DESIGN AND DEVELOPMENT OF A SERVICE KNOWLEDGE MANAGEMENT SYSTEM (SKMS) PROTOTYPE AT EDGE SYSTEMS COMPANY KENYA

BY

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DECLARATION

DECLARATION BY THE CANDIDATE:

I declare that this is my original work, and it has not been submitted to any other college, university, or institution.

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DECLARATION BY THE SUPERVISORS:

This thesis has been presented for examination with our approval as the appointed university supervisor.

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DEDICATION

I dedicate this study to my parents who have been an excellent source of inspiration, love and support to me.

ABSTRACT

Service delivery improvement and continual management are crucial for three reasons, value achievement of Information Communication Technology (ICT) service, ICT service continuity, and ICT services support of the core business in the organization. Edge systems company required a centralized platform to document all ICT service management processes and use the data retrieve reports to aid in decision making; Eliminate the inefficiencies of the manual ICT service management process and identification for the areas that will ICT service continuous improvement. Therefore, there is a need to develop a platform SKMS that will facilitate the adoption of ITIL. The study sought to design and develop a service knowledge management system prototype model for Edge System Company an ICT service delivery entity with the view to ensure optimal and improved ICT service is provided. The objectives of the study were: influence of ITIL in ICT service delivery at edge systems; establish the level of user acceptance of ITIL in ICT service delivery at edge systems; determine the effect of the service management process (including plan-do-check-act) in ICT service delivery at edges systems; design and development of a service knowledge management system (SKMS) in reference to ITIL for ICT service delivery at edge systems. A qualitative and quantitative research approach was adopted. The non-probability sampling procedure was used to draw 98 respondents from a population of 327 staff comprising of edge systems customer care, ICT support, ICT implementation personnel, account managers, sales agents, ICT staff of the client resolution health. The study adopted an online questionnaire the monkey survey and interviews for requirements gathering. Descriptive and thematic analysis methods were used in data analysis where evolutionary prototyping methodology was adopted in developing the system. The SKMS was running on an Android mobile platform. The study established once the service delivery improved there was a value-add to the ICT service. There was a notable 75% improvement in ICT service; the level of user acceptance of the services improved by 73.2%; ICT support toward the business was enhanced by 50% and Plan – Do –Check – Act of ICT services offered improved the service delivery by 80%. There was a notable influence of ITIL in ICT service delivery when the respondents indicated their delight to be able to refer to documented changes and incidences for insight where need be. The study concluded that to improve ICT service delivery and ICT service continuity management, there needs to be a continuous evolution of the ICT service to meet end-user needs and continuous end-user interactions with the ICT vendor. The study recommends the use of mobile applications for ICT service management to ensure end-user interaction, documentation on improved ICT service provision.

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ACROYNMS AND ABBREVIATIONS

BCM	Business Continuity Management
CMDB	Configuration Management Database
CMS	Configuration Management System
CSI	Continual Service Improvement
ICT	Information Communication Technology
ISO/IEC	International Organization for Standardization and the International Electro-Technical Commission
ITSCM	Information Technology Service Continuity Management
ITSM	Information technology service management
ITILv3	Information Technology Infrastructure Library Version 3
KEDB	Known Error Database
KMS	Knowledge Management System
KM	Knowledge Management
OGC	Office of Government Commerce
SKMS	Service Knowledge Management System
SLA	Service Level Agreement
SLM	Service Level Management
RFC	Request for Change
RCA	Root Cause Analysis

DEFINITION OF TERMS

Incident: - It is an event that causes or may make intrusion or debasement an IT Service.

Information Technology Infrastructure Library: - is possessed by the OGC and comprises of a progression of distributions giving direction on the arrangement of eminent IT Services in addition to the procedures and offices expected to bolster them.

Known Error: - It is the known reason for an occurrence for which an answer and workaround additionally exists.

Request for Change: - It is a formal proposition for an alteration to be made. It incorporates points of interest of the likely change and might be electronic or paper documentation.

Root Cause: - It is the fundamental or unique reason for an episode or issue.

Service Catalog: - It is an organized archive having all IT Services being used, including those accessible for an organization.

Service Desk: - It is the single purpose of contact between the specialist organization and the clients.

Service Knowledge Management Systems: - It is an arrangement of instruments and databases that are intended for managing data and knowledge.

Workaround: - It is lessening or killing the Impact of an Incident or Problem for which a full determination is not yet accessible.

CHAPTER ONE

INTRODUCTION AND BACKGROUND INFORMATION

1.0 Introduction

This chapter deals with the background information of the study. It includes the objectives of the problem, the statement of the problem, the beneficiaries of the study, and the scope of this study. Today, companies are mindful of the fundamental part of information technology (IT) inside their firms which have been underutilized to legitimize the high expenses or to run Information Technology (IT) administrations. Subsequently, there has been a spotlight on IT administration that highlight the significance of IT administration (Vicente, Gamaand Mira da Silva, 2013a). It is argued that as the market requires rules and regulations to evolve so IT should continually demonstrate compliance, this can only be seen through successful independent audits (Gama et al., 2012). Thus, there is high demand for IT to accomplish more with less -and make extra value while amplifying the utilization of existing assets.

Accepting IT support for the business is paramount it confirms that aggressive user support is required. This is achieved in the ITIL framework through the implementation of incidence management, problem management, change management and known error management of which at hand, leads to better IT user support. Whereby ITIL framework provides a comprehensive, consistent and coherent set of best practices for IT service management processes, promoting a quality approach to achieving business effectiveness and efficiency in the use of information systems (ITIL Version 3 Service Improvement,2007). Improvement of the IT user support ensures continued support of the business (Vicente et al., 2013b).

A service knowledge management system (SKMS) is an information system within ITIL where it is a repository of information and knowledge that the ICT service providers entities need to administer manage the lifecycle of their ICT services ITIL® Process Map & ITIL® Wiki July (2020). The benefit of ICT administration and consistent quality wound up noticeably a standout amongst the most imperative parts of ICT service providers in the very competitive electronic-business economy (Roman, 2012). The information system SKMS will provide a platform ITIL framework to be adopted in the ICT service provision and administration.

1.1 Background of the Study

The ICT has transformed the way business is carried out in most organizations. As early as 2009, Nfuka et al. (2009) observed that widespread use of technology has caused a critical dependency on IT that calls for the specific focus on IT Governance.

1.1.1 IT Service Management in Kenya

The Kenya government with a specific end goal to enhance, streamline and defend the ICT services founded Information Communication Technology Authority (ICTA). ICTA was established in August 2013 and assigned the role of advancing ICT proficiency and development of Kenya National ICT Masterplan 2017 to accomplish there was advanced ICT proficiency and development to endeavour Kenya National ICT Masterplan 2017. This was a merge of the e-Government Directorate, Information and Communication Technology Board of Kenya and the Government Information and Technology Services. ICTA upheld IT administration gauges to give protestation prerequisites of government IT specialists and expert staff (ICT Authority, 2016). This guaranteed the legislature got an incentive from IT benefit and IT administrations were emphatically essential to the administration. ICTA models

utilized regularizing references of the beneath universal gauges: - PRINCE2, COBIT 5 and ITILv3.

1.1.2 ITIL

ITIL was built by the UK central computer and Telecommunications Agency (CCTA) in the mid-1980s and later renamed the office of government commerce (OGC) (Persse, 2012). OCG observed a gap where the IT service providers they procured from had an absence of structure and IT service governance. In the absence of service fulfilment by the IT service providers selected by the OCG, it was in guidelines proposed that guidelines be developed that could be trailed and upgraded consistency by the IT specialist. This was expected to build up the primary execution objectives and eventually enhance conveyance quality IT services (ITIL Version 3 Service Improvement, 2007). ITIL has evolved since publication to the current ITIL version 3.

Numerous institutions have embraced ITIL to improve and control IT administration conveyance and support. ITIL best practice structure once actualized as expected to empower supervisors to report, review, and enhance the IT benefit administration forms (Cater-Steel A, Tan W, and Toleman M, 2009).). ITIL adds value to IT as it is a service to the business whereby existing internal IT in the organizations transforming themselves into compelling and useful IT specialist organizations, absence of which they stop to be pertinent to the business and, before long, stop to exist. Therefore, structured ICT service management is paramount (Nabiollahi et al., 2011). The business operations have turned out to be reliant on IT to satisfy their corporate goals and for IT administrations to meet the clients' necessities and desires (Lacy, 2011). Plenty of exertion and change has been made to guarantee high accessibility in every innovation business (Potegieter et al., 2013). ITIL is a vital and persuasive focal point

of an IT service administration (Marrone and Kolbe, 2011). IT specialist co-ops perceive that technique and plan are absent in the administration of the ICT service. In 2007, the ITIL version3 is discharged to cover the entire lifecycle of administration which contained five volumes as five phases of administration: Service Strategy, Service Design, Service Transition, Service Operation and Continual Service Improvement (Pedersen et al., 2010). ITIL appropriation has a substantial following in Europe, particularly in the administration division, and selection is developing in North America, Australia and different nations (Gehrmann, 2012). Late studies and contextual investigations detailed an upsurge in mindfulness and appropriation of ITIL and control objectives for Information and Related Technology (CobiT) (Gehrmann, 2012, Iden and Eikebrokk, 2013). ITIL had additionally been utilised as the reason for some merchant offerings, including Systems Management Solution Lifecycle (SMSL) by IBM's, IT Service Management Reference Model (ITSM), Hewlett-Packard (HP's) and Microsoft's Operations Framework (MOF) (Marrone and Kolbe, 2011).

ITIL was delivered in 1989, and it was the gathering of aides over a progression of administration ranges of which included administration level administration, possibility arranging and change administration (Pollard and Cater-Steel, 2009). After ten years Office of Government Commerce (OGC) in the UK discharged ITIL v2, it was like ITIL v1, yet it incorporated a fundamental change. ITILv2 included two areas benefit support and administration conveyance (Alojail and Corbitt, 2014). The utilization and reception of ITIL globally ended up noticeably prevalent and was perceived as the structure appropriate when it came to administration plan, advancement, arrangement and IT operations (Pedersen et al., 2010). In 2007 discharged ITIL v3 permanently extended the extent of ITIL and installed a robust

accentuation on administration as an expansion of business mission administration (Persse, 2012). OGC ITIL was revived in 2011 with the new version exhibiting more significant updates than real substance changes, and textures were introduced across life cycle stages and processes. The enlightenment and escalation were incorporated, and the fundamental difference content-wise was that business relationship organization, a point treated inferential in the past structure, and was managed unequivocally with its method (Persse, 2012).

Companies are setting up IT administration to guarantee that IT is adjusted to the targets of the association (Cater-Steel and Tan, 2009). IT administration is an indispensable piece of big firms' management and consists of the authority and hierarchical structures and systems that assurance that the affiliation's IT underpins and widens the affiliation's strategy and goals' (Sallé, 2011). Sarbannes-Oxley Act in the U.S has presented more stringent corporate administration prerequisites, and associations around the globe were taking after the lead of the US and concentrating on corporate administration (Pollard and Cater-Steel, 2009).ITIL is an arrangement of best practice direction for data innovation benefit administration of IT service management. ITIL comprises a progression of productions guiding the conveyance of Quality IT Services, on procedures and offices expected to bolster them (Waschke, 2015). ITIL has characterized a great administration methodology plan that has bolstered business and has accomplished both quality and incentive for cash in IT operations (Iden and Eikebrokk, 2013). In any case, there has been constrained academic research about ITIL despite the expanding upsurge in mindfulness and appropriation of ITIL by IT professionals (Potgierer et al., 2013). ITIL best practice on accessibility administration is to guarantee that administration influencing episodes don't happen, or that a convenient and successful move is made when they do occur.

The idea of accessibility is identified with consistent quality and practicality (Iden and Eikebrokk, 2013).

Information Technology Infrastructure Library (ITIL) practice was created in the mid-1990s by the British government (Pollard and Cater-Steel, 2009). ITIL offers a system of structure, adaptability, best practice forms that associations can receive and adjust to fit their surroundings to enhance ICT benefit conveyance and its progression. Regardless of the expanding upsurge of mindfulness and reception of ITIL by IT practitioners (Hochstein et al., 2005), ITIL top performance on accessibility administration is to guarantee that rates on administrations don't re-happen, or that opportune and powerful move is made when they do re-happen. ITIL is a world-perceived way to deal with IT benefit administration, giving the business an extensive arrangement of "best practices" for distinguishing, arranging, conveying and supporting IT administrations for business associations (Lacity, Khan and Willcocks, 2009).

The most widely recognized course to accomplishing the prerequisites of International Organization for Standardization and the International Electro-Technical Commission (ISO/IEC) 20000 is still employing the utilization of ITIL structure direction, to the degree that ISO/IEC 20000 was much of the time alluded to as 'the ITIL standard' and ISO/IEC 20000 was received by specialist organizations that wished to exhibit they have embraced ITIL counsel in a productive way (Potgieter, Botha & Lew, 2013). ITIL system comprises the production of five distributions. Each gives the direction important to a coordinated approach, as required by the ISO/IEC 20000 standard determination that is administration system, benefit configuration, benefit move, benefit operation and constant administration change

(Vicente, 2013a).

1.1.3 SKMS

Service Knowledge Management System (SKMS) is an information system within ITIL whose role is to collect a repository of data that is used in the ICT service life cycle. The SKMS incorporates the configuration management systems (CMS), and additionally different instruments and known error database with aim of averting the gaps identified in the ICT delivery. The SKMS platform ensures updates and exhibits all data in an environment that an ICT specialist could require to deal with the full lifecycle of IT service provision and administration lack of which will lead to substandard ICT services (Betz 2013). SKMS will provide a platform for the adherence of the ITIL framework administration and conveyance, this will be utilised to actualize information technology service continuity management (ITSCM) whereas ITSCM is one of five parts of ITIL benefit conveyance (Betz 2013). ITSCM ensures the ICT foundation is aligned in support of business continuity management (BCM) and will add value to the business. ITSM is built up given present-day universal models, for example, ISO /IEC 20000 and ITIL version 3 (2007). SKMS offers a platform to aid for continuity management, knowledge management and configuration management of ICT services as guided by ITIL (Iden and Eikebrokk, 2017).

The SKMS will contain Knowledge Management (KM) and Configuration Management Database (CMDB). ITIL characterized knowledge management as the one focal process in charge of providing information to all IT Service Management and Service Knowledge Management System (SKMS) this is a solution to the lack of information in the ICT service life cycle that aid is ICT service continuity and reliability (Nabiollahi and Sahib Uddin, 2011). Lack of structured or quality service

during system configuration will lead to mishaps and systems that are unfunctional therefore the need for CMDB and Configuration Management System (CMS) that will offer standard guidance on configuration management (ITILV3, 2007). SKMS platform deployment will aid in improving the ICT service architecture and quality for an ICT service delivery entity (Nabiollahi, Alias and Sahibuddin, 2011). The goal of the study is to develop an SKMS platform that will enable an ICT service delivery entity to improve the quality of management decision making by ensuring that reliable and secure information and data is available throughout the service lifecycle and have continuous improvement of the service.

In the ITIL framework, the SKMS manages the information and knowledge with the ICT service. Therefore, offers the central repository for knowledge management, assessment management, documentation, incident and problem management and service catalogue. This is the information and knowledge that will be used in the ICT service provision as required by the ITIL framework, The SKMS will provide a platform to collect, store, evaluate, and present information in a structured manner; this will be governed by ITIL. ITIL is the framework that guides the tool SKMS on the structure to adhere to in ICT service management int eh information management and knowledge management (ITILV3, 2007). The SKMS offers controlled access to knowledge and information during the IT service management cycle offering the ICT service provider ease of access and efficiency management (ITILV3, 2007).

