212TPM+0.253PM+0.581CBM…...…….(Equation 4.5)

From model equation 4.5, a unit increase in total productive maintenance on average led to only 0.212 increase in stakeholders' satisfaction at design stage, a unit increase in preventive and conditioned based maintenance practices on average led to 0.253 and 0.581 increases respectively in stakeholders' satisfaction at design stage.

Under the construction stage of maintenance, preventive maintenance and conditioned based maintenance with p=0.000 and p=0.000 are statistically significant ($p<0.05$), with only total productive maintenance with p=0.111, not statistically significant ($p>0.05$). Implying that total productive maintenance as an independent variable does not contribute to achievemnent of dependent variable and therefore, the high R-sq values at the design stage (0.88) reflects a good fit because of the high significancy of preventive maintenance and condition based maitenance. In other words, preventive maintenance and conditioned based maintenance explained 88% of the variation in satisfying rehabilitation needs of Uganda's prisons' stakeholders at construction stage.

The significancy of preventive maintenance and conditioned based maintenance on satisfaction of the rehabilitation needs of Uganda's prisons' stakeholders at construction stage of maintenance implied that there was a realistic effect of the satisfaction brought to prisons' stakeholders by preventive and conditioned based maintenance practices at construction stage of maintenance of prisons' buildings.

On the other hand, total productive maintenance had no significant effect ($p>0.05$) on satisfaction of the rehabilitation needs of Uganda's prisons' stakeholders at construction stage of maintenance. This implied that there was no realistic positive effect of total productive maintenance on satisfaction of the rehabilitation needs of Uganda's prisons' stakeholders at construction stage of maintenance. Prisons' stakeholders are not satisfied in regard to the level of use of TPM in maintenance works much as it is a popular maintenance practice used by prisons.

SCS = 0.171TPM+0.396PM+0.468CBM…...…….(Equation 4.6)

From model equation 4.6, a unit increase in total productive maintenance on average led to only 0.171 increase in stakeholders' satisfaction at construction stage, a unit increase in preventive maintenance and conditioned based maintenance on average led to 0.396 and 0.468 increases respectively in stakeholders' satisfaction at construction stage.

The regression model equations confirmed that preventive maintenance and conditioned based maintenance had high increases to satisfying rehabilitation needs of the prisons' stakeholders, thus underpinning the use of conditioned based maintenance. Conditioned based maintenance ranked above average by respondents on how highly it is used in maintenance of prison's buildings. Key informants' interviews also revealed conditioned based maintenance as one being highly used in maintenance of prison' buildings. In regards to preventive maintenance, the findings compliments Kamau (2014) finding who stated that this practice reduces work load on maintenance staff, increases asset availability, reduces the rate of breakdowns and maintains optimum efficiency of the equipment. Kamau (2014) finding aligns with this study's finding in regards to

preventive mantenance in context to reduction on work load on maintenance staff brought by the maintenance practice.

In the structure of Uganda Prisons service, the engineering department which is also in charge for maintenance of prisons' buildings is still centralised at the headquarters which has few staff compared to the number of prisons countrywide which they are supposed to manage. Therefore, the only way for the understaffed prisons' maintenance team to effectively manage maintenance of all its structures amidst the shortage in staff; is by making maintenance interventions before structures significantly deteriorates. Maintaining a structure which hasn't significantly deteriorated demands less work load and materials thus the justification of prison's stakeholder's satisfaction on use of preventive maintenance alongside conditioned based maintenance.

The low increase in satisfaction brought about by total productive maintenance is probably due to no job enrichment of the practice in prisons maintenance system. The lack of job enrichment is confirmed by the Welfare and Rehabilitation Officer of Oyam district prison. He stated that prisons' staff are involved only through escorting of skilled inmates who participate in construction and renonation activities. Participating through escorting inmates is not job enriching than it would be if the staff were carrying out the real skilful maintenance works. The Rehabilitation and Reintergration Officer for Apac women prison stated that only Officers in Charge are involved in planning process. The Officer in Charge of Oyam district women prison and the Assistant Rehabilitation and Reintergration Officer of Lira women prison cited no involvement of staff or inmates in planning maintenance works. All these are causes of stakeholder dissatisfaction on total productive maintenance in prisons maintenance management as confirmed by the model.

In that regard, inmate workers may be used under supervision of corrections staff, to complete maintenance tasks but in way that would not let them access to or information of confidential procedures or jail security systems (Nelson, 2018).

4.7.3 Risk factors on satisfaction factors

Table 4.11 Regression model 3: risk factors on satisfaction factors

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. mvreg SPS SDS SCS = NSPP LPR IELK, noconstant cformat(%9.3f) pformat(%5.3f) sforma
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Equation	Obs	Parms	RMSE	"R-sq"	F	P
SPS	123	3	1.620662	0.8141	175.1995	0.0000
SDS	123	3	1.653505	0.8021	162.1401	0.0000
SCS	123	3	1.523138	0.8276	191.9707	0.0000

		Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SPS							
	NSPP	0.233	0.109	2.142	0.034	0.018	0.448
	LPR	0.619	0.115	5.378	0.000	0.391	0.847
	IELK	0.409	0.094	4.335	0.000	0.222	0.596
SDS							
	NSPP	0.292	0.111	2.634	0.010	0.073	0.512
	LPR	0.623	0.117	5.308	0.000	0.391	0.856
	IELK	0.318	0.096	3.297	0.001	0.127	0.508
SCS							
	NSPP	0.216	0.102	2.113	0.037	0.014	0.418
	LPR	0.666	0.108	6.157	0.000	0.452	0.880
	IELK	0.357	0.089	4.019	0.000	0.181	0.532

SPS= Satisfaction at Planning Stage, SDS=Satisfaction at Design Stage, SCS=Satisfaction at Construction Stage, NSPP=Not Sticking to Project Plans, LPR=Low participation Rate and IELK=Inexperience and Lack of Knowledge.