1.1.4 Edge Systems Company

Edge systems company was incorporated in 2009. It is an ICT service delivery that offers various ICT services. Edge systems company specializes in the design and installations of structured cabling, offering technical support for computers, printers,

IP telephony, server infrastructure, CCTV/IP cameras, ethernet and fibre cabling wireless/access points and network infrastructure. The company mission is to provide the most quality, innovative and cost-effective solutions for customers by continuous development and enhancement of the solutions; to ensure customer satisfaction by providing service with full commitment and professionalism; to exceed customer expectations by providing total telecommunications and networking solutions with the best available technologies(Edge Systems, 2021). Edge systems company is a client of resolution health whereby they offer ICT services is all the resolution offices. Edge systems maintain the ICT infrastructure in all the resolution health sites. The research analyzed the ICT service delivery entity edged systems company since it is offering ICT services with a client that has various offices and offering a wide scope of services. Edge systems have no platform to manage, track and document the ICT services being offered to ensure a structured ICT service delivery standard.

1.1.5 Resolution Health Insurance

Resolution health insurance was incorporated in 2002 (resolution, 2021). It is an insurance entity that provides medical insurance. The entity vision is to be the recognized leader and preferred provider of insurance services in Kenya and mission to serve their clients, employees, stakeholders and society by providing responsive and comprehensive insurance solutions (resolution, 2021). The entity had 9 nine branch offices therefore was the ideal client from edge systems to be used for this study. Since the objective is to provide a platform that will allow ICT service delivery entities to offer quality and standard ICT services and at hand improve user acceptance. This will provide a case scenario for analyzing how to ensure quality and standard configuration management, acknowledgement and continuous ICT service improvement.

1.2 Statement of the Problem

IT is a key business driver and hence organizations are investing in IT service knowledge management to have customer-centric IT service as a competitive advantage. However, the growing need for efficient ICT services to support the business require structured ICT services and continuous improvement of the service being offered. Besides, the complexity of managing IT Service delivery necessitates IT Service knowledge management as an important area of focus in the IT service industry.

The intricacy of managing IT Service delivery that adds value to the business has led to the need for ITIL an important area of focus in the IT industry (Titus M. Kitavi, 2014). ITIL characterizes ICT best practices. Its framework provides guidance for IT service management and IT service knowledge management. IT service knowledge management is the information collected from incident management, known error management, problem management and change management. ITIL framework offers capacity for incident management, known error management, problem management and change management data management. The data collected can be used to guide the business on the services that require continuous improvement and improve the efficiency of the ICT service being offered.

IT service delivery organisations aim at attaining optimal service delivery to achieve competitive advantage not just by investing in expensive IT infrastructure but also by implementing service and customer-centric IT continuous service management best practices. This ensures continuous service improvement, acceptance and knowledge management (Titus M. Kitavi,2014). To realize this, the ICT service provision must have a continuous improvement Plan–Do–Check–Act (Deming cycle) which in turn

will promote a continuous quality ICT service provider that is aligned with the ITIL framework. The proposed use of the SKMS platform in this study is expected to offer continuous ICT service management, support the business and provide a platform that integrates ICT service and knowledge management to the ITIL framework. The SKMS platform will be a prototype mobile application that provides a platform for ICT service delivery organizations to implement the ITIL framework. The continuous monitoring of the level of user acceptance of ITIL in the ICT service delivery platform will ensure the benefits of ITIL are effected on all levels of ICT service provision.

1.3 Aim of the Study

The study sought to design and develop a service knowledge management system prototype model for Edge System Company with the view to ensure optimal ~~and improved~~ ICT service is provided.

1.4 Objective of the Study

The study's objectives were to;

1. Examine the influence of ITIL in ICT service delivery at edge systems.
2. Establish the level of user acceptance of ITIL in ICT service delivery at edge systems.
3. Determine the effect of the service management process (including plan-do-check-act) in ICT service delivery at edges systems.
4. Design and develop a service knowledge management system (SKMS) in reference to ITIL for ICT service delivery at edge systems.

1.5 Research Questions

The study sought information that answered the following questions:

1. What is the influence of ITIL on ICT service delivery at edge systems?
2. What is the association of user acceptance of ITIL in ICT service delivery at edge systems?
3. What is the effect of the service management process (including plan-do-check-act) in ICT service delivery at edges systems?
4. Design and development of a service knowledge management system (SKMS) in reference to ITIL for ICT service delivery at edge systems.

1.6 Significance of the Study

The research sought to develop an SKMS that will aid in the implementation of the ITIL framework. The platform will incorporate ITIL in ICT service delivery to add value to the service to enable the entity to enjoy structured ICT services and ICT benefits. This study will thereby assist companies and organizations mainstream the viability of ITIL as means of ICT administration efficiency. This will enhance ICT service administration, benefits, propel ITIL as a critical component in achieving business objectives and value enhancement. The findings from this study will also be of great benefit to researchers who will be interested in conducting research related to SKMS. Therefore, research findings from this study will be a significant contribution to a topic that requires more knowledge accumulation. Since the main objective is to design and develop an SKMS prototype for Edge Systems Company, it will be of much significance to other service institutions and organizations since they will get access to a more cost-effective prototype that can easily be implemented. This will

further assist the interested organizations to significantly reduce the initial cost of developing an SKMS thereby increasing ICT User Support uptake and efficiency.

1.7 Scope of the Study

The scope of the study was limited to Edge systems ─ an ICT service provider entity and one of their key client ─ Resolution health ICT team. Edge systems have a population of 294 and the client Resolution health has 33 personnel in the ICT department.

1.8 Limitations of the Study

The main limitation of the study was that the findings cannot be generalized to other ICT organisations that offer other ICT specialized services other than ICT support taking into account that both case that is under study ─ the Edge systems (the ICT service provider entity) and Resolution health ICT team (the client) have a unique history, culture and operating conditions. Therefore, different service providers have various factors affecting service delivery even on a departmental level.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter focuses on literature related to the study topic. The chapter, therefore, covers in depth the ITIL v3 framework based on its five productions. The chapter further outlines literature on service knowledge management systems and their relationship with ITIL.

2.2 Theoretical Foundation

The study is anchored on the application of the ITIL framework in ICT service delivery with the view to ensure optimal and improved ICT service is provided through the use of an SKMS platform that will be guided by the ITIL framework publications.

2.3 ITIL v3 Framework

As indicated by ITIL 2007 report, ITIL v3 comprises of five productions tabulated below: -

2.3.1 Service Strategy

Service strategy gives volume heading on the most proficient method to the configuration, create and execute benefit of ICT service administration (ITIL, 2007). This direction is offered on the standards covering the act of an administration that help create administration strategies, rules and procedures over the Service Lifecycle of ITIL (Steinberg & Yearsley, 2007). The service strategy will offer guidance to an organization in adopting ITIL and adapting to meet the organization business needs and their customers. . ITIL is adopted by organizations to enable them to deliver value

for customers through services, optimize ICT services to add value to the business strategy and customer needs, measure, monitor and optimizes IT services and service provider performance, manage knowledge, improve the interaction and relationship with customers and coordinate the delivery of goods and services across the value network ITIL® Service Strategy (2011).

2.3.2 Service Design

For ICT services to offer value to the business needs, they must be designed with the business objectives in mind. The Service Design volume guides the design and development of services and service management processes. (ITIL, 2007). It includes the changes and improvements necessary to increase or maintain value to customers over the lifecycle of services, the continuity of services, achievement of service levels, repository of the service catalogue and conformance to standards and regulations and guides organizations on how to develop design capabilities for service management. ITIL® service strategy (2011). ICT continuity of services ensures the support of the overall ICT service availability in the case of ICT service interruptions and the process of ensuring that the required ICT resources or service can be recovered within business-related agreed upon time frames (Ellis and Karla, 2011).

The service design ITIL v3 defines a service catalogue as the database or structured document with information about all live IT services, including those available for deployment. The service catalogue is the only part of the service portfolio published to customers and is used to support the sale and delivery of IT Services (ITIL, 2007).

2.3.3 Service Transition

Service transition offer volume direction to advancement and change of abilities for transitioning new and changed administrations into operations (Steinberg & Yearsley, 2007). This report gives direction on how the essentials give Service Strategy is encoded in Service Design and are adequately acknowledged in Service Operation. In this study, we will analyze the change management, configuration management and knowledge management in the service transition stage.

Change management ensures the when the ICT system alterations there are no service interruptions before and after the changes and to track the changes when there is an incident to easily identify the root cause. Businesses undergo transitions regularly that differ in risk and impact and it is vital to streamline this process to keep these two factors in control therefore change management is significant to deploy new changes without any disruption or downtime (Padmavathy, Freshworks Inc.)

Configuration management The IT Process Wiki (Jan 2021) aims to maintain information about Configuration Items (CIs) required to deliver an IT service, including their relationships. Configuration Management is imperative in the overall ICT service provision. Configuration focuses on the best practices of creating support models, a knowledge base, standardizes systems deployment and support, workflow management, and developing communication for use in the transitioning of ICT services to production.

Knowledge management is the various strategies and practices used in an organization to identify, create, represent, deliver, and enable the adoption of insights, lessons learnt and experiences where the insights and experiences comprise

knowledge, either shared by individuals or from organizations as processes or practices (Colin, 2013).

2.3.4 Service Operation

As indicated by Steinberg and Yearsley (2007), service operation epitomize rehearses in the administration of administration operations. It includes direction on accomplishing viability and effectiveness in the conveyance and support of administrations, so esteem is conveyed to the client and the specialist co-op. In this study, we will analyze the incident management, problem management, workaround ad request fulfilment.

Incident management is the logging, recording and resolving incidents that have occurred in an environment to ensure quick resolution of the ICT service issue at all times to ensure the ICT service is optimal (Ucisa ITIL, 2015). The incident report can either become a known error with a solution to the issue identified or have a workaround that offers a temporal fix therefore the issue becomes an identified problem.

Problem management is the process of identifying the root cause of the incidence that has no permanent fix and getting a temporal fix a workaround to reduce incidences (Tutorial point,2021). The workaround identified is recorded in the KEBD for future reference. The problem management can either be reactive this occurs when an incident is reported by the end-user or proactive that is identified when during continuous service improvement or from a request fulfilment.

Request fulfilment is the process where the end-user shares a service request that could service improvement, recommendation or any other request they may have (ITIL, 2017). The objective of the request fulfilment is to offer the opportunity for the

end-users to request and receive their ICT service requirements; a platform for the ICT service delivery entity to collect the end-user requirements, comments, complaints or information; opportunity to gauge the end-user level of acceptance of the ICT service provided (Ucisa ITIL, 2015).

2.3.5 Continual Service Improvement

Continual service improvement administration change gives fundamental direction in making and keeping up an incentive for customers using better presentation, optimal service delivery, outline and operation of administrations. It consolidates standards, practices and strategies from quality administration, change administration, capacity change, service growth and evolution to ensure continuous improvement (ITIL, 2007).

Table 1 indicates five phases (volumes) and all related procedures which every phase presented for the administration lifecycle. The most imperative point as of now is that albeit each procedure is received in one phase, a number of them are not constrained to just a single stage. For instance, handle numbered c.7 as information administration influence on all phases aside from administration system.

Benefit Design (SD) stage, is the second step of IT Service Lifecycle in ITIL V3, all parts of administration configuration including: new or changed administration arrangements, benefit administration frameworks and instruments, innovation structures and administration, frameworks procedures, parts and abilities, estimation techniques and measurements will be viewed to ensure ICT service continuous improvement (ITIL distribution 2007). One of these viewpoints is innovation engineering of administration which is considered as the prerequisites of administration structure. Benefit engineering endeavoured to coordinate all data

identified with the administration. This data included applications, data, information and frameworks for any IT benefit. Continuous improvement sources the opportunity for improvement from the incidents raised request raised by the end-users, technology evolution and in areas the ICT service delivery entity observes they require improvement through the Deming cycle.

Table 1: Summary of ITIL V3 Stages and Processes

ITIL V3 stages (volumes) and process		
a. Service strategy	**b. Service design**	**c. Service transition**
a.1Service portfolio management	b.1 Service level management	c.1 Transition planning and support
a.2 Financial management	b.2 Catalogue management	c.2 Change management
a.3 Demand management	b.3 Capacity management	c.3 Service asset and configuration management
a.4 Strategy generation	b.4 Availability management	c.4Release and deployment management
	b.5 Service continuity management	c.5 Service validation and testing
	b.6 Information security management	c.6 Evaluation
	b.7 Supplier management	c.7 Knowledge management

ITIL V3 stages (volumes) and process		
d. Service operation	**e. Continual service improvement**	
d.1 Event management	e.1 Service measurement	
d.2Incident management	e.2 Service reporting	
d.3 Request fulfillment	e.3 Service improvement	
d.4Problem management		
d.5Operation management		
d.6Work around		

Source: Nabiollahi et al., (2010)

2.4 The Influence of ITIL in ICT Service Delivery

The ITIL v3 has service transition and the service operations publications that within them we find problem management, incident management, configuration management stages, change management, known error database and knowledge management that influence the ICT services.

Change management objectives are to have communication and approval management of the change, documentation of the change and reduction in the number of incidents of the ICT service due to the change; this is at hand ensures efficiency of the ICT service being provided to the ICT service delivery entity. It adds value since there is the opportunity for the stakeholders to be advised about the change to prepare for ICT service provision interruption and/or approved for the change to be implemented. (Padmavathy, Freshworks Inc.) Change management capabilities are in the ICT service delivery industry are minimal/no disruption to the ICT services, effective resource utilization by having an approved service interruption and related activities, identifying configuration items that may be potentially impacted due to service provision, proper documentation of all relevant changes and communication of changes to all stakeholders.

The Service Knowledge Management System (SKMS) inside ITIL Version 3 as depicted in the service transition period of the lifecycle is a mix of devices and databases that are utilized to oversee data and information about administrations. SKMS is the "information distribution centre"/entrance or introduction layer that utilizes data for the configuration management database (CMD) and changes enterprise system management frameworks that screen applications, system, server and other foundation gadgets, alongside the service desk framework, get to configuration items and different data on the operation of administrations and their

essential parts.

The synchronization of these different information sources gives the learning required to settle on administration portfolio choices, survey and enhance strategies methodology and procedures. It likewise decides to prepare needs, observed administration level goals track and proficiently oversaw resources and controlled changes. The value of the data in the configuration management database offers guidance to the users of the services where necessary. Numerous components that are given particular checking and administration for the system, server, application or database spaces give vigorous tools and support to the specific innovation storehouse they uphold.

Knowledge comprises information, data, knowledge, aptitude, encounter, mastery, thoughts, instinct, or understanding in the setting used by Fatt and Khin (2010). Knowledge therefore could be arranged into two sorts, which were specific information and implicit information. Express knowledge is the learning that mutual with others that could be recorded sorted transmitted to others Tan (2011). Knowledge management is about perceiving and dealing with all the association's scholarly resources (which incorporate the information, data and information) that meet business destinations. The knowledge management (KM) method is presented through the administration move of ITIL V3. The objective of the KM system in ITIL V3 is to engage relationships in improving the way of the organisation in decision making by ensuring that reliable and secure information and data is open all through the organisation lifecycle (ITIL, 2007). Knowledge management has been especially noteworthy inside the service lifecycle since the pertinent and fitting information is one of the critical administration components that is used. Among the administration

service lifecycle association are expected to concentrate on recovering, sharing and using their insight through critical thinking, dynamic learning, essential arranging and central leadership; for this to be accomplished education is required to be exchanged to different parts of the association at particular focuses in the lifecycle. As indicated by Stevens et al. (2010), knowledge management is characterised as a deliberate and integrative procedure of planning extensive association exercises of getting, making, putting away, sharing, diffusing, creating and sending information by people and gatherings in the quest for the broad, authoritative objectives. As indicated by Fatt and Khin (2010), knowledge management is worried about perceiving and dealing with all the association's scholarly resources (which incorporate the information, data and information) to meet business goals. Knowledge management framework according to Deng and Hu (2007) is an IT framework that is used to bolster and to fortify the procedure of information creation, get to, exchange and utilization. Information administration views learning to share the centre goal. Just through trades, would we be able to create learning; only using information, cant new bits of knowledge be gotten from the existing understanding.

2.5 Level of User Acceptance of ITIL in ICT Service Delivery

ITIL offers robust, mature and time-tested practices that have applicability to all types of ICT service organizations. (ITIL Service Strategy, 2011). Within ITIL we have the service operation stage of which it offers guidance on ensuring effectiveness and efficiency of the ICT service. We can analyze the level of user acceptance from use and actualization of these process request fulfilment, incident management and problem management.

Incident management can characterize observing prerequisites to bolster occasion and episode discovery through robotization and can open occurrence tickets and additionally auto-heighten episode tickets consequently (ITIL 2007). The incident and evident checking can recognize changing circumstances and conditions which help with anticipating and pre-empting conditions and conditions along these lines keeping away from conceivable administration and partial disappointments. It is basic to recognize the scope of the ICT services offered the difficulties the end users experience in the ICT procedure or frameworks. The use of the incident management module allows the ICT service delivery entity to gauge the level of acceptance of the use of the module when adhered to ITIL through the use of the platform and/or if there to many issues this could also mean the ICT service needs further optimization. The services vary - hardware parts, software parts, networks (VPN), services – in-house and outsourced, policies, techniques and administration, security controls and documentation and training materials. The issues reported if the issue is provided with a solution it is documented, the documentation is the manual for fabricating the Known Error Database (KEDB). A Known Error Database is a storehouse of data that depicts the more significant part of the conditions in your IT frameworks that may have had an occurrence of an incident and the solution has been recorded for future reference. IT is imperative when end-clients report issues to the bolster engineers log, and they are arranged and organized (ITIL report, 2007). After an incident is reported a solution or workaround is sourced and documented in the KEDB. This will at hand enhance ICT benefit progression. Specialists will collaborate with the KEDB like any web search tool or learning base, whereby before settling an issue or occurrence they would look if it's a repeat and is archived on the KEDB. The level of user acceptance of ITIL can be gauged from the number of incidences raised if the service is too

problematic then the end-user is not enjoying the service, therefore, should be optimized for optimal use.

Problem management (PM) is the procedure in charge of dealing with the lifecycle of all issues (ITIL, 2007). The essential goal of problem management is to keep occurrences from happening and to limit their effect this is characterized by the ICT service issue being raised for at least more than one episode Bardallo (2009). Whereby the permanent solution is not known at the time, a workaround record is made in the KEDB, and the issue administration process oversees further examinations. The PM handle oversaw the lifecycle of the issue. The PM process covers different proof and finding of the primary driver; determination assurance; usage of the determination through proper controls which incorporate change administration and discharge administration; responsibility for about issues and essential workarounds and resolutions; documentation of the workaround and settlement in the SKMS. The level of user acceptance ITIL can be gauged from the number of incidences raised that do not have a solution but have workarounds if the service is too problematic then the end-user is not enjoying the service, therefore, should be optimized for optimal use.

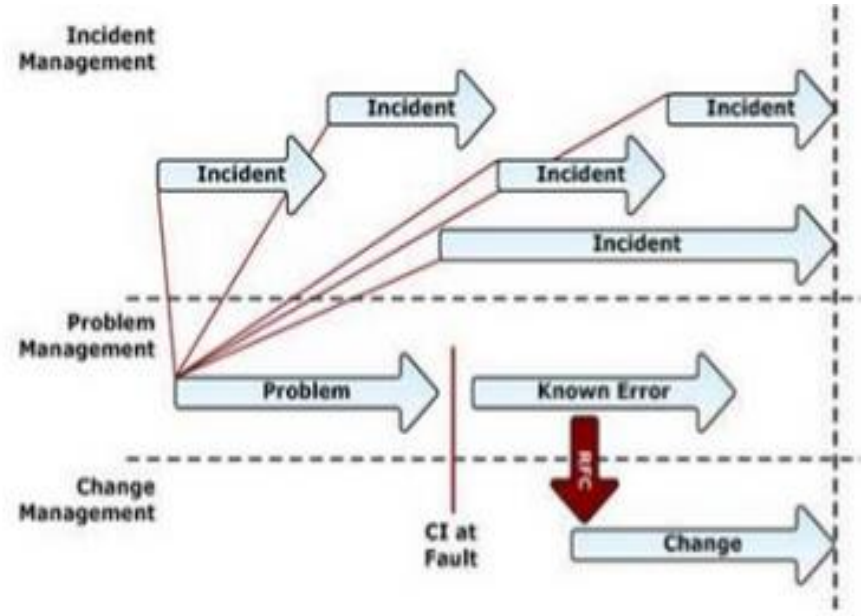


Figure 1: Problem Management Process Relationship with others Process

Source: Bardallo (2009)

The request fulfilment offers the end-user platform to share their perception about the service received this is an optimal platform for the ICT service delivery entity to gauge the level of acceptance of the ICT services provided when adhered to ITIL. The process required to fulfil a service request will vary depending upon what is being requested but this can be broken down using the Deming cycle to ensure continuous improvement (Ucisa ITIL, 2015).

2.6 The Effect of the Service Management Process (Including Plan-Do-Check-Act) in ICT Service Delivery

According to the ITIL publication (2007), the Deming cycle of Plan–Do–Check–Act is an efficient quality management system to follow.

Figure 2: Deming Cycle

Source; ITIL publication (2007)

Plan-do-check-act includes: -

- Plan: -which perceives an open door and plan a change
- Do: -Test the change. Complete a little-scale study.
- Check: -Review the test, break down the outcomes and recognise what you've realised
- Act: -Take activity in light of what you accomplished to review step

If the change did not work, experience the cycle again with an alternate arrangement. On the off chance that you are fruitful, consolidate what you gain from the test into more extensive changes.

A central idea in executing Total Quality Management (TQM) is the Deming's cycle focuses on an arrangement of administration practices to help organizations increment their quality and efficiency (ITIL, 2007). It also focuses on making the unfaltering quality of explanation behind upgrading things and organizations and get the new rationale. It even stops dependence on evaluation to finish quality, end the demonstration of allowing the business on cost alone. Instead confine mean cost by working with a lone supplier and improve dependably and unendingly every strategy

for orchestrating, creating and organising. It also gets ready at work, grasp and foundation activity, drive out fear, isolate obstacles between staff zones, wipe out trademarks, requests and centres for the workforce and wipe out numerical sums for the workforce and numerical targets for the organization.

2.7 Design and Development of A Service Knowledge Management System (SKMS) about ITIL for ICT Service Delivery.

The SKMS platform will have a change management database (CMDB) to document and offer approval management of change management. The benefits of work area programming merchants took care of the episode administration, issue administration, change administration, benefit list and (CMDB) information. Additionally, they offer satisfactory incorporation over these different procedure territories. Even the most thorough apparatus utilized by merchants experience issues achieving the nirvana that pull the majority of the data together to make the learning that is required to give all-encompassing choice support over the ITSM lifecycle. The heterogeneity of information and the different qualities of instruments used as a part of most associations remains the most significant ITSM mechanization challenges.

The SKMS platform will have knowledge management that could be created This will be with the known error database and configuration management system. As indicated by ITIL V3, (2007) report, supporting the knowledge management offers learning with extensive amount of information, which will be held in a focal legitimate vault or configuration management system (CMS), configuration management database (CMDB), known error database and known error database (KEDB). SKMS for administration design: SKMS is an arrangement of modules and databases that are utilised to oversee learning and data management. The SKMS incorporates a

framework setup administration framework and different instruments and databases. The SKMS stores monitor updates and display all data that an IT Service supplier needs to deal with the full Lifecycle of IT Services.

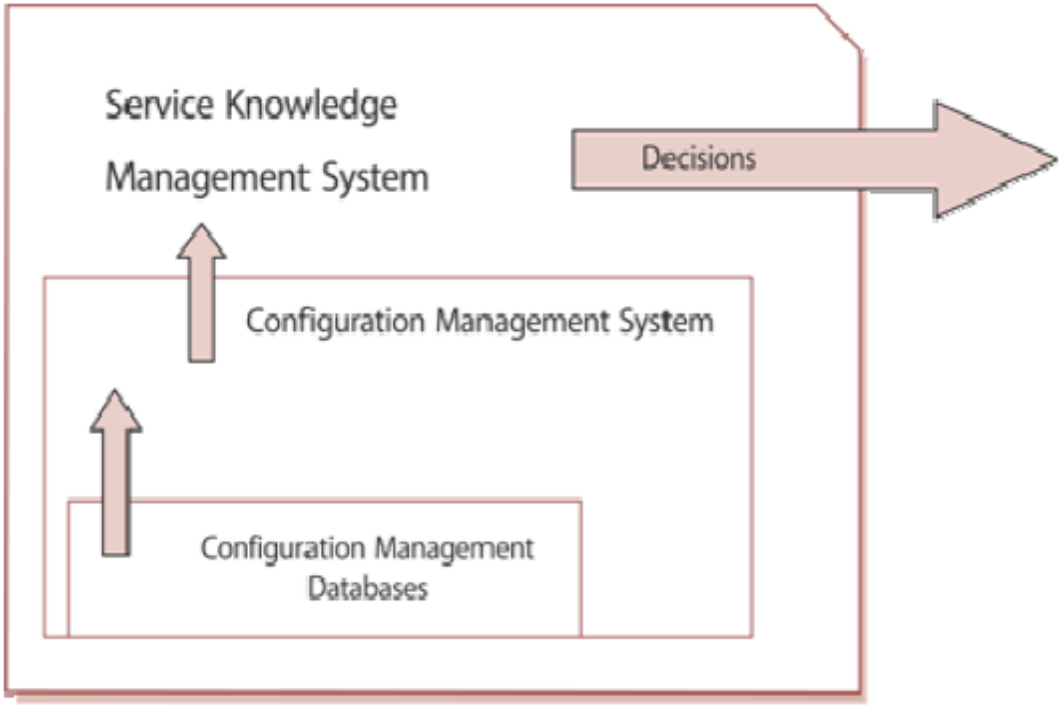


Figure 3: Relationship of CMDB, CMS and SKMS

Source: ITIL V3, (2007)

Configuration management (CM) is the procedure in charge of keeping up data about arrangement things that are required in conveying an IT Service, including their connections (ITIL 2007). The CM is overseen through the lifecycle of the design things. Setup administration is a piece of a general administration resource and arrangement administration handle. Design administration is the train for controlling the development of programming frameworks. The setup administration controls the product frameworks advancement using CMS which is an arrangement of instruments and databases that are used to oversee setup things for IT Service supplier's (ITIL

2007). The CMS will contain the data about episodes, issues, known errors, changes. CMS is used as a part of the IT benefit administration for learning administration about the setup things.

As indicated by the ITIL report (2007) SKMS for administration engineering: As indicated in segment two, IITL characterises its SKMS as taking after: "An arrangement of instruments and databases that are used to oversee learning and data. The SKMS incorporates a framework design administration framework and different instruments and databases. The SKMS stores oversee updates and display all data that an IT Service supplier expected to deal with the full lifecycle of IT administrations."

In the execution of service knowledge management, one has the chance to enhance the nature of administration conveyed to the end clients, increment end client's fulfilment, diminish the cost of keeping up and overseeing administrations by empowering more professional basic leadership all through the undertaking. Service knowledge management concentrate on guaranteeing that the correct data is conveyed to the perfect place or individual, at the ideal time, empowering educated and opportune choices, through the change of information in the undertaking into learning that is dynamic and setting based, different procedures inside the ITIL structure likewise advantage.

The SKMS platform will have knowledge management it aids continuous learning and improvement of the ICT service.ITIL express that compelling learning administration is a capable asset for people in all parts over all periods of the organisation lifecycle. It is an excellent method for individuals and gatherings to share data, information and find out about all parts of an IT advantage (Deng & Hu, 2007). The availability of continuous learning from the knowledge provided will aid in the

continuous improvement of the ICT services. A knowledge management system (KMS) is an IT framework that is used to bolster and reinforce the procedure of learning creation, get to, exchange and use. Learning administration sees information sharing as the centre target. Just through data exchange, would we be able to create learning; just through the utilising of information, can new bits of knowledge be gotten from the existed learning.

The SKMS platform will have a service catalogue. A service catalogue is a pattern for arranging the services and products offered (Stevens et al., 2010).

The purpose of the service catalogue is to:

- Manage the information of the services and products being offered.
- Platform to share accurate information of the services and products being offered and the details about the services.
- Ensure the accurate audience has access to the service catalogue.
- Avail the ability for the ease of the audience ordering items through the service catalogue.
- The service should evolve with the evolving ICT service needs.

Service catalogue administration includes administration and control of the Service Catalog which contains data about administrations right now accessible to use by clients (ITIL report, 2007). Commonly, such data incorporates features of the administration. Guidelines for fitting utilisation of the administration, means of getting to the administration, pricing data, essential contact data and service level agreement data with the merchant offering the administration.

2.8 Service Delivery Dependent Variable

2.9 Conceptual Framework

A conceptual framework is a diagrammatic representation of variables under study. The main variable in this study was the service knowledge management system (SKMS). A relationship between independent variables (configuration management, incident management and problem management), structure/framework (ITIL V3 framework, Deming Cycle) and dependent variables (service catalogue, known error database) in conjunction with SKMS is shown in Figure 4

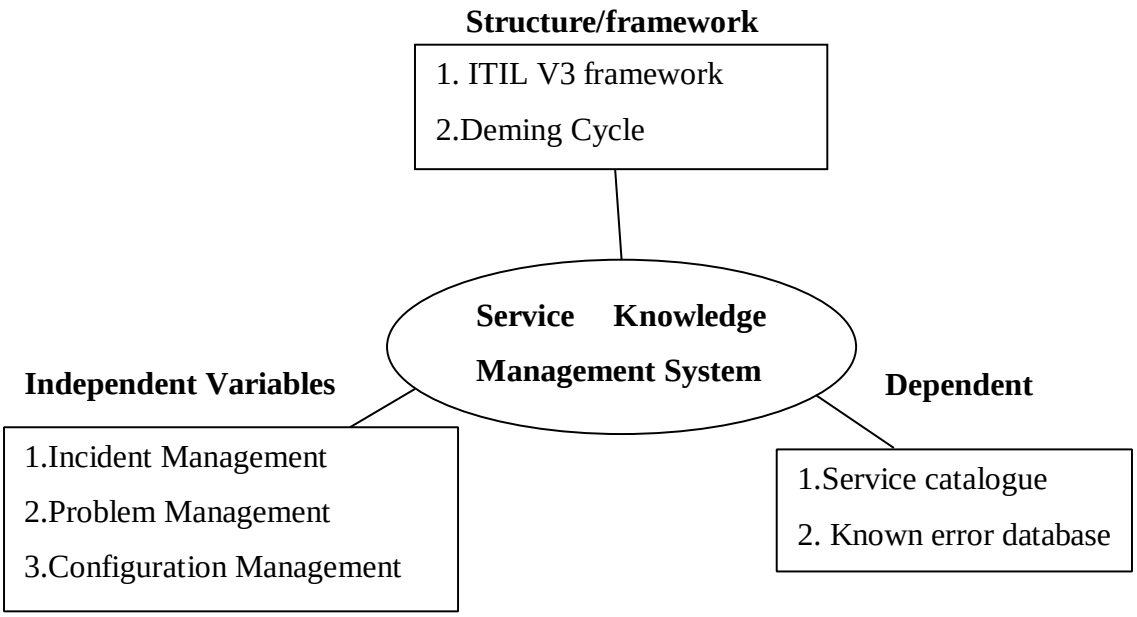


Figure 4: Conceptual Framework

Source: Author

SKMS is the platform that allows the collection of information to create a repository of knowledge. This will in turn add value to the ICT services in an entity/environment. The source of information is configuration management for the ICT services offered and the incident and/or problem management for all the issues

raised related to the ICT services in the use of the environment. This information keyed in should adhere to the ITIL framework and the Deming cycle process structure. This will ensure the quality and value of the analyzed information when output is generated. The repository will offer information as an output through the service catalogue and known error database which is used by the end-users to make their work easier therefore the end-user acceptance, decision making by the business will be informed.