Regression model 3 summary findings from Table 4.11 above indicate that the model is a good fit.

Under the planning stage, not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge of stakeholders' needs with p=0.034, p=0.000 and p=0.000 respectively are statistically significant ($p<0.05$). The high R-sq values at the planning (0.81) reflects a good fit because of the high significancy of not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge on stakeholder s' needs. In other words, not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge on stakeholder s' needs explained 81% of the variation in satisfying rehabilitation needs of Uganda's prisons' stakeholders at planning stage.

The significancy of not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge by maintenance/renovation team on stakeholders' needs; in satisfying rehabilitation needs of Uganda's prisons' stakeholders at planning stage of maintenance implied that not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge by maintenance/renovation team on stakeholders' needs are the risk factors that had realistic effects on satisfying rehabilitation needs of prisons' stakeholders. Not addressing the three factors significantly contributes to poor understanding of stakeholders' needs and is in context with Zhang et al. (2016) finding. The research group stated that projects fail due to poor understanding of stakeholders' values and the key issues in managing projects is to discover basic values that drive planning, design and construction of projects as derived from the varied stakeholders' viewpoint.

SPS = 0.233NSPP+0.619LPR+0.409IELK…...……(Equation 4.7)

From model equation 4.7, any unit increase in not sticking to project plans and decisions made, low participation rate by stakeholders, inexperience and lack of knowledge by maintenance/renovation team on stakeholders' needs on average yielded 0.233, 0.619 and 0.409 increases respectively in satisfaction of stakeholders at planning stage.

Under the design stage, not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge on stakeholders' needs with $p=0.010$, $p=0.000$ and $p=0.001$ respectively are statistically significant ($p<0.05$). The high R-sq values at the design stage (0.80) reflects a good fit because of the high significancy of not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge on stakeholders' needs. In other words, not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge of stakeholders' needs explained 80% of the variation in satisfying rehabilitation needs of Uganda's prisons' stakeholders at design stage.

The significancy of not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge by maintenance/renovation team on stakeholders' needs; in satisfying rehabilitation needs of Uganda's prisons' stakeholders at design stage of maintenance implied that not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge by maintenance/renovation team on stakeholders' needs are the risk factors that had realistic effects on satisfying rehabilitation needs of prisons' stakeholders at design stage of maintenance. Not addressing the three factors significantly contributes to

poor understanding of stakeholders' needs and is in context with Zhang et al. (2016) finding.

SDS = 0.292NSPP+0.623LPR+0.318IELK…...……(Equation 4.8)

From model equation 4.8, unit increases in not sticking to project plans and decisions made, low participation rate by stakeholders, inexperience and lack of knowledge by maintenance/renovation team on stakeholders' needs on average contributed to 0.292, 0.623 and 0.318 increases respectively in satisfaction of stakeholders at design stage.

Under the construction stage, not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge on stakeholders' needs with p=0.037, 0.000 and p=0.000 respectively are statistically significant ($p<0.05$). The high R-sq values at the planning stage (0.83) reflects a good fit because of the high significancy of not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge of stakeholders' needs. In other words, not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge on stakeholders' needs explained 83% of the variation in satisfying rehabilitation needs of Uganda's prisons' stakeholders at construction stage.

The significancy of not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge by maintenance/renovation team on stakeholders' needs; in satisfying rehabilitation needs of Uganda's prisons' stakeholders at construction stage of maintenance implied that not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge by maintenance/renovation team on stakeholders' needs are the risk

factors that had realistic effects on satisfying rehabilitation needs of prisons' stakeholders. Not addressing the three factors significantly contributes to poor understanding of stakeholders' needs and is in context with Zhang et al. (2016) finding.

SDS = 0.216NSPP+0.666LPR+0.357IELK…...……(Equation 4.9)

Similarly from model equation 4.9, unit increases in not sticking to project plans and descisions made, low participation rate by stakeholders, inexperience and lack of knowledge by maintenance/renovation team on stakeholders' needs on average contributed to 0.216, 0.666 and 0.357 increases respectively in satisfaction of stakeholders at construction stage.

The model equations confirmed the significant effects of not sticking to project plans and descisions made, low participation rate by stakeholders and inexperience and lack of knowledge by maintenance/renovation team on stakeholders' needs in satisfying rehabilitation needs of Uganda's Prisons' stakeholders. The high increase in satisfaction brought about by a unit increase in participation rate by stakeholders across all stages of maintenance stems from an interview conducted with among others the Assistant Rehabilitation and Reintergration Officer from Lira district women prison. She recommended that prisons' Officer's in-Charge should give a detailed report on prisons structures that need renovation to top management at prisons headquarters. Thereafter the top officials from headquarters has to send a team to different prisons to cross check/confirm the report of the Officers in Charge. The CASP of Apac district prison recommended for consultation from the real beneficiaries of the structures. The Officer in Charge of Oyam district women prison recommended for involvement of most stakeholders in planning. The Rehabilitation and Reintergration Officer of Apac women

prisons recommended that the planning process and assessment must be participatory by inmates, staff and Officers in Charge. The Welfare and Rehabilitation Officer of Oyam district prison recommended that during planning, the engineers should involve the prisons' rehabilitation department to ascertain the priority need in as far as rehabilitation of inmates is concerned. These recommendations indicates that there is low participation rate by sections of prisons' stakeholders in maintenance works and therefore if improved on, stakeholders' satisfaction will increase drastically as confirmed by the model equations.