2.10 Research Gaps

The study will analyze edge systems company which is an ICT service delivery entity on the adoption of ITIL through the use of an SKMS platform. The research identified the following opportunities the adoption can add value:-

- Repetitive incidents and problems are not captured and take up human resources and time to resolve where the solution could be documented for future reference and quick resolution.
- Need for a centralized platform for client and service provider to report incidence and document changes implemented.
- Challenge in retrieving information and generating reports.
- Inefficiency in the current manual system for change management, configuration management, incident and problem management processes.
- Provide a centralized platform to document all processes and use the data retrieve reports to aid in decision making.
- Eliminate the inefficiencies of the manual system.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The research methodology section describes the methods and procedures used to carry out the study. This chapter covers the overall methodology used in the study, the research design, population and sample, data collection methods and research procedures.

3.1 Research Design

A research design is a program that guides the investigator in the processes of collecting, analyzing and interpreting observations (Chava and Nathmias, 2005). The study adopted a mixed-method design. The research design adopted was descriptive and experimental research design. Descriptive research design which is also known as statistical research describes phenomena as they exist (Akhtar, 2016). The experimental research design that is used to test a research design of causal relationships under controlled situations is called experimental design (Akhtar, 2016). The mix-method research design was adopted since the research was testing the SKMS at edge systems company and required to review the system in the environment. This was done to ease collecting and analysing the respondents' opinions using opened questions that required qualitative research methods and the respondents' observations recorded in numbers that required quantitative research methods. In so doing the quantity and quality elements of the phenomenon under study which was how the ITIL framework could be implemented through an SKMS to improve service delivery, were both addressed.

3.2 Target Population

The target population is the total collection of elements from which the researcher wishes to make some influence (Donald, 1990). The population of interest was 327 comprising edge systems' customer care, ICT support staff, ICT implementation personnel, account managers and sales agents as well as ICT staff of the client resolution health. Resolution health has 9 nine branch offices where edge systems company offer ICT service, therefore, was the ideal for this study. Since the objective of the study was to provide a platform that will allow ICT service delivery entities to offer quality and standard ICT services and subsequently improve user acceptance, therefore, Edge systems being an ICT service delivery entity and offering services to Resolution health therefore used for this study. The focus was on employees of the ICT customer care, sales agents and account managers in edge systems, support and implementation departments at the organization as summarized in Table 2.

Table 2: Target Population

EDGE SYSTEMS	
Department	**Population**
Customer care	67
ICT Support	67
ICT Implementation personnel	60
Account managers and line Management	33
Sales Agent in edge systems	67
Sub-total	**294**
Resolution Health	
ICT team resolution health client	33
Grand Total	**327**

3.3 Sampling Design

Sampling is the procedure by which a modest number of people or gatherings is chosen and examined to get some data about the entire populace (Mugenda and Mugenda, 2003). The study employed 30% of the target population as the sample size. Mugenda and Mugenda (2003) recommend a sample size of between 10-30% a good representation of the targeted population. The sampled frame used was the department's register of the client resolution health ICT department. The researcher used a sample of 98 employees, which was obtained using a non-probability sampling procedure; that is controlled quota sampling of the various respondent categories. The resulting sample distribution is shown in Table 3.

Table 3: Sample Size

Department	Population	Sample ratio	Sample size
Edge systems			
Customer care	67	30%	20
ICT Support	67	30%	20
ICT Implementation personnel	60	30%	18
Account managers and line Management	33	30%	10
Sales Agent edge systems	67	30%	20
Resolution health			
ICT staff resolution health client	33	30%	10
TOTAL	**327**	**0.3**	**98**

3.4 Data Collection Methods

The primary data was obtained by the use of an online questionnaire via the tool monkey survey and an interview for the respondent that were not able to engage on the online questionnaire. The interviews were done upon request. They were informed about the procedure for the online questionnaire and where necessary interview session. The online questionnaire method was used as it provided anonymity and confidentiality, and, it was an advantageous method for finding the solutions. The study had open and close-ended questions to ask opinions on study. The study had five areas, covering every one of the factors. Meetings were considered for those respondents who were not ready to answer the inquiries and this was done upon request. The content collected was not shared with unauthorized respondents.

3.5 Ethical Consideration

During this research, respondents were informed that the study being undertaken was purely for academic purposes and assured of the confidentiality of the information given. The respondents were assured information given was purely for academic purposes and would not be disclosed to a third party but will be done a plagiarism test.

The online questionnaire method was used as it provided anonymity and confidentiality, and, it was an advantageous method for finding the solutions.

3.6 Validity and Reliability of Data Collection Instruments

Validity explains how well the data collection tool can collect data that covers the actual area of investigation (Ghauri &Gronhaug, 2005). Validity means “measure what is intended to be measured” (Field, A. P, 2005). Internal validity ensures the extent to which the observed results represent the truth in the population we are

studying and, thus, are not due to methodological errors. (Patino & Ferreira, 2018) The researcher ensured that the questions of the questionnaire were relevant to this study by requesting peers in the field to review the questionnaires. The questions were straightforward, easy to understand, and flexible for ease of use for both the interview and respondents to avoid misleading feedback from the respondents.

Reliability is a measure of the degree to which a research instrument yields consistent results after repeated trials (Mugenda and Mugenda, 2003). An instrument is reliable when it can measure a variable accurately and consistently and obtain the same results under the same condition over time it's considered acceptable. The researcher applied Test-retest reliability. The reliability coefficient is obtained by repetition of the same measure a second time, which is called the test-retest reliability Graziano and Raulin (2006). It indicates score variation that occurs from testing session to testing session because of errors of varying perceptions. The same test will be given to the same people twice in a different period to eliminate problems arising from memory, human error, maturation, learning.

3.7 Research Procedure

With the assistance of the associates, the researcher read the questions to recognize any errors, such as spelling oversights, lucidity, and dialect utilized. This helped give an affirmation that the respondents comprehended the questions asked. The question has both open and closed ended questions for quantitative and qualitative data respectively. The same questionnaires were used for both interviews and online surveys. A presentation letter from the specialist is conveyed to the respondents to give the purposes behind doing the study. The researcher was issued with an introduction letter from Moi University and later a Research Permit from the National

Commission for Science, Technology and Innovation (NACOSTI) that ensured the study was carried out smoothly. A copy of the permit is in appendix 5.

3.8 Data Analysis

The analysis was quantitative and qualitative. Quantitative analysis is carried out using descriptive statistics such as frequencies. This was presented using graphs, pie charts and tables. A final report containing the recommendations and conclusions of the study is presented. Qualitative data was analyzed thematically by use of content analysis.

3.9 System Methodology

The system development type that was used was evolutionary prototyping. This allowed the use of the Deming cycle and ITIL v3 framework in the structure of SKMS because both adhere to continual improvement of the service of the prototype, therefore when the user requirements evolve the application evolves.

This development model is suitable for complex projects that require all requirements to be delivered at one time (Aggarwal & Singh, 2007). However, the initial version of the prototype it's not compulsory for it to be fully functional. The model repeats the same development steps until the prototype is fully functional according to the user needs.

The stages included the below: -

1. Specification: This included specification of requirements which includes; scope of the most likely problems (their resolution and workarounds); standard configurations; list of service catalogue; change management process; frameworks outline (ITILv3 and Deming cycle) for prioritization changes and

continual improvement. The identification ensured requirements were analyzed and prioritized.

2. Prototype development. This included the creation of the 1st identified requirements and other prototypes projects of improvements and fine tuning to ensure its success.

3. Validation of prototype. This was done through experimentation using participants from edge systems and resolution health ICT staff. The end-users provided feedback which was used in the requirements analysis and prioritization, therefore, ensuring continual improvement.

4. Prototypes changes/redefinition and continual improvement. This was the specification for the next version. The feedback from the end-users was used to identify areas for change and continual improvement which was forwarded to identification for analysis and prioritization.

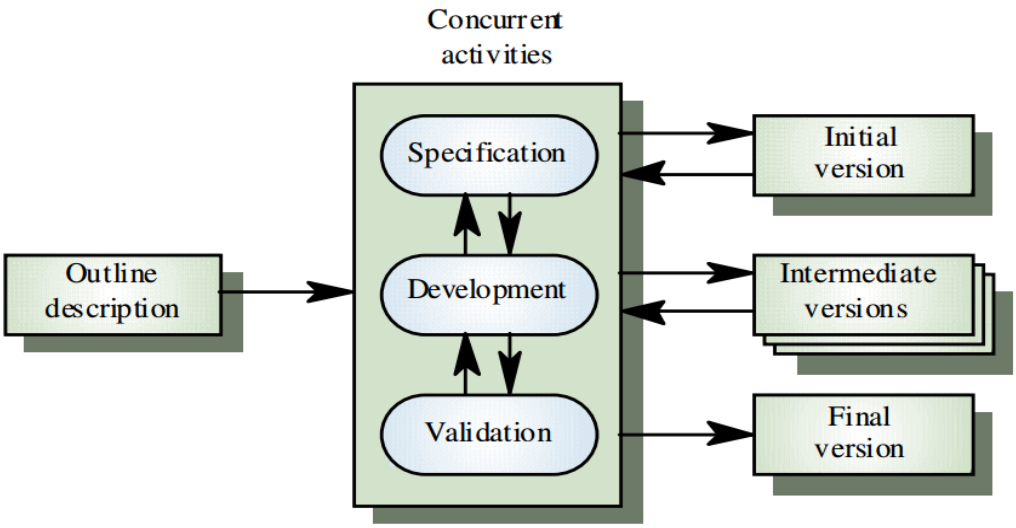


Figure 1: Evolutionary Prototype

Source: Aggarwal & Singh, (2007)

3.10 Tools for modelling

The system used the below tools:

- Android Studio
- MySQL
- Monkey Survey

CHAPTER FOUR

SYSTEM DEVELOPMENT AND DOCUMENTATION

4.1 Introduction

This chapter presents the SKMS mobile application the design and development lifecycle used to develop the prototype application and all the modules in the application, their purpose and how they are aligned to the study objectives.

4.2 Evolutionary Prototyping

Evolutionary prototyping was used to develop SKMS and the initial version was presented to resolution health ICT staff one of the clients of edge systems.

4.2.1 Specification

A need analysis was done to identify if the SKMS mobile application is necessary for the edge systems business environment.

a) Scoping the requirements: - Below are the needs that were identified

- Edge systems ICT technician mobility and ability to work from anywhere.
- The platform for end-users to share their users' needs to ensure continual service improvement.
- The platform for the end-users to raise ICT incidences and problems.
- A platform that will share real-time downtime alerts.
- A Platform where the edge systems ICT technician and end-users can search for the solution to known errors and workarounds to problems.
- A platform to share feedback on the ICT services offered.
- A platform to purchase products offered by edge systems.

b) Requirement's analysis (prioritization). The above-identified needs were deemed all to be important however were prioritized according to the study objectives.

- Influence of ITIL in ICT service delivery at edge systems

✓ Edge systems ICT technician mobility and ability to work from anywhere

- The platform for the end-users to raise ICT incidences and problems.
- Level of user acceptance of ITIL in ICT service delivery

✓ A platform to share feedback on the ICT services offered

✓ A platform to purchase products offered by edge systems.

- ICT service management process in ITC services on service delivery

✓ A platform that will share real-time downtime alerts.

✓ The platform where the edge systems ICT technician and end-users can search for the solution to known errors and workarounds to problems

- Plan – do –check – act (The Deming Cycle) on the ICT service

✓ The platform for end-users to share their users' needs to ensure continual service improvement

4.2.2 Prototype Development.

During this step, the prototype of the mobile application was developed using android studio together with PHP and MySQL. The mobile application was hosted on *000webhost.com. The development commenced with the design flow of processes* from the point the end-user logs in into the SKMS. The application development, evolution prototyping flow chart is in Appendix 5.

4.2.3 Validation of Prototype and System Test

This was done through experimentation using participants from edge systems company staff and resolution health ICT staff. The end-users provided feedback after the test which was used in the requirements analysis and prioritization, of the 2nd prototype after a recommendation is made for continual service improvement.

The mobile and web application was presented to the test environment at resolution health and edge systems company for review. An android package kit (APK) was sent to end-users to test the first mobile application prototype and link for the web application. These allowed the end-users to install on their mobile applications. The requirements were for the end-user to use a phone with the Android operating system and have android version 4.1 (jelly bean) and above. While accessing the mobile application and web application, the end-user was required to have an internet connection. During an internet fluctuation, an alert is sent to the end-user.

The end users tested the system functionality whereby all the modules were tested to ensure that they corresponded to the functionality requirements. The test started on the mobile application where the end users had been preconfigured by the system administrator. The end users from resolution health logged in, posted in the incidence module, a change request, viewed existing known errors and made requests on the service catalogue.

ticket_id	subject	issue	preview	solution	suggested_workaround
1	Data centre temperature	The primary air conditioner failed and we are curr...	The primary air conditioner failed and we are curr...	The service provider has been request to avail the...	Use fans to ensure the hot air does not accumulate...
17	Unable to access youtube by the marketing executiv...	The marketing department should have access to you...	The marketing department should have access to you...	Confirm internet connection on the endu-user machi...	
15	Sms server unreachable	The sms server switched its self off since the vmw...	The sms server switched its self off since the vmw...	Ensure all virtual servers have enough unused spac...	Always ensure the Lun and Volume space on Netapp h...
18	Internet downtime	The internet service provider is expriencing a co...	The internet service provider is expriencing a co...	Use of the 3rd backup setup for internet service w...	Use modems for critical departments.
	Error displayed	The computer	The computer		

Figure 6: Database Snapshot of Sample Data for the Tickets Log

Source: Author

subject	category	issue	solution	suggested_workaround	root_cause	created_time	created_by
The trust relationship between this workstation an...	Urgent	User unable to login and instead the get this erro...	Remove computer from the domain and return it.	Temporal solution remove your network cable and re...		2015-05-23 07:28:35	Dan - assistant systems administrator
Next fianancial not present on sage	Moderate	Finance team unable to add next financial year on ...	upgrade to sage 300	This can be done from the database . The database ...		2015-08-24 14:05:00	Kefa-technician
Macfee epo not syncing with AD	Moderate	When we add a new machine in the active directory ...	Add the domain controller a fressh on the EPO serv...	Download the macfee installation agent from the ep...		2015-05-08 11:09:11	Kituku - Assistant Systems Administrator
Sap web server not open citrix	Moderate	After upgrade of SAP from pl12 to pl13 all the cli...	Remove the published application untistall and the...			2015-07-12 02:11:09	Kituku - Assistant Systems Administrator
call are dropping	Very Urgent	Calls to external numbers are	Check on the E1 line network and	Divert the calls isdn lines on safaricom and airte...	Main E1 line link	2015-09-05 09:00:00	Systems Administrator

Figure 7: Database Snapshot of Sample Data for the Known Error Table

Source: Author

Whereas the technicians from Edge Systems Company logged in to the mobile application where they resolved the incidents to either have a solution therefore

posted as a known error or a workaround posted in the problem module. They also tested the second prototype where they checked in at various sites, posted preventive maintenance tasks, posted site visit tasks, requested peripherals and money refunds.