4.7.4 Developing a maintenance framework for assessing prisons' stakeholders' satisfaction

A maintenance framework was developed as a guide for assessing prisons' stakeholders' satisfaction, based on the most significant key performance indicators, maintenance practices, risk factors and satisfaction factors as presented in Figure 4.1:

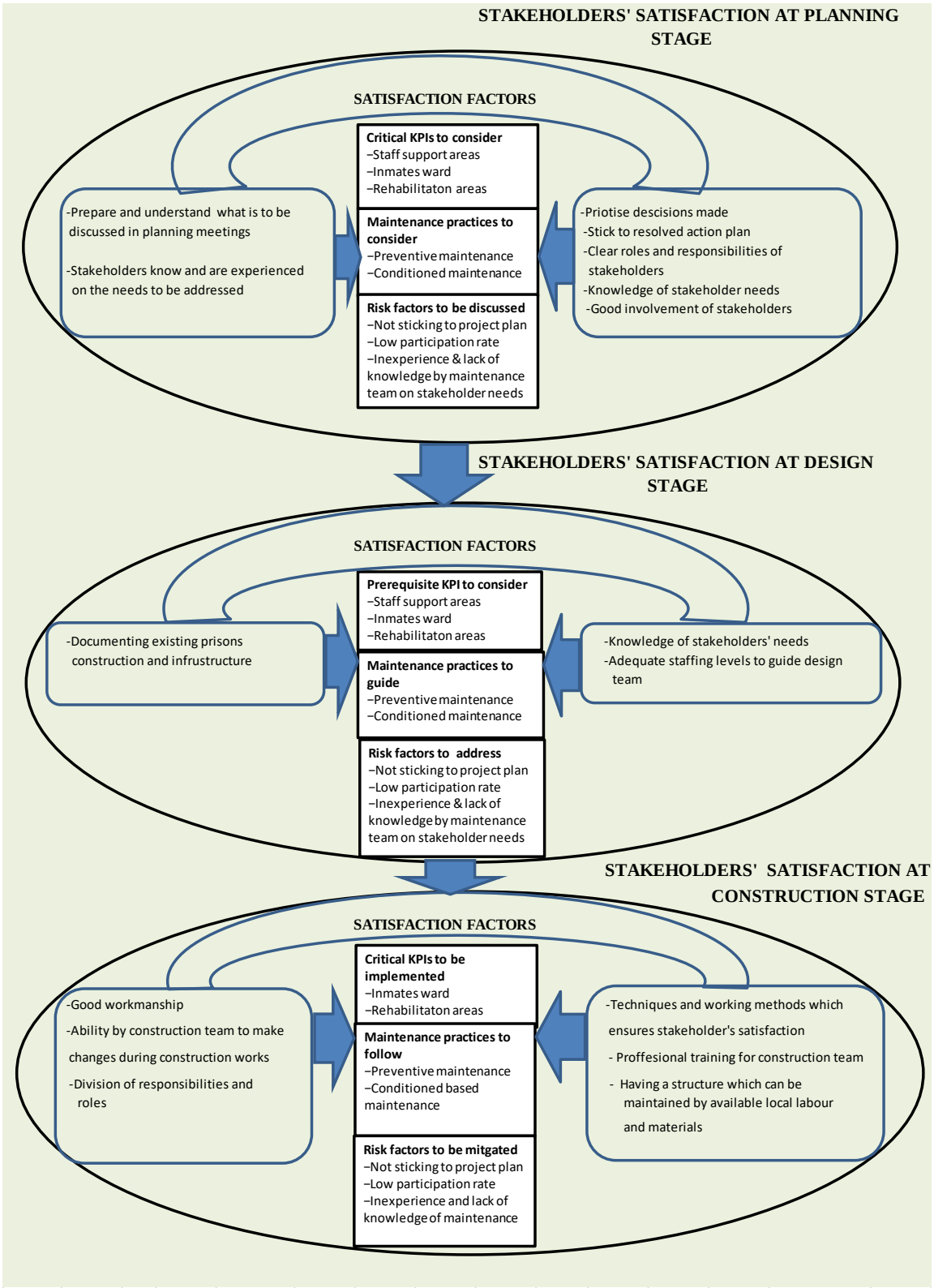

Figure 4. 1 Maintenance framework for assessing prisons stakeholders' satisfaction

For stakeholders' satisfaction at planning, design and construction stages of maintenance, the maintenance framework in Figure 4.1 indicates that the critical KPIs that maintenance team need to address while planning, designing and constructing during prisons' maintenance are; staff support areas, inmates ward and rehabilitation areas. The maintenance practices that need to be taken into consideration are; preventive maintenance and conditioned based maintenance, while bearing in mind the likely risks arising from not sticking to project plan and decisions made, low participation rate and inexperience and lack of knowledge by maintenance team on stakeholders' needs.

With the above withstanding, prior to planning meetings; the maintenance team should prepare and ensure that participants understand what to discuss with the stakeholders, advocate for good involvement of stakeholders in planning meetings, ensure that stakeholders in presence are knowledgeable and experienced about prison affairs, ensure that decisions made from planning sessions are given priorities, ensure that resolved action plans are stuck to, ensure that clear roles and responsibilities of participants are clearly stated and finally ensure that all stakeholders in participation know what they need/require from the maintenance team (maintenance objectives). During designing, there should be adequate staffing levels of the prison's maintenance management team, documentation of existing prisons construction and infrastructure and prisons maintenance management team should know stakeholders' needs.

Finally during construction, there has to be good workmanship, professional training of maintenance team, ability to adapt to changes resulting from monitoring and evaluation feedbacks, having a structure which can be maintained by available labour and materials,

division of responsibilities and roles and use of techniques and working methods in line with stakeholder's satisfaction.

Notably, this study established that stakeholder satisfaction is not determined at commissioning stage, as the sole dependent variable under the commissioning stage i.e. venue of commissioning had its relative importance index below average, thus not subject to regression analysis and discussion. Hence all activities aimed at satisfying rehabilitation needs of Uganda's prisons' stakeholders stops at construction phase.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The conclusion and recommendations presented in this chapter, were guided by the findings and discussions made in chapter four.

5.2 Conclusions

The current state of Uganda's prisons buildings in respect to key performance indicators is that staff support areas, inmates' ward areas and rehabilitation programs areas have to be prioritised for maintenance at both planning stage and design stage of prisons maintenance works, but still with some consideration to general areas like open space around prisons. Then when it reaches construction which demands a lot of funds, in the event where funds are not enough; in order to still satisfy the stakeholders, emphasis should be in efficiently and effectively improving the inmates' ward areas and rehabilitation programs areas, and then remainder of funds, if any; committed to staff support and general indicators. While at commissioning stage, there is no way stakeholders can be satisfied when there was no satisfaction in the preceding stages of planning, design and construction.

Maintenance practices used to guide planning and design and which should be implemented during construction are preventive maintenance and conditioned based maintenance, since they had significant effects on satisfaction of the rehabilitation needs of Uganda's prisons' stakeholders. The element of maintenance practices is irrelevant at commissioning stage.

Maintenance risk factors to be mitigated in order to satisfy rehabilitation needs of Uganda's prisons' stakeholders include; not sticking to project plans and decisions made, low participation rate by stakeholders and inexperience and lack of knowledge by maintenance/renovation teams on stakeholders' needs, since they had significant effects in satisfying rehabilitation needs of stakeholders at planning stage, design stage and construction stage. They are irrelevant at commissioning stage.

With the guidance of a maintenance framework which has been developed, a road map for achieving stakeholders' satisfaction at planning, design and construction stages is in place in respect to key performance indicators to be addressed, maintenance practices to be used and risk factors to be mitigated.

5.3 Recommendations and suggested areas for further research

5.3.1 Recommendations

This study recommends that;

- All Uganda's prison's maintenance teams should ensure staff support areas, inmates' ward areas and rehabilitation programs areas are considered at both planning and design stages of prisons' maintenance works. More importantly, inmates' ward areas and rehabilitation programs areas have to be emphasized at construction stage.
- All maintenance teams of Uganda's prisons should ensure that maintenance practices like preventive maintenance and conditioned based maintenance are guiding practices at planning, design and construction stages of maintenance.
- All maintenance teams of Uganda's prisons should ensure that not sticking to project plans and decisions made, low participation rate by stakeholders and

inexperience and lack of knowledge by maintenance/renovation team on stakeholders' needs, are mitigated at planning, design and construction stages of maintenance.

- All maintenance teams of Uganda's prisons should adopt the maintenance framework developed in chapter four (Figure 4.1), to address stakeholders' key performance indicators like staff support areas, inmates' ward areas and rehabilitation ward areas at planning, design and construction stages; know which maintenance practice to use and the risk factors to mitigate so that stakeholders are satisfied from the maintenance service in context to rehabilitation needs.
- For stakeholders to be satisfied with the use of TPM in prisons, capacity building should be done to prison staff and inmates in charge of maintenance works so that they are given tasks which causes job enrichment and thus satisfaction to stakeholders.

5.3.2 Areas for further research

The researcher recommends that further research be conducted to;

- Ascertain the impact of maintenance practices on rehabilitation of prisoners.

5.4 Study limitations

- This study was limited by financial resource to facilitate the process of proposal development, data collection, analysis and report writing. However, the researcher had to lobby funds from friends and relatives to enable facilitation of the research process.

- The interruptions caused by the COVID-19 pandemic also limited this study. This resulted in an increase in time scope to more than one academic year yet earlier the researcher had planned to carry out this study for one academic year.
- Respondents' response on their knowledge on value management concept could have been due to intuition not honesty, so results of their knowledge on value management is questionable as only 21 out of 123 rated their knowledge on value management concept thus a very small sample size to base on for inferences.

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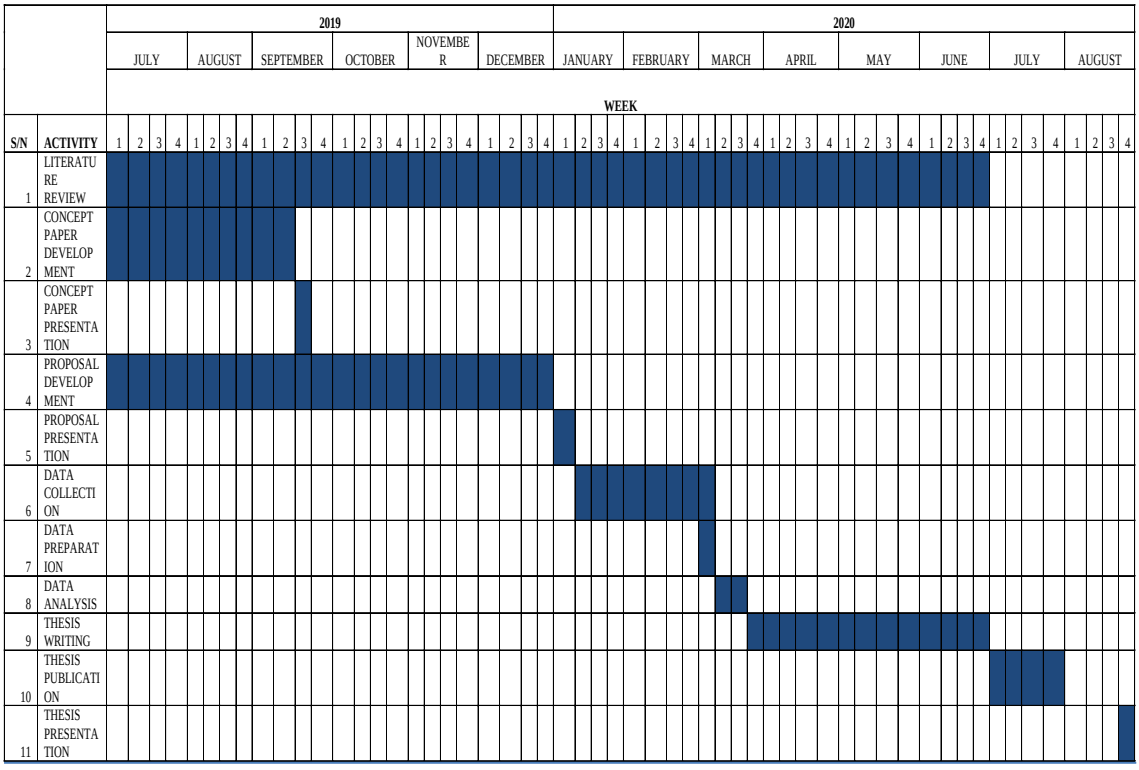
APPENDICES