checkin_id	checkin	date_checkin	technician
1	Nation Centre, Kimathi Street,Nairobi, Kenya	2014-09-23 05:04:08	1
2	Zuri Centre, Kenyatta Highway, Thika, Kenya	2015-06-21 05:05:10	3
3	Mega city plaza, Kisumu City	2015-06-02 05:11:59	15
4	Parkfield place, Westlands, Waiyaki way, Kenya.	2015-05-05 05:38:33	13
5	Mocha place, Moi Highway, Kisii	2015-11-09 06:49:47	6
6	Nation Centre, Kimathi Street,Nairobi, Kenya	2015-06-08 08:05:32	1
7	Parkfield place, Westlands, Waiyaki way, Kenya.	2015-09-04 08:05:43	10
8	Parkfield place, Westlands, Waiyaki way, Kenya.	2015-09-07 08:01:59	2
9	Masters Plaza, Kenyatta Avenue, Nakuru, Kenya	2015-08-15 09:10:05	1
10	Masters Plaza, Kenyatta Avenue, Nakuru, Kenya	2015-08-24 11:35:01	3

Figure 8: Database Snapshot of Sample Data for the Technicians' Checkin

Source: Author

claim_id	claim_category	description	amount	claim_date	paid_date	status	status2
0	Select a Claim Category	test today	1000.00	2021-06-16 02:16:38	2021-06-16 02:16:38	Not Paid	
4	Mileage	Westlands and town trip mileage request	522.00	2015-06-13 06:23:44	2015-06-20 06:23:44	Not Paid	Approved
5	Peripherals	Patch Cord	500.00	2015-05-16 06:44:35	2015-05-29 06:44:35	Not Paid	Justification Required
6	Transport	Transport Thika	2000.00	2015-04-16 06:54:12	2015-05-28 06:54:12	Not Paid	Awaiting
7	Communication	Communication Test	8000.00	2015-05-16 07:00:06	2015-06-16 07:00:06	Not Paid	Approved
8	Mileage	Kisumu trip mileage request	8000.00	2015-05-16 07:04:59	2015-05-16 07:04:59	Not Paid	Approved
9	Peripherals Purchased	keyboard and mouse	600.00	2015-06-07 08:46:26	2015-07-07 08:46:26	Not Paid	Awaiting
10	Peripherals Purchased	keyboard and mouse	600.00	2015-06-15 09:45:47	2015-10-11 09:45:47	Not Paid	Awaiting
11	Mileage	Trip to Westlands	400.00	2015-05-16 09:52:58	2015-09-14 09:52:58	Not Paid	Approved
12	Peripherals Purchased	Mouse purchased	600.00	2015-05-11 10:00:13	2015-05-30 10:00:13	Not Paid	Awaiting
13	Mileage	Trip to Westlands	455.00	2015-05-29 10:01:45	2015-06-23 10:01:45	Not Paid	Approved
23	Nakuru Mileage	Trip to Nakuru	1000.00	2015-05-26 10:01:45	2015-06-23 10:01:45	Not Paid	Approved

Figure 9: Database Snapshot of Sample Data for the Technicians' Money Refund requests

Source: Author

visit_id	client_name	type_of_visit	description	date_of_visit	time_in	date_out	time_out	client_verification	client_feedback	technician_name
3	Nation Branch Office	Service Downtime	MPLS connection from HQ to Nation Branch	2015-06-09	14:43:00	2015-06-10	02:02:00	Confirmed	Services resumed to normalcy	Technician- Mercy
1	Nation Branch Office	Reception Computer Crashed	The computer was stuck at windows update at 20% fo...	2015-06-09	14:43:00	2015-06-10	02:02:00	Computer Functioning	My computer is now working	Technician- Kefa
4	Thika Office	Printer not functioning	The users were not able to print over the network.	2015-06-14	11:43:00	2015-06-15	02:02:00	Printer functioning	None	Kituku
7	Westlands Office	Printer not functioning	The users were not able to print over the network.	2015-06-14	11:43:00	2015-06-15	02:02:00	Printer functioning	None	Systems Admin - Dan
2	Mombasa Branch Office	Internet and MPLS Service Downtime	The branch cisco router was freezing therefore the...	2015-07-01	09:27:00	2015-07-01	11:02:00	Confirmed	Services resumed to normalcy	Technician- Mercy
	Kisumu	ICT Courtesy							All equipment	

Figure 10: Database Snapshot of Sample Data for the Technicians' Site Visits Reports

Source: Author

preventative_id	client_name	items_serviced	items_patched	parts_replaced	recommendation	time_in	time_out	client_verification	client_feedback
1	Nation Office	PM Cisco Switch	Cisco 9600x	none	This switch has ports that failed and is freezing ...	09:11:00	10:00:00	Confirmed	Service Uptime
2	Nation Branch Office	PM on Cisco Router	Cisco 2800 was maintained	none	Router Upgrade since current is freezing	12:03:00	15:20:00	Client Signed	Services resumed to normalcy
3	Kisumu - resolution insurance	Desktops and Laptops	Windows updates	None	Ram upgrade	14:00:00	18:44:00	Branch Manager	We will monitor the computer speeds, however they ...
4	Mombasa Office	PM of the All the computers and the branch server...	Server Firmware	none	RAM upgrade of the business consultant desktop	08:10:00	15:35:00		
5	Thika branch office	All Desktops and Laptops	Windows updates	None	Ram upgrade of the reception computer	14:00:00	18:44:00	Branch Manager	We will monitor the computer speeds, however they ...
6	Head Office	Data Centre PM	Storage applicance, server, firewall, router, acce...	none	none	06:03:00	20:20:00	Client Signed	All equipmen a re optimal
8	Eldoret PM	All Desktops and Laptops	Windows updates	None	None	18:00:00	18:44:00	Branch Manager	We will monitor the computer speeds, however they ...
7	Nyeri Office	Server PM	Server PM and Firmware update	none	The disk capacity is almost full, buy new HDD	08:03:00	09:20:00	Client Signed	Happy the PM was done

Figure 11: Database Snapshot of Sample Data for the Technicians' Preventative Maintenance Report

Source: Author

The managers had the opportunity to post calendar events for filed technicians, view reports and make approvals for claims, change requests and user needs.

user_needs_id	request	description	request_date	status
2	Reports	Provide Preventative Maintenance and SIte Visit Re...	2015-10-19 17:00:58	Approved
3	How to reset configs of router	Kindly upload how to reset configs of a cisco rout...	2015-10-19 17:00:58	Approved
4	how to add extension on alacatel PABX	Kindly upload how to add extension on alacatel PAB...	2015-10-19 06:48:17	Awaiting
5	closing ticket	Help me out i need to close a ticket opened incorr...	2015-10-19 06:48:17	Awaiting
6	Incidence module is hanging	Kindly urgently assist am unable to use the incide...	2015-10-19 06:48:17	Awaiting
7	Phone extension rebooting	Phone extension reboot every quarter	2015-06-08 13:20:15	Awaiting
8	DASHBOARD SKMS	place all modules icons in the dashboards	2015-06-11 13:20:37	Awaiting
9	ACTISURE SERVICE	Actisure Service to be extended to customer servic...	2015-06-01 13:20:46	Awaiting
10	Data Analysis	Kindly provide a solution analysize data about our...	2015-10-19 12:30:58	Approved
11	Call centre gretting script	Kindly provide call centre greeting script providi...	2015-10-19 12:30:58	Approved
12	UNLIMITED INTERNET ACCESS	Kindly ensure claims department have limited inter...	2015-06-05 12:07:52	Awaiting

Figure 12: Database Snapshot of Sample Data for the End Users User Needs.

Source: Author

change_id	request	details	changeItem	downtime	end_user	technician	date_requested	date_facilitated	status
		- Drag to reorder. - Click to mark/unmark. - Double-click to copy column name. The PABX server suffered a ... beyond re...		0	Call Centre	Dennis - technician	2015-08-15	2015-08-17	Awaiting
5	Cisco Router	The cisco router at Kisumu office resolution insur...	Cisco 2811 Router	0	Mega City branch Resoltuion Ins	Daniel Mwangi - Assistant System Administrator	2015-07-28	2015-07-28	Rejected
6	Switch Installation	Switch Installation	Cisco 2960 switch	2	Resolution Insurance	Admin User	2015-05-02	2015-05-05	Approved
7	Share point links	Redirect the sharepoint on premise links to share ...	Share point links to Board files	5	Resolution Insurance	Damaris Kamau	2015-07-03	2015-07-05	Approved
9	Netapp disk replacement	One of the netapp fas 2220 netapp box failed the d...	Netapp Harddrive	0	Resolution Insurance Disaster recovery site	Daniel Mwangi - Assistant System Administrator	2015-06-03	2015-06-09	Approved
	Citrix License	Annual support of	Citrix support		Branch	Assistant -			

Figure 13: Database Snapshot of Sample Data for the Change Requests

Source: Author

The end-users were required to share feedback from the test to the email njecaro@gmail.com. The end-users were advised to share a screenshot of the android activity and comments where they required change. However, for complete additions on the application, the end-users should preferably share a template if not possible a description of the process requires being included in the application. Below are the

changes request and additions that led to the build of the second prototype.

4.2.4 Prototypes Changes/Redefinition and Continual Improvement

The specification for the next version was the below new additions and change requests. The feedback from the end-users was used to identify areas for change and continual improvement which were analysed and prioritised in the specification stage. Therefore, achieving the Deming cycle of (plan, do check and act).

4.3 The Recommended New Additions after the Test

4.3.1 Site Visit Reports

Edge systems requested for site reports to be included on the mobile application to ensure real-time attendance to the feedback from the site technicians.

They shared a template for the desired report in appendix 2

4.3.2 Preventative Maintenance Report

Edge systems requested for preventative maintenance (P.M) reports being included on the mobile application to ensure the P.M notes a recorded for future reference. Edge systems recommended this to be added to the mobile application to ensure ease of use for the field ICT technicians.

They shared a template for the desired report in appendix 3

4.3.3 Site Visits Orders

Edge systems requested for site visit orders to be included to ensure real-time attendance to the feedback from the field ICT technicians while on site. These will in turn ensure orders of parts are placed by the field ICT technicians, and the response

rate will be prompt.

They shared a template for the desired report in appendix 4

4.3.4 Change Requests

Resolution health the client indicated they would like to be aware of the changes made on the services and are being offered by edge systems. Edge systems saw it suitable to have the module for change requests to be included in the mobile application. This will at hand enable the field ICT technician to record the changes they have made or intend of making and each change should be approved by the client. The change request template recommended include: -

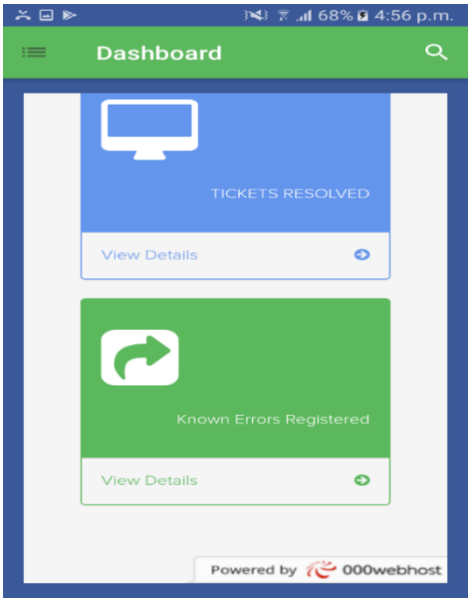
- What is being changed
- Reason for change
- Downtime required for the change
- Lastly, the area for the approver to approve for the change to be implemented.

4.3.5 Dashboard

Edge Systems recommended the dashboard should have the below:

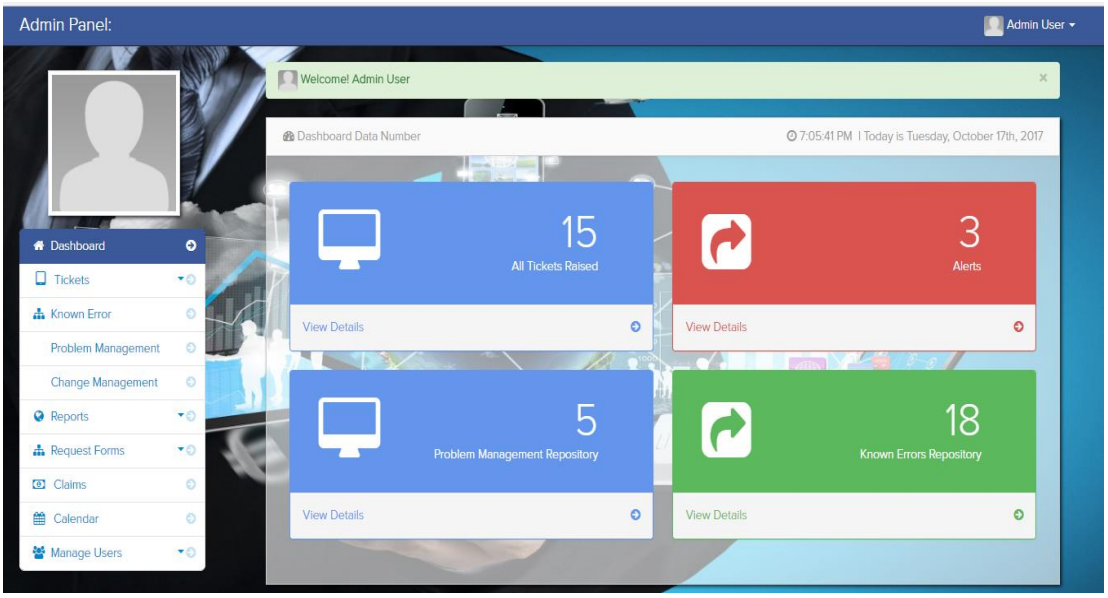
- Downtime alerts
- Shortcuts to the below feature
- Incidence management
- Problem management

- Reports
- Known error database
- Change management
- Product and service catalogue



The previous dashboard

The current dashboard



The new dashboard was also enumerated on the web application

4.4 Module Documentation

SKMS application was developed on an Android mobile platform and backend web portal to allow the service provider easier management of data. It was developed to achieve the objectives identified in the study. The mobile application has the below modules: -

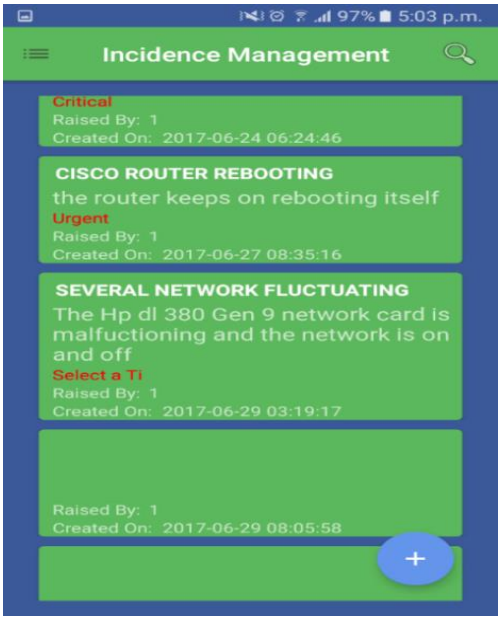
- Incidence management
- Problem management
- Reports
- Known error database
- Change management

- Product and service catalogue

4.4.1 Incidence Management

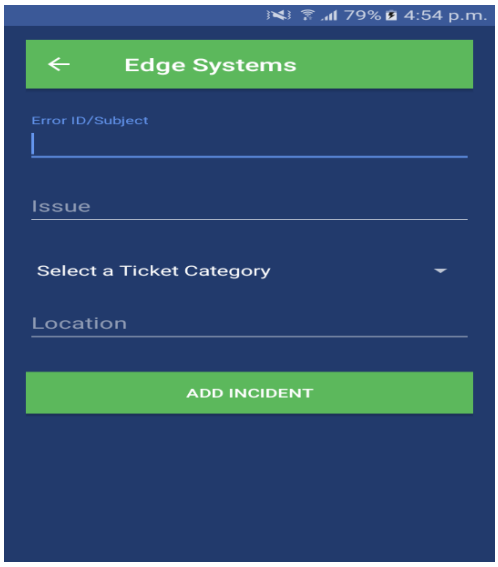
This module offers the field ICT technician and the end users a platform to report any service interruption they experienced to have a prompt response. Once the field ICT technician and the end-users post a request, it is immediately allocated to a technician to go to the site immediately to resolve the issue or to remotely assist the end-user or field technician. The field ICT technician can post an incident to escalate for resolution.