Appendix.1: Budget estimate

S/N	DESCRIPTION	UNIT	QTY	RATE (Ugx)	AMOUNT (Ugx)
1	Internet, software (SPSS version 25.0) and computer services	Lump sum			711,000
2	Tele communication services	Lump sum			100,000
3	Stationery	Lump sum			108,000
4	Transport and welfare services e.g. movements, lodging, foods and refreshments etc.	Days	60	75,000	4,500,000
5	Purchase/hire of books, journals etc. for literature review	lump sum			500,000
6	Total				5,919,500
7	Miscellaneous (5% of total)				295,975
8	Grand Total				6,215,475

Appendix.2: Work plan



Appendix.3: Detailed Reliability Test statistics

Appendix.3a: Key performance indicators statistics

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.971	.974	25

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
1	78.17	574.167	.610	.	.970
2	79.00	556.800	.737	.	.970
3	78.67	561.467	.648	.	.971
4	78.50	577.500	.580	.	.971
5	79.00	567.600	.870	.	.969
6	77.83	572.167	.678	.	.970
7	77.33	558.267	.904	.	.968
8	77.50	580.300	.844	.	.970
9	78.50	541.500	.990	.	.967
10	78.17	593.367	.667	.	.971
11	78.50	585.500	.697	.	.970
12	78.00	562.400	.980	.	.968
13	79.33	567.867	.864	.	.969
14	78.67	595.067	.519	.	.971
15	78.83	569.367	.568	.	.971
16	78.17	555.767	.939	.	.968
17	77.67	566.267	.724	.	.970
18	78.50	559.900	.709	.	.970
19	78.67	555.467	.810	.	.969
20	78.50	544.300	.799	.	.969
21	78.17	552.967	.788	.	.969
22	79.33	563.467	.711	.	.970
23	78.50	568.300	.653	.	.970
24	78.33	533.067	.872	.	.969
25	78.17	542.567	.943	.	.968

Appendix.3b: Maintenance practices statistics

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.915	.928	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
1	17.50	28.300	.718	.	.907
2	16.50	29.900	.835	.	.892
3	16.83	28.967	.818	.	.892
4	17.67	26.667	.807	.	.894
5	16.83	27.767	.697	.	.912
6	17.17	32.567	.844	.	.901

Appendix.3c:Risk factors statistics

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.893	.900	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
1	12.83	27.767	.780	.	.864
2	12.67	25.467	.817	.	.857
3	12.17	30.567	.712	.	.878
4	12.50	26.300	.725	.	.875
5	12.17	30.567	.712	.	.878
6	11.83	28.567	.609	.	.893

Appendix.3d: Satisfaction factors statistics

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.983	.985	27

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
1	103.83	636.567	.870	.	.982
2	103.83	636.567	.963	.	.981
3	103.83	636.567	.870	.	.982
4	103.17	630.167	.904	.	.982
5	103.67	635.067	.898	.	.982
6	103.50	634.700	.845	.	.982
7	103.33	631.867	.914	.	.982
8	103.67	660.267	.703	.	.983
9	103.17	650.967	.891	.	.982
10	103.50	653.100	.745	.	.982
11	103.17	649.367	.802	.	.982
12	103.67	678.667	.614	.	.983
13	103.17	672.967	.818	.	.982
14	103.17	670.567	.881	.	.982
15	103.67	678.667	.614	.	.983
16	102.67	686.667	.685	.	.983
17	102.67	665.067	.943	.	.982
18	103.33	650.667	.959	.	.981
19	103.67	657.867	.743	.	.982
20	103.50	652.700	.860	.	.982
21	103.33	659.467	.796	.	.982
22	102.83	645.367	.942	.	.981
23	103.17	649.367	.919	.	.981
24	102.67	665.067	.943	.	.982
25	103.83	658.167	.859	.	.982
26	103.33	653.467	.907	.	.982
27	103.33	674.667	.646	.	.983

Appendix.4: Detailed Normality Tests statistics

Appendix.4a: key performance indicators

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
RII	.136	25	.200*	.941	25	.160

Appendix.4b: Maintenance practices

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
RII	.192	6	.200*	.971	6	.899

Appendix.4c: Risk factors

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
RII	.188	6	.200*	.977	6	.936

Appendix.4d: Satisfaction factors

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
RII	.176	27	.031	.937	27	.103

Appendix.5: Questionnaire for custodial prisons' staff

KYAMBOGO UNIVERSITY
Department of Civil and Environmental Engineering
P. O. BOX 1, KYAMBOGO – KAMPALA, UGANDA
TEL: +256-41-287340, FAX: +256-41-289056/222643

Questionnaire Number……

Dear Sir/Madam

I am Ochen Ceasor pursuing a Master of Science Degree in Construction Technology and Management of Kyambogo University. I am undertaking a research study titled "Use of value-based maintenance management in satisfying buildings stakeholders in Uganda- A case study of Uganda government Prisons in Lango Sub Region", Value Management is a practical/proactive, creative, problem-solving or problem-seeking service that gets the best out of a project, in terms of intended usage of the project, by using a well thought out, team-oriented exercises aiming at satisfying stakeholder needs. On the other hand, Prison Stakeholders are the people being served by the prisons or offering their service to a Prison e.g. staff, inmates, community, scholars etc. You have been identified as a resourceful person in this study, therefore, I kindly request for your participation to give your honest response(s) to the under listed set of questions. The outcome of the study will be of use for improvement of renovations of prison structures. I wish to assure you that the information you will provide will be purely for academic purposes and will not be divulged to any other third party.