This ensures prompt attendance of incidences once reported (since they are allocated relative to the technician without a site they were working on. After resolution, the incidence is recorded under known error together with the resolution for future reference. The below displays the list of incidences posted during the pilot test Edge systems and Resolution health however if just a workaround is achieved on the incidence, this will be recorded in the problem management module.



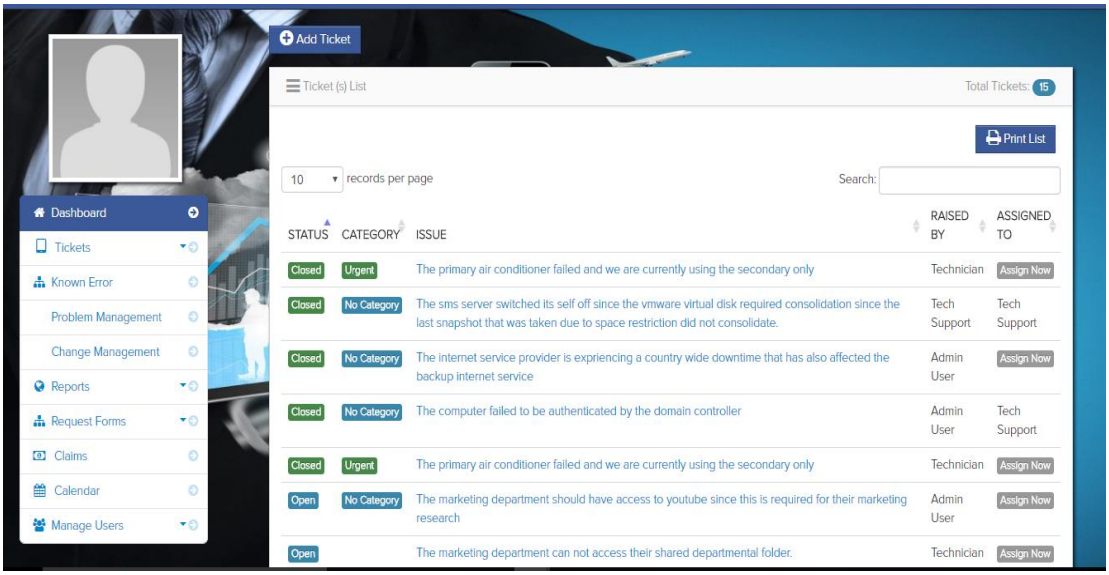
Screenshot of the incidence management module

Each incidence is categorized according to the impact it has on the business if the service is down. We have categorized the incidences as low, medium, high, urgent.



How to add an incidence

When an incidence is added it will appear on the web application portal whereby the personnel at edge systems will allocate to their technicians. After resolution, the technician will post resolution or workaround if it's non-existence. The ticket allocation is done on the web application to the field ICT technician who will tackle it.

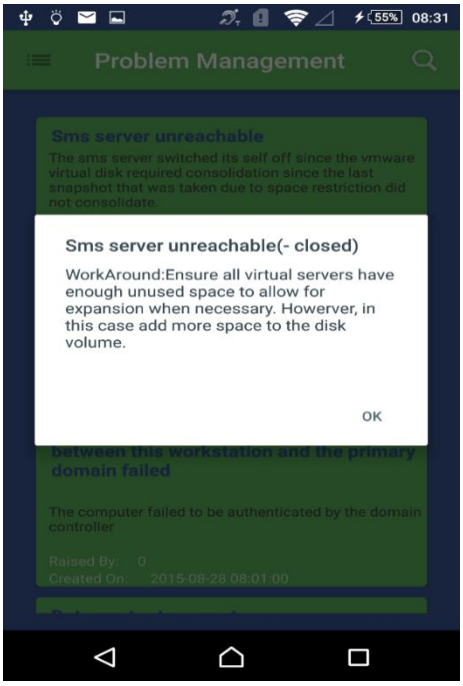


Web application ticket allocation

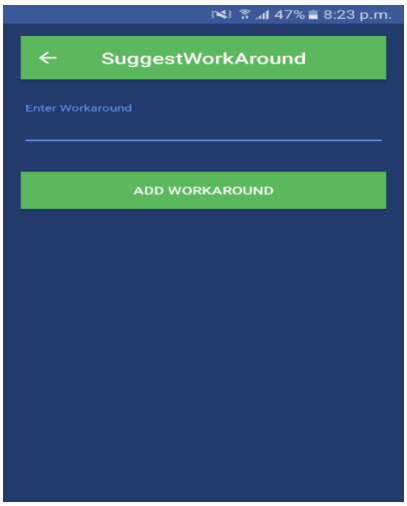
4.4.2 Problem Management

This platform offers a list of the repository of the problems with workarounds that edge systems have collected over time. Also, the incidences posted once attended to by the ICT field technicians if no solution was found but a workaround. This will be forwarded to the problems management repository for future reference. The field ICT technician can also post directly problems experienced at the site with the workarounds. However, there will be continuous verification by the ICT field technician supervisor of the problems, and their workarounds posted. This will ensure quality check of the information disseminated to the clients and other ICT field technicians as the workaround to their incidences.

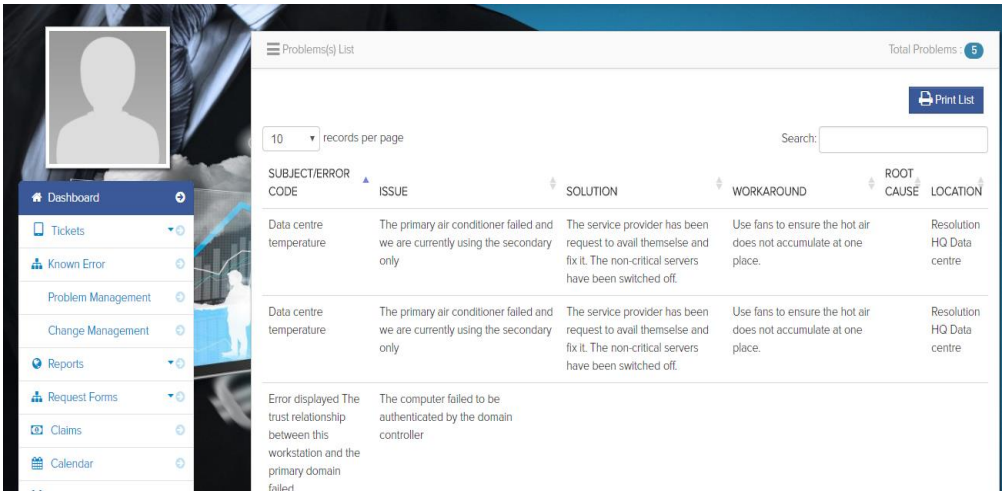
This module also offered the field ICT technician and the end users a platform to search from the organization repository of the problems to get a workaround. This ensures I prompt resolution of the incident at the site recorded since the field ICT technician 1st impulse will be to resolve the incident. The below will display a list of problems whenever one clicks on the problem, and it was posted without a workaround the get the dialogue to post the workaround.



The below displays the dialogue in which the end-user can key in their suggestive workaround after selecting the problem.



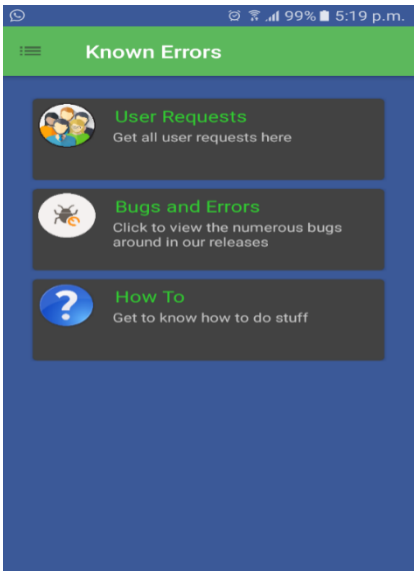
The problems posted also appear on the mobile application are verified on the web application. If the supervisor requires changing they would raise a change request which will allow the database administrator to change on the database level.



4.4.3 Known Error Database

The known error platform has

- User requests
- Bugs and Errors
- How to

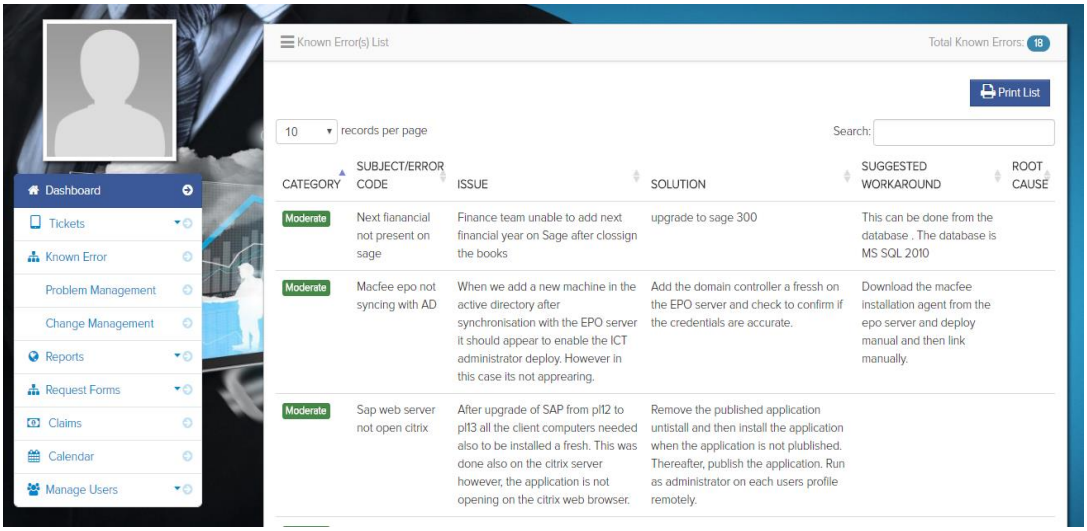


4.4.4 Bug and Errors

This module offers the field ICT technician and end-users a platform to search from the repository of the known errors of incidence. These will ensure fast resolution to

the incidence. This known error repository is continuously updated when an incidence is resolved and posted. Also, the field ICT technician supervisor can add resolution to various issues they may foresee that could be problematic to the end-users. Known errors are also identified during training of the end-users and in workshops that the edge systems arranged for the end-users.

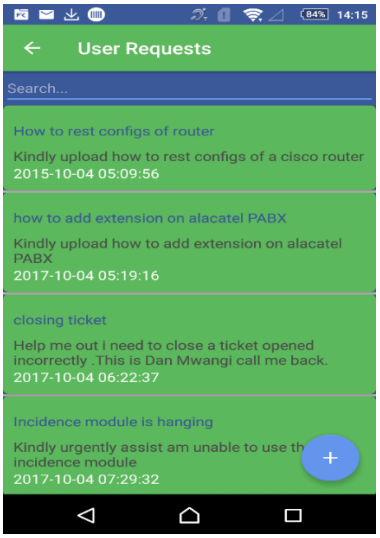
The know errors posted also appear on the mobile application are verified on the web application. If the supervisor requires changing they would raise a change request which will allow the database administrator to change on the database level.



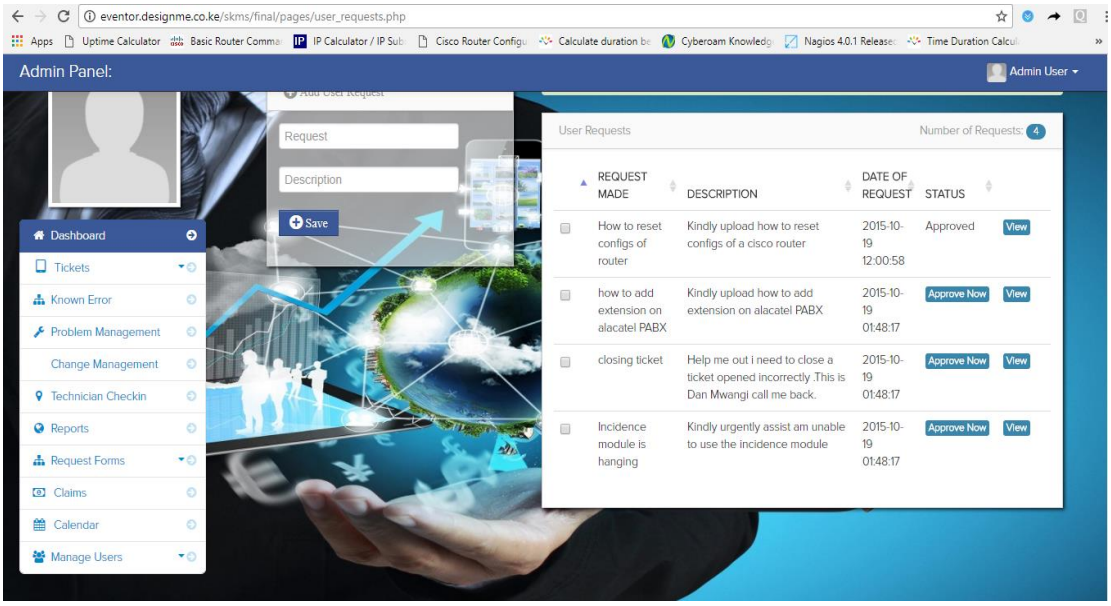
Web application view of the known error

4.4.5 User Requests

This platform also offers the end-users an opportunity to add users requests that may not have been addressed.



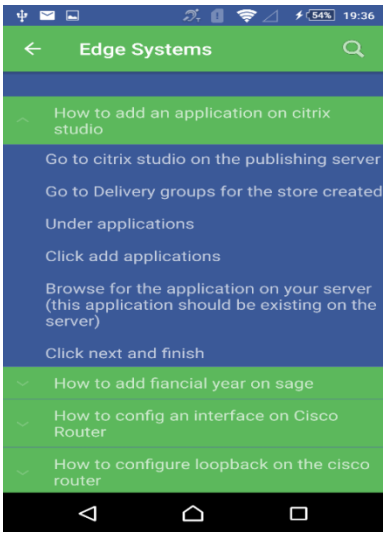
The user requests are received by the helpdesk supervisor for review and action, below is the view on the web browser.



4.4.6 How To

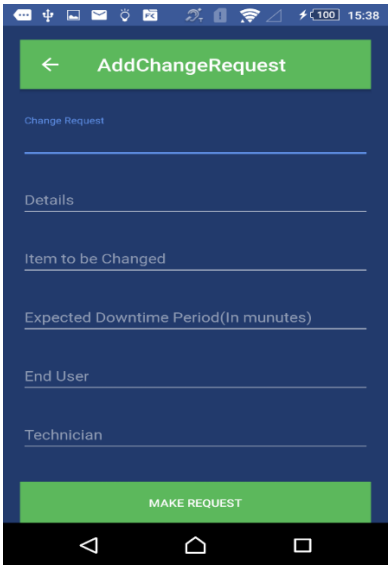
This is a repository of configuration items, basic knowledge of implementing objects resolution that they have in their ICT inventory. This will help technicians at the site

or the ICT team in the organisation query how to configure certain basic items they may not know of. This has been limited to services edge systems have implemented.