SECTION A: Respondent characteristics.

a)- Which organization do you work for?

……

……..

From b) to h) below, tick in the appropriate box.

b)-Which district are you deployed to?

i. Lira ☐

ii. Apac ☐

iii. Kwania ☐

iv. Oyam ☐

v. Kole ☐

If none of above, please specify?

…….

c)- What is your professional field?

i. Social Work ☐

ii. Administration and Finance ☐

iii. Policy and Planning ☐

iv. Welfare and Rehabilitation ☐

v. Sports ☐

vi. Law and Security ☐

vii. Records and Registry ☐

viii. Correctional Services ☐

ix. Human Resource, Training and Research ☐

x. Production (Agriculture/Vetinary) ☐

xi. Health ☐

xii. Construction ☐

If none of above, please specify?

…….

d)-Sex**:**

i) Male ☐ **ii) Female** ☐

e)-What is your age bracket?

i. 18 to 30 years ☐

ii. 31 to 40 years ☐

iii. 41 to 50 years ☐

iv. 51 to 60 years ☐

f)-How long have you been in service?

i. Less than 5 years ☐

ii. 6 to 15 years ☐

iii. 16 to 25 years ☐

iv. 26 to 35 years ☐

v. More than 35 years ☐

g)-What is your highest level of education?

i. PHD ☐

ii. Advanced degree ☐

iii. First degree ☐

iv. Diploma ☐

v. Certificate ☐

vi. UACE ☐

vii. UCE ☐

If others, please specify …….

h)-Knowledge of concept of value based maintenance management.

Have you ever received any value engineering training?

i) Yes ☐ ii) No ☐

Have you ever participated in any value engineering workshop?

i) Yes ☐ ii) No ☐

If your response to the above two questions is yes, rate your knowledge of the value management concept.

Very good ☐ Good ☐ Moderately good ☐ Poor ☐ Very poor ☐

SECTION B: Evaluating the current state of Uganda's prisons buildings in respect to key performance indicators in satisfying rehabilitation needs of Uganda's prisons stakeholders.

In this section; for each key performance indicator stated in the table below, indicate how you are satisfied with the prison's building(s) in respect to the indicator(s). Choose one option from the five options- Highly dissatisfied; Dissatisfied; Partially Satisfied; Satisfied and Highly Satisfied; either tick under (1) for Highly dissatisfied or (2) for Dissatisfied or (3) for Partially Satisfied or (4) for Satisfied or (5) for Highly Satisfied.

S/N	Key Performance Indicators.	Are you satisfied with the prison's buildings in respect to the Key Performance Indicators?				
		Highly dissatisfied	Dissatisfied	Partially Satisfied	Satisfied	Highly Satisfied
		1	2	3	4	5
	GENERAL INDICATORS (Applying to all buildings).					
1	Hygiene in the prison environment.					
2	Sound insulation e.g. provision of sound absorbent ceiling tiles.					

3	Quality of interior of building.					
4	Security (CCTV, alarm system, digital video recorder etc.).					
5	Communication (telephone, internet facilities, voice speakers etc.).					
6	Steel mesh fenced walkways interconnecting all prison facilities.					
7	Steel mesh perimeter fencing.					
8	Open space around the prison's perimeter fencing e.g. open field or garden.					
	STAFF SUPPORT INDICATORS					
9	Provision of					

	peeping openings on the doors of wards.					
10	Working environment for staff.					
11	Proximity of staff deployed from administrators.					
12	Adequacy of staff accommodation and welfare.					
	INMATE S' WARD INDICATORS					
13	Adequacy of medical and psychological treatment centers.					
14	Provision for sanitary facilities and services for physical wellbeing of inmates e.g. saloons, laundries					

	etc.					
15	Separation with in prisons for those on remand, long termers and short termers.					
16	Special rooms for the privileged, well behaved and those with special needs e.g. those on work release, minimum-security inmates, inmate workers, pregnant women, mentally ill etc.					
17	Adequacy of space for meeting with visitors.					
18	Proximity of wards from staff quarters and from surveillance room if any.					

19	Wards shared by not more than five inmates.					
20	Wards with all domestic rooms e.g. kitchens, laundries, living rooms etc.					
21	Provision (s) for restrooms /shades.					
22	Provision for a shop within prison for inmates to buy basic needs e.g. soap.					
	REHABILITATION PROGRAMES					
23	A gate with a gate room at rehabilitation blocks.					
24	Convenient dedicated place for a recreation and/or					

	physical training area.					
25	Convenient dedicated area for agricultural activity.					

SECTION C: Knowledge of maintenance/renovation type used in Uganda's prisons to satisfy rehabilitation needs of Uganda's prisons stakeholders. For this section, for each maintenance/renovation type stated in the table below, indicate how high it is used during maintenance /renovation of prisons' structures. Choose one option from the five options -Very high, High, Moderately high, Low and Very Low; either tick under (5) for Very high or (4) for High or (3) for Moderately high or (2) for Low or (1) for Low.