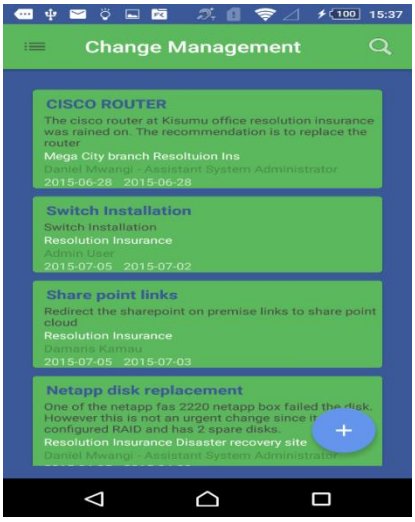


4.4.7 Change Management

This Platform Will Ensure The End Users Get To Post A Change Request For Quick Approval and documentation for future reference.

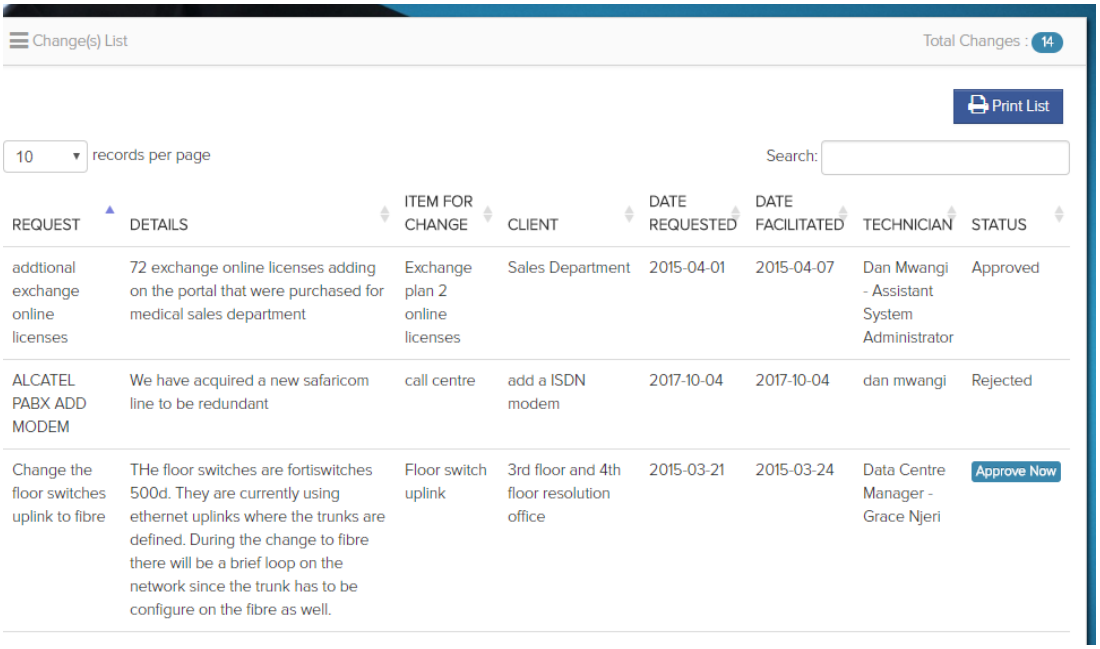


How to add a change request



List of changes alerts posted

The change request once posted by the site technician will appear on the web portal where the supervisors should be able to approve or decline.



Web portal view of change requests

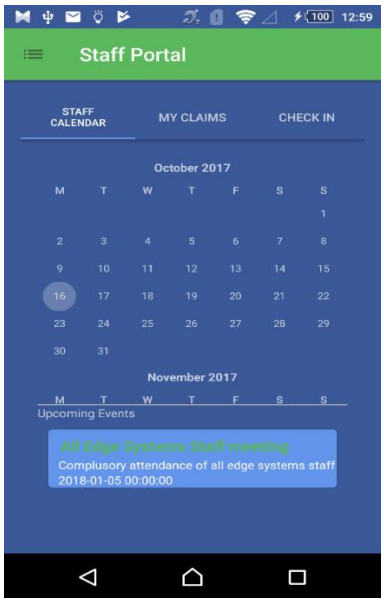
4.4.8 Staff Portal

The staff portal offers the field ICT technicians a portal that offers all services that they would require them to report to the office. This, therefore, provides independence to the field ICT technicians to work in the field without having to report to the office. The functionalities available on the staff portal are as below:

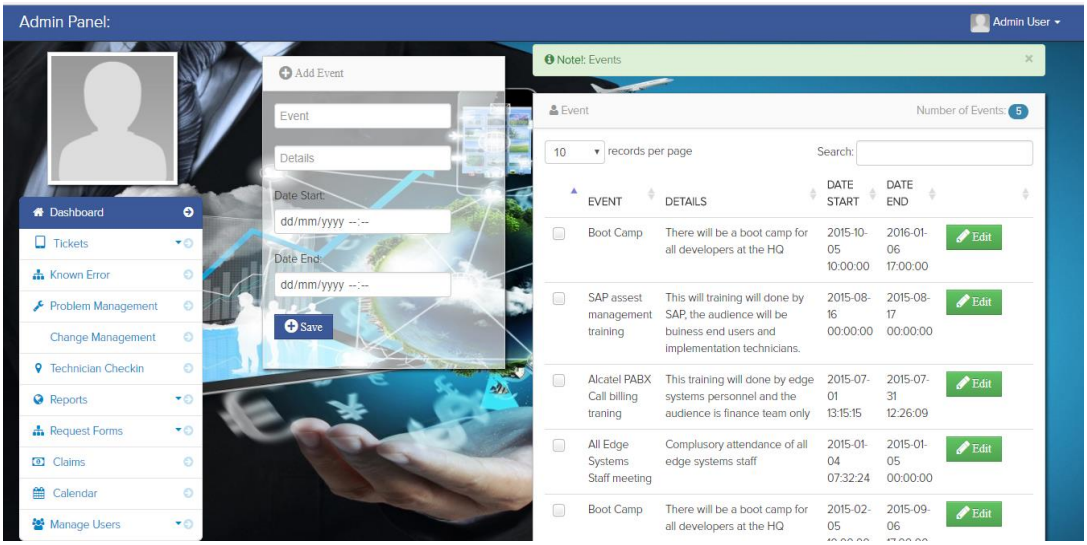
- Staff calendar
- My claims
- Check-in

4.4.9 Staff Calendar

The staff calendar platform offers the platform for the office (edge systems) to communicate to the field personnel (technicians) on updates that were tied to a date. e.g. staff meetings

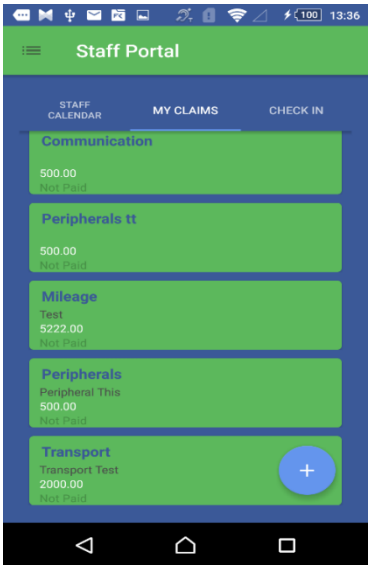


The calendar was updated from the web application as per the below screenshot.

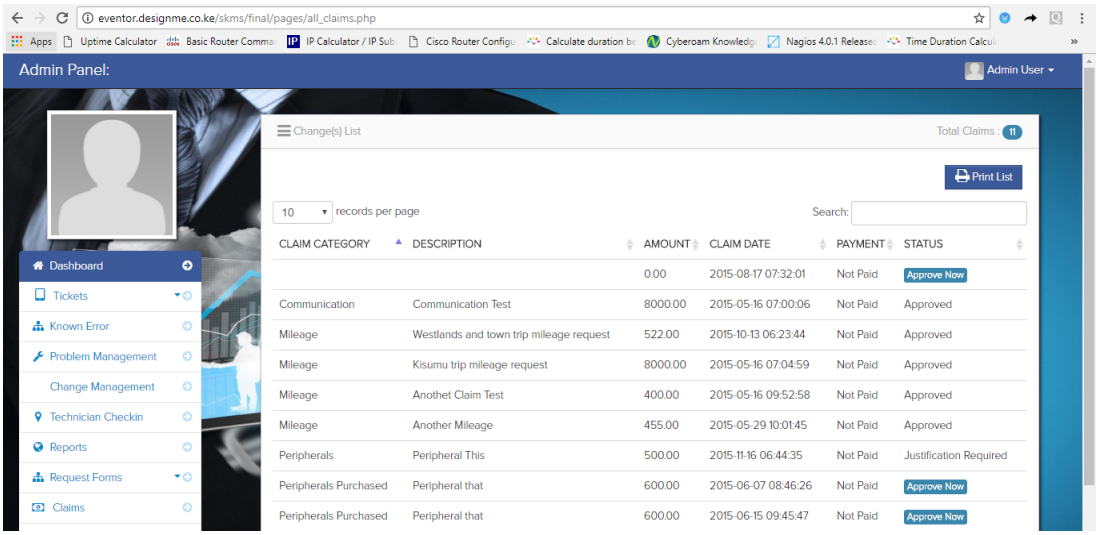


4.4.10 My Claims

The field ICT technicians can post the expenses claims without going into the office, and when available to report to the office they will provide the original receipts where necessary. These funds once approved will be refunded using the M-Pesa mobile payment platform.



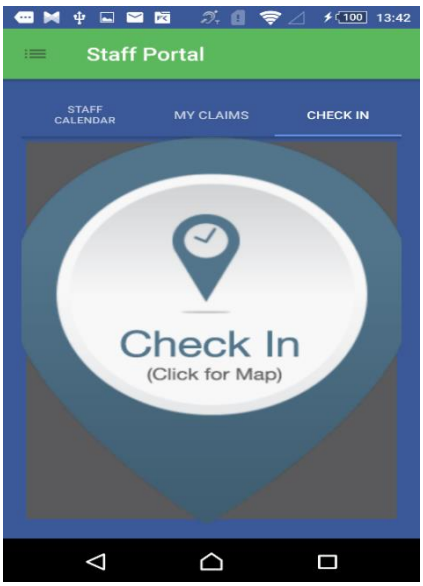
The claims are received by the ICT field technicians for review and approval for funds to be paid using MPesa.



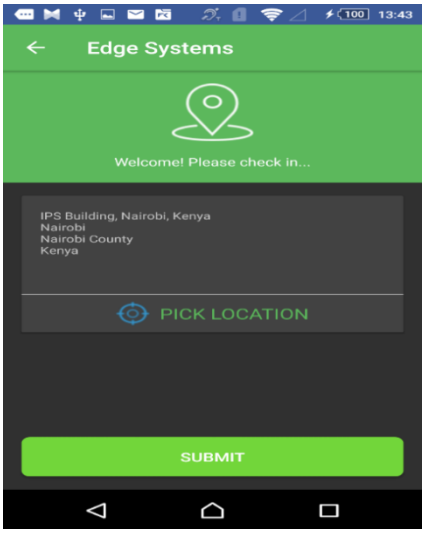
Web portal view of the claims

4.4.11 Check-in

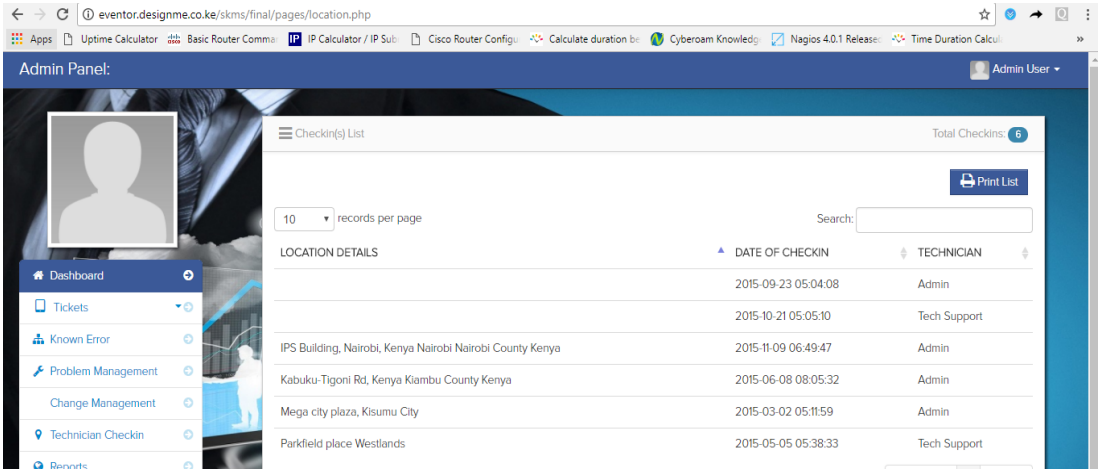
The Check-in module aim is to achieve time management by edge systems whereby all the field ICT technicians are required to check in through the mobile application every time they report to a site. This information will ensure (quality of service) QoS of service offered to the client.



Once the field ICT technician clicks on check in the mobile application, it picks the physical address of their location and a timestamp is received.



The ICT field technician supervisor can track the whereabouts of the personnel and ensure the personnel report on time at their required sites.



Web portal view of the various check-in

4.5 Chapter Summary

The SKMS platform was designed and developed to meet the following identified gaps in the ICT service delivery at edge systems company, The repetitive incident and problems are not captured and take up human resources and time to resolve where the solution could be documented for future reference and quick resolution. The need for a centralized platform for clients and service providers to report incidence and

document changes implemented. The challenge in retrieving information and generating reports. The inefficiency in the current manual system for change management, configuration management, incident and problem management processes. The SKMS offered a solution to these gaps by ensuring documentation of known errors which were captured from the solutions and a workaround for repetitive incidents and problems. The SKMS provided a centralized platform to document all processes and use the data retrieved from reports to aid in decision making and eliminate the inefficiencies of the manual system.

CHAPTER FIVE

DATA ANALYSIS AND PRESENTATION OF RESULTS

5.1 Introduction

This chapter presents the analysis and findings of the study as set out in the research objectives. The study analysis and establishes data on the design and development of a service knowledge management system (SKMS) prototype at edge systems company Kenya. The sample of 98 respondents was drawn from employees in Edge System's staff of the customer care, ICT support, ICT implementation personnel, account managers, sales agent and ICT staff of the client resolution health. Data collected were collated, and reports were produced in the form of tables and figures based on qualitative and quantitative analysis done.

5.2 Analysis of the Response Rate

The research targeted respondents from Edge Systems and Resolution Health who used SKMS and utilized the reports from SKMS. Table 4 presents the response rate.

Table 4: Response Rate by Category from Questionnaires and Interviews

Sample Size		**Questionnaires received after distribution**	**Interviews done**	**Total**	**% of response rate**
Resolution Health					
ICT staff	10	4	3	7	70
Edge Systems					
Customer care team	20	13	3	16	80
ICT support	20	11	4	15	75
ICT implementation personnel	18	11	4	15	83.3
Account managers	10	3	2	5	50
Sales agents	20	5	8	13	65
Totals	**98**	**47**	**24**	**71**	**72.4**

Source: Author

Out of the 98 questionnaires distributed 47 respondents filled in, returned the questionnaires and 24 respondents requested for interviews, this represented a 72% response rate which was excellent for statistical reporting. This is a suitable response rate for data analysis as Mugenda and Mugenda, (2003) pointed that for generalization a response rate of 50% is adequate for analysis and reporting, 60% is good, and a response rate of 70% and over is excellent. The response rate is, therefore, adequate for data analysis. Table 4 below depicts the findings of the study, whereby we have 70% ICT staff at resolution health response rate and from edge systems company the responses rates in customer care team was 80%, the response rate from the ICT support was 75%, the response rate from the ICT implementation personnel was 83%, the response rate from the account managers was 50% and the response rate from the sales agents was 65%. The findings depict the ICT implementation personnel had the highest response rate since they are the 1st persons to interact with the clients during solution deployment. The highest respondents were the ICT implementation personnel staff was 83%. This is important because they run the initial application implementation of solutions for the end users.