S/N	**Maintenance/Renovation types.**	**How high is the use of the maintenance/renovation type?**				
		5	**4**	**3**	**2**	**1**
		Very high	**High**	**Moderately high**	**Low**	**Very low**
1	**Use of Conditioned based maintenance.** Prisons repairing its structures to correct defects.					
2	**Use of Total Productive Maintenance.** Repairing of Prisons structures being done by selected inmates and staff.					

3	**Use of Preventive maintenance.** Prisons looking after its structures to prevent defects from developing.					
4	**Use of Reliability Centered Maintenance.** Prisons keep on changing the design of its structures to suit the requirements of the users and intended function of the structure.					
5	**Use of Predictive Maintenance.** Prisons repairing its structures to strengthen them to withstand suspected forces e.g. floods, earthquakes, storms etc.					
6	**Use of Perfect Maintenance.** Prisons repairing its structures to restore them to as good as original new condition.					

SECTION D: Knowing the maintenance/renovation risk factors to be mitigated in order to satisfy rehabilitation needs of Uganda's prisons stakeholders.

In this section, for each risk factor stated in the table below, indicate the likelihood of the risk factor happening during maintenance/renovation of prisons buildings. Choose one option from the five options- Almost Definite, Very Likely, Likely, Some-what Likely and Rarely; either tick under (5) for Almost Definite or (4) for Very Likely or (3) for Some-what Likely or (1)rarely.

S/N	Risk Factors	What is the Likelihood of the risk factors happening?				
		Almost definite	Very likely	Likely	Somewhat likely	Rarely
		5	4	3	2	1
1	Low participation rate by stakeholders.					
2	Poor communication among stakeholders.					
3	Not sticking to project plans and decision(s) made.					
4	Inexperience and lack of knowledge by maintenance/renovation team on stakeholder needs. .					
5	No commitment by project parties.					
6	Lack of documentation on prison construction and infrastructure.					

SECTION E: Developing a maintenance framework for assessing prisons' stakeholders' satisfaction.

In this section, for every satisfaction factor stated in the table below, indicate how advantageous is the factor towards satisfaction of prison stakeholders at the different levels of a maintenance/renovation service. Choose one option from the five options -Very high, High, Moderately high, Low and Very low; either tick under either (5) for Very high or (4) for High or (3) for Moderately high or (2) for Low or (1) for Very low.

S/N	Satisfaction Factors.	How advantageous is the Satisfaction Factor?				
		Very high	**High**	**Moderately high**	**Low**	**Very low**
		5	**4**	**3**	**2**	**1**
	PLANNING STAGE					
1	Preparation and understanding of what to be discussed during meetings.					
2	Good involvement and commitment of project stakeholders e.g. cooperation from related departments.					
3	Knowledge and experience by stakeholders on the method of determining priority needs.					
4	Making decisions aiming at addressing priority needs.					

5	Clear responsibilities and roles of participants/ stakeholders.					
6	Knowing what stakeholders need.					
7	Sticking to the resolved action plan and decision(s) made.					
	REDESIGN STAGE					
8	Knowing what stakeholders needs.					
9	Good involvement and commitment of project stakeholders					
10	Knowing the available funds for renovation works.					
11	Adequate technical staffing levels at prisons to guide design team.					

12	Documenting existing prison construction and infrastructure.					
	CONSTRUCTION STAGE					
13	Techniques and working methods in line with stakeholders ’satisfaction.					
14	Timely approval of plans and permits.					
15	Having risk control measures.					
16	Division of responsibilities and roles.					
17	Support from non-government sector.					
18	Appropriate resource allocation					
19	Timely construction					
20	Ability to adapt to changes.					
21	No budget					

	overruns.					
22	Good workmanship.					
23	Availability of Finance.					
24	Professional training.					
25	Having a structure which can be repaired by available local labour and materials.					
26	Adequate technical staffing levels at prisons to oversee maintenance works.					
	COMMISIONING STAGE					
27	Venue of commissioning.					

Thank you.

Yours Faithfully,

Ochen Ceasor

Appendix.6: Interview guide for key informants

KYAMBOGO UNIVERSITY
Department of Civil and Environmental Engineering
P. O. BOX 1, KYAMBOGO – KAMPALA, UGANDA
TEL: +256-41-287340, FAX: +256-41-289056/222643

RESEARCH INTERVIEW GUIDE

Dear Sir/Madam

I am Ochen Ceasor pursuing a Master of Science Degree in Construction Technology and Management of Kyambogo University. I am undertaking a research study titled "Use of value-based maintenance management in satisfying buildings stakeholders in Uganda- A case of Prisons in Lango sub region" You have been identified as a resourceful person in this study, therefore, I kindly request for your participation to give your honest response(s) to the under listed set of questions. The outcome of the study will be of use for improvement of renovations of prisons' structures. I wish to assure you that the information you will provide will be purely for academic purposes and will not be divulged to any other third party.

1).State in the space below your district of deployment, rank, age, sex, length in service and highest educational level (in that order).

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2).Do you have an idea of what value -based maintenance management is? (If so could you state in a few words how you understand it?

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3.a). Basing on your experience and knowledge on rehabilitation of prisoners, do you think the nature/condition of a building space or environment in which a prisoner is put in has an effect on his rehabilitation. (If yes briefly state the effect?).

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b).From your judgment on the prison where you are deployed, is the way prisoners are housed and the environment around them help in their rehabilitation? (If no briefly state why?).

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c).If your answer to b) is no, which aspects of the prison's buildings and its environment would you wish to be improved on or constructed in order for such buildings and its environment to be able to enhance rehabilitation of prisoners?

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4.a). Whenever Uganda Prisons Service is deciding to renovate its buildings and its environment, what do they base on to reach a decision for carrying out the renovations? (what determines the need for such renovations?).

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b). Right from the planning stage to completion of renovation works, are you and the rest of the staff /inmates involved? (If so, at what stage(s) are you involved in and how are you involved?).

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5). In your opinion, if the housing and working conditions of both the staff and prisoners was to be improved through renovating of the buildings to a state which aids rehabilitation of prisoners, which factors do you think would hinder these buildings to be renovated to a state where both the staff and the prisoners are satisfied in respect to fostering rehabilitation of prisoners?.(Factors during planning and carrying out of renovation works which would make the completed renovated building not to accomplish the purpose of aiding rehabilitation of prisoners).

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6). Basing on 5) above, what recommendation(s) would you make, right from the planning stage of renovating prisons structures to completion, so that the renovations which are done to Prisons buildings and environment can have a positive impact on rehabilitation of prisoners?

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7). What would you like to share with the researcher aside from the above information?

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Thank you for your cooperation

Appendix.7: Researcher's Introductory letter to study area

KYAMBOGO UNIVERSITY
Department of Civil and Environmental Engineering
P. O. BOX 1, KYAMBOGO – KAMPALA, UGANDA
TEL: +256-41-287340, FAX: +256-41-289056/222643

10th November 2021

The Commissioner,

Uganda Prisons Services

P.O Box,7182, Kampala.

Dear Sir

RE: REQUEST FOR PERMISSION TO ACCESS INFORMATION FOR AN ACADEMIC RESEARCH.

I am Ochen Ceasor pursuing a Master of Science Degree in Construction Technology and Management of Kyambogo University. I am undertaking a research study titled **"Use of value-based maintenance management in satisfying buildings stakeholders in Uganda"-A case study of Uganda government Prisons in Lango Sub Region.**

The purpose of this letter is to humbly request your office to grant me permissionto access relevant information and guidance from the relevant staff of Uganda Prisons Service as they are my target respondents especially those from Lango subregion prisons as the region constitutes my case study. The outcome of the study will be of use for improvement of renovations of prisons structures. I wish to assure you that the information I will be provided will be purely for academic purposes and will not be divulged to any other third party. Do find attached the approved questionnaire portraying the nature of information I seek to collect during the study.

Please, I will be verygrateful if my request is granted.

Yours faithfully

Ochen Ceasor

Tel:0774944966

Email; ceasorochen@gmail.com

UGANDA PRISONS HEADQUARTERS
RECEIVED
10 NOV 2021
KAMPALA

Appendix.8: University Introductory letter to study area

KYAMBOGO UNIVERSITY
Department of Civil and Building Engineering
P. O. BOX 1, KYAMBOGO – KAMPALA, UGANDA
TEL: +256-41-4287340, FAX: +256-41-4289056/4222643

10th November 2021

The Commissioner,
Uganda Prisons Services
P.O Box, 7182 Kampala

Dear Sir,

RE: INTRODUCTION LETTER FOR MR. OCHEN CEASOR REG: NO 18/U/GMET/22126/PD

This is to introduce the above-named final year student who is undertaking a Master of Science in Construction Technology and Management at the Faculty of Engineering, Department of Civil and Environmental Engineering, Kyambogo University. Ceasor is undertaking a research study titled: **USE OF VALUE BASED MAINTENANCE MANAGEMENT IN SATISFYING BUILDINGS STAKEHOLDERS IN UGANDA-A CASE STUDY OF UGANDA GOVERNMENT PRISONS IN LANGO SUB REGION".** This is one of the requirements for graduation at Kyambogo University to conduct research and submit a dissertation/thesis by graduate students before awarding them a degree.

The purpose of this communication, therefore, is to humbly request your office and the relevant staff to assist him access the necessary information and guidance to help him successfully conduct his research at your organisation. The information will only be used for academic purposes and shall be kept confidential.

We thank you in advance for your cooperation and we hope the findings of this research will also benefit the organisation.

Yours faithfully,

KYAMBOGO UNIVERSITY * DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING * HEAD OF DEPARTMENT 10 NOV 2021

Dr. Muhwezi Lawrence
Senior Lecturer and Head of Department
Civil and Environmental Engineering
Faculty of Engineering, Kyambogo University
Tel. +256772 402883/702 402883
Email: lmuhwezi@kyu.ac.ug/lmuhwezi@hotmail.com

Appendix.9: Acceptance letter from study area

WEBSITE : www.prisons.go.ug
TELEPHONE : +256-414-256751
FAX : +256-414-344104
EMAIL : compris@utlonline.co.ug
: info@prisons.go.ug

A REPLY TO THIS LETTER SHOULD BE ADDRESSED TO
THE COMMISSIONER GENERAL OF PRISONS AND THE FOLLOWING

UGANDA PRISONS SERVICE
PRISONS HEADQUARTERS
P. O. Box 7182,
KAMPALA, UGANDA

REFERENCE NO. QUOTED: PHQ **ADM/143/219/01**

5th January 2022

Mr. OCHEN Ceasor
Kyambogo University
P. O. Box 1
KAMPALA

Tel: 0774944966

REQUEST FOR PERMISSION TO ACCESS INFORMATION FOR AN ACADEMIC RESEARCH

I am in receipt of yours about the above subject matter.

It is a pleasure to inform you that you have been granted permission to carry out research project on the topic **"Use of Value-Based Maintenance Management in Satisfying Buildings Stakeholders in Uganda"** to fulfil the partial requirement for the award of a Degree of Master of Science in Construction Technology and Management at Kyambogo University.

By a copy of this letter, you have been advised to report to Regional Prisons Commander, Mid-Northern Region for more guidance concerning your research exercise.

N.B You are advised to comply with the Standard Operating Procedures (S. O. P's) and other regulations as provided by the Ministry of Health to fight Corona Virus (Covid19) and Rules and Regulations of the Department.

D. A. Ahimbisibwe
For: COMMISSIONER GENERAL OF PRISONS
Copied to: The Regional Prisons Commander, **Mid-Northern**
The Head of Department, Civil and Environment Engineering