5.3 Reliability and Validity Results

Golafshani (2003) says that reliability is the extent to which results are consistent over time and an accurate representation of the total population under this study while validity determines whether the research truly measures that which it was intended to measure. The researcher did test-retest reliability and the questionnaire questions were to ensure they were accurate, consistent, simple and not misleading this was verified from peer to peer to request. Validity means “measure what is intended to be measured” (Field, 2005). The researcher ensured that the questionnaire questions were relevant to this study. The questions were simple, focused and easy to understand to

avoid misleading feedback from the respondents. The interview questions are in Appendix I. This ensured trustworthiness of this Research, confidence in the findings and generalization of the results.

5.3 Analysis of the Background Information

The general information of the respondents is imperative for the study to accomplish its objective. It is also crucial in this section to formulate the foundation under which the study can reasonably develop the applicable information. The analysis depended on the information of the respondents to categorize the different results according to their acquaintance and responses.

5.3.1 Respondents' Work Experience

The study requested the respondent to indicate their work experience. The findings depicted the respondents with 0 to 5 years work experience were 57.7%, 6 to 10 years' work experience respondents were 32.4%, 11 to 20 years work experience respondents were 7% and above 20 years work experience respondents were 2.8%. From the findings, it can be depicted that most of the respondents had minimal work experience in the ICT field and were straight from campus.

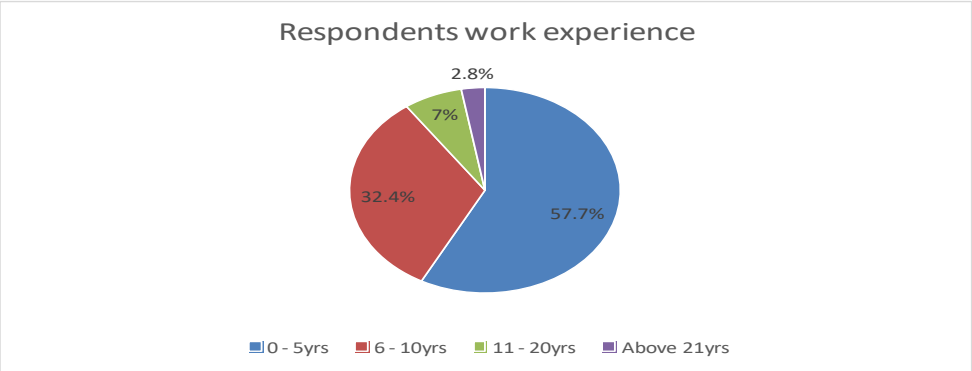


Figure 14: Respondents Work Experience

Source: Author

5.4 Influence of ITIL in ICT Services Delivery

The study requested the respondents to indicate the influence of the ITIL framework played in service delivery at Edge systems company. Questions requested touched on the efficiency in incidence management, known error database, problem management and service management. From the findings as illustrated in figure 15 (59.0%) of the respondents were successful in reporting an incidence on the SKMS platform, 65% of respondent's issues were resolved when they referred the solution from the KEDB, 59% of the respondents reported issues resolution process was seamless and 57% of the respondents from edge systems were aware of the organization initiative to implement ITIL framework in service management. From the findings, it can be depicted that most of the respondents from edge systems were aware and supported the efforts of the organization to implement the ITIL framework through the platform SKMS that is offering the services that are aiding in ICT service management while most respondents from resolution health had a positive impact on ICT services offered after the implementation of the SKMS, through the efficiency experience in incidence management, problem management and know error knowledge management.

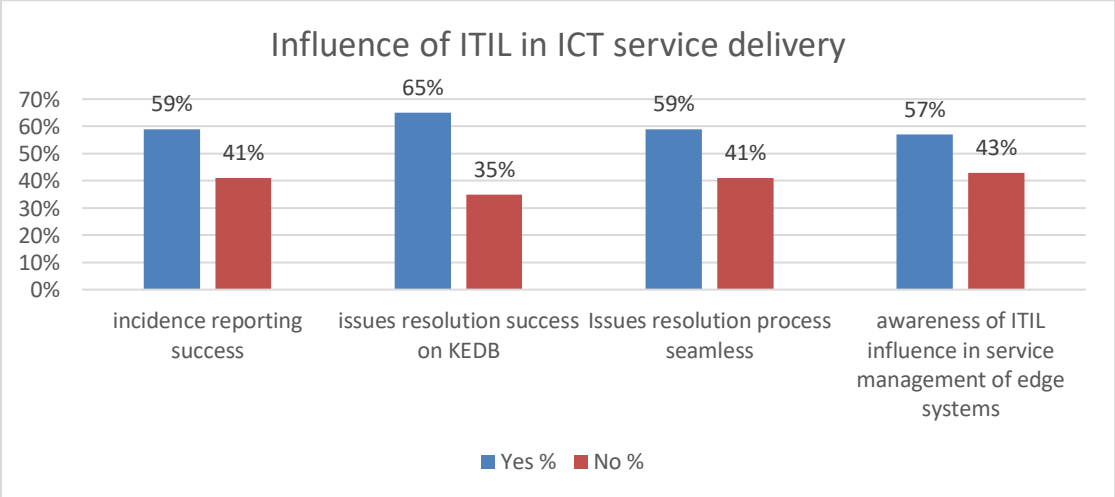


Figure 15: Influence of ITIL in ICT Service Delivery

Source: Author

The study also requested an understanding of the impact on ICT service delivery after implementation of SKMS. The question addressed the analysis in service desk, request fulfilment, change management, know error management and helpdesk management. From the finding as illustrated in figure 8 request impact on ICT service delivery after implementation of SKMS, the lowest response from respondents was 6 % where the feedback was not applicable and the highest 38% the response being the moderate extent of the impact, change management impact had 6% as the lowest response is not appropriate and 38% as the highest response whereby there was the great extent of the impact. Know error management there was unanimous 15% response of which it was the lowest response of not applicable, to less extent, to a moderate extent of the impact of ICT service delivery while helpdesk management the respondents indicated 3% not applicable as the lowest responses and 41% as the highest response on the impact of ICT service delivery. From the findings, it can be depicted that most of the respondents from resolution health proof the implementation of SKMS had a high impact on the continuous business support. The highest ICT service delivery improvement was depicted in change management, followed by helpdesk management, known error management and lastly request fulfilment.

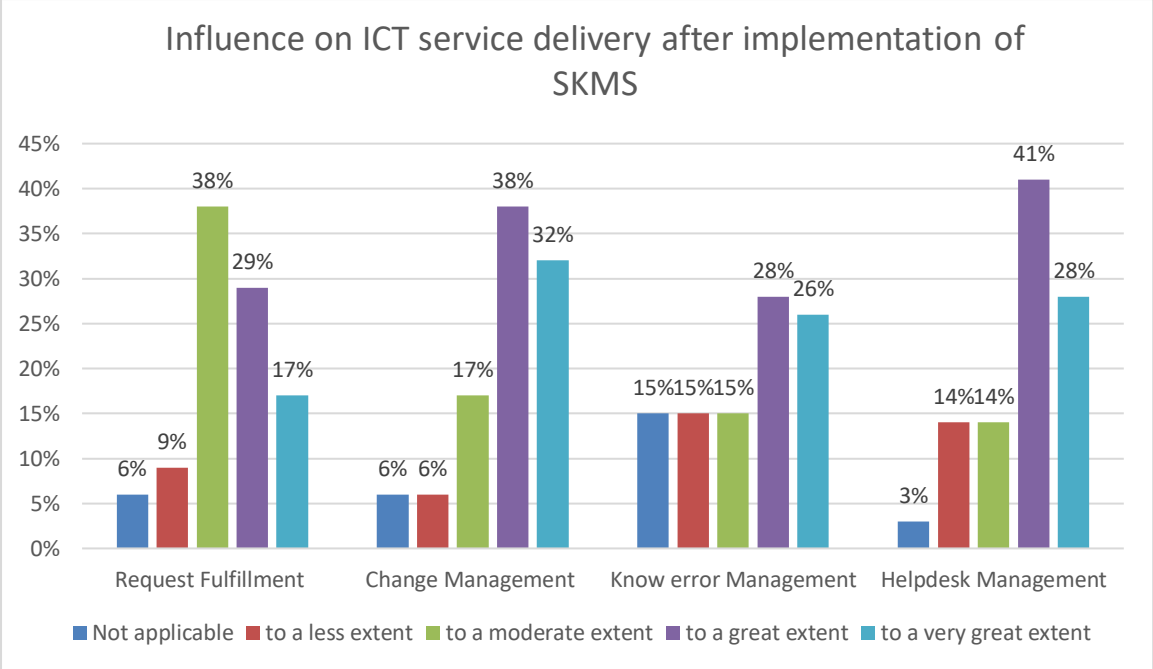


Figure 16: Influence on ICT service delivery after implementation of SKMS

Source: Author

The respondents were requested to advise after implementation of SKMS whether there were success factors in the incidence management, change management, know error management, reports, service management and continuity management in that this analysis for their responses helped identify the influence of ITIL has played in ICT service delivery and benefits in turn. Figure 16 presents findings on the impact on ICT service delivery after the implementation of SKMS.

Table 5: Influence of ITIL in ICT Service Delivery at Edge Systems

ITEM	RESPONSE	COMMENTS
Respondent 1	It is now easier to track incidences, identify their root cause and solutions to avoid reoccurrence.	This was made possible by implementing a platform for the end users to document incidences on SKMS
Respondent	Recently we made a change that	This was made possible by

2	affected internet access for the night shift personnel if it were not for the change management documentation we would not have known the root cause for the downtime.	implementing a platform for the end users to document changes and capture the approval process of changes on SKMS
Respondent 3	I find it cumbersome to keep on recording incidences, changes and referring to the known error before reporting issues.	The weight of information offered by the incidence was seen to be integral however it was demanding to the end-user entering the information
Respondent 4	the reports a very helpful they share a summary of the service issues, advise if the service being offered is efficient in all it advises what is happening on the ground.	It was assessed the reports were offering important information. This is information played a major role in the decision making of the management and understanding of the activities happening on the ground in summary.
Respondent 5	I like this platform it is documenting our efforts to make the resolution environment most suitable and efficient.	It was identified the personnel required a platform that will depict their effort to ensure the customer is comfortable.

Table 5 indicating some of the selected qualitative responses for the interviews and questionnaires. The findings depict the respondents have appreciated the benefits that ITIL has brought to ICT service delivery at resolution health by edge systems. Areas of interest from a sample of the respondents are the documentation of incidences and changes, offering very informative reports. Some of the respondents indicated their delight to be able to refer to documented changes and incidences for insight where need be. Depicting the ITIL was beneficial and played a major influence in ICT service delivery at edge systems and these were implemented by the use of SKMS at resolution health

5.5 Level of User Acceptance of the ICT Service

The study requested the respondents from edge systems and resolution health to rate if the application SKMS met their performance expectations if it was easy to use if it met efficient expectations and if it offered service continuity. This information was requested to gauge the level of user acceptance of the SKMS application. 69.0% of the respondents from both resolution health and edge systems indicate the application met their performance expectations, 73.2% indicated the SKMS was easy to use, 63.4% were of the opinion that SKMS met their system efficiency expectations and 57.7% of the respondents indicated SKMS offered ICT service continuity. Therefore, according to the findings, the SKMS application was user-friendly, and the end-users appreciated the benefits it offered.

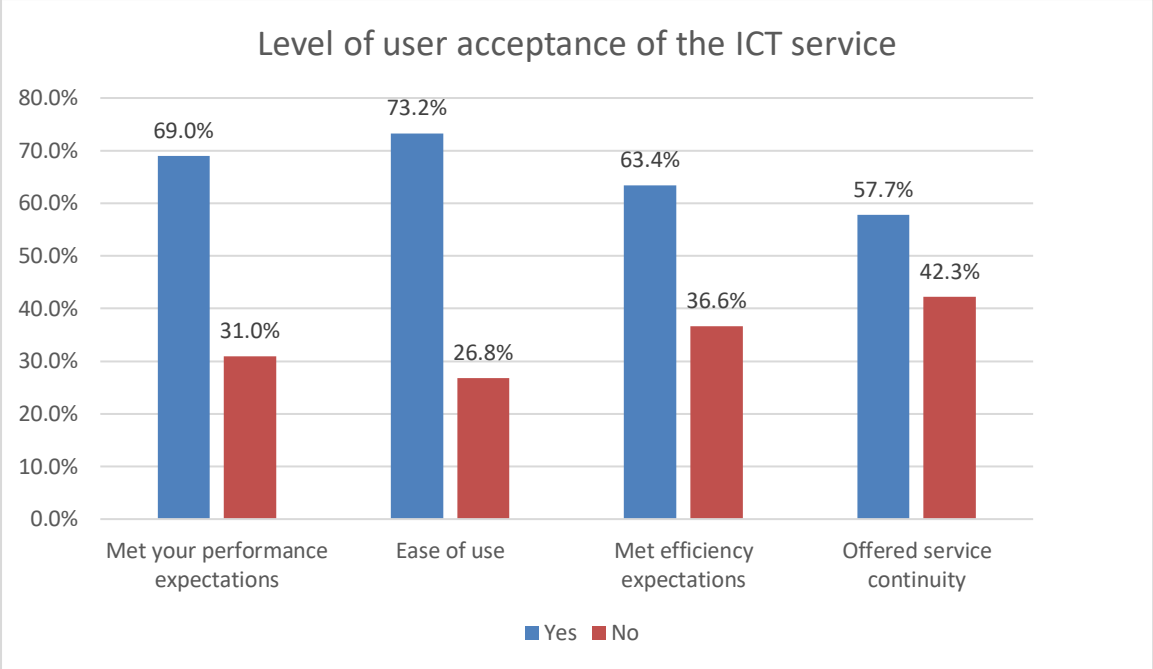


Figure 17: Level of user Acceptance of the ICT Service

Source: Author

To obtain the respondents' opinion of whether the ICT service management support offered by edge systems after the implementation of SKMS was acceptable by sharing their perception according to this statement. “SKMS will make work easier, efficient, ensure ICT service continuity and offer exceptional reports.” Table 6 presents the qualitative responses.

Table 6: Establishment of the Level of User Acceptance of the ICT Service

ITEM	RESPONSE	COMMENTS
Respondent 1	I am great full of the reports since they removed the manual reporting factor and made my work easier during my monthly reports.	The reports made work easier
Respondent 2	I like the information offered on change management, incidence management, problem management, this information results have ensured ICT service continuity.	From the discussion the reports in the ICT service continuity
Respondent 3	As an engineer, I have noticed a high decrease in some support calls I believe the end-users are using the known error database.	The helpdesk has been in helpful in-service continuity
Respondent 4	Well, the work is easier, but I believe we are now going to miss the human touch in the long run with client and vendor relationships.	The human touch may gradually depreciate.
Respondent 5	I am glad this software offered a platform to raise tickets and escalate. This has made work easier and ensured the closure of support calls.	Issues escalation has improved service continuity

The qualitative findings depict the respondents have appreciated the SKMS benefits and were helpful in the day-to-day activities. The platform made work more accessible and added value in the business process according to the analysis from end users' responses.

5.6 Effect of the Service Management Process in ICT Services Delivery

The study requested the respondents from edge systems to indicate if and how the ICT service management process has continuous support to the ICT service delivery. The respondents were requested to confirm in the SLA matrix reports, incidence management reports, several sales and sales orders processing, after the SKMS implementation if there were support and service improvement. From the findings as illustrated in Figure 6 majority of the respondents (81.7%) indicated that continuous support of the business had the highest impact on SLA matrix reports supporting decision making. SKMS supported the business 80% of the respondents indicated there was an increase in the sales numbers, 63.40% indicated incidence management reports supported decision making in the business. 54.9% of the respondents from edge systems indicated the sales order process speed is efficient. Therefore, the findings depict the implementation and use of SKMS have been beneficial to ICT service delivery where it has offered important information used during decision making.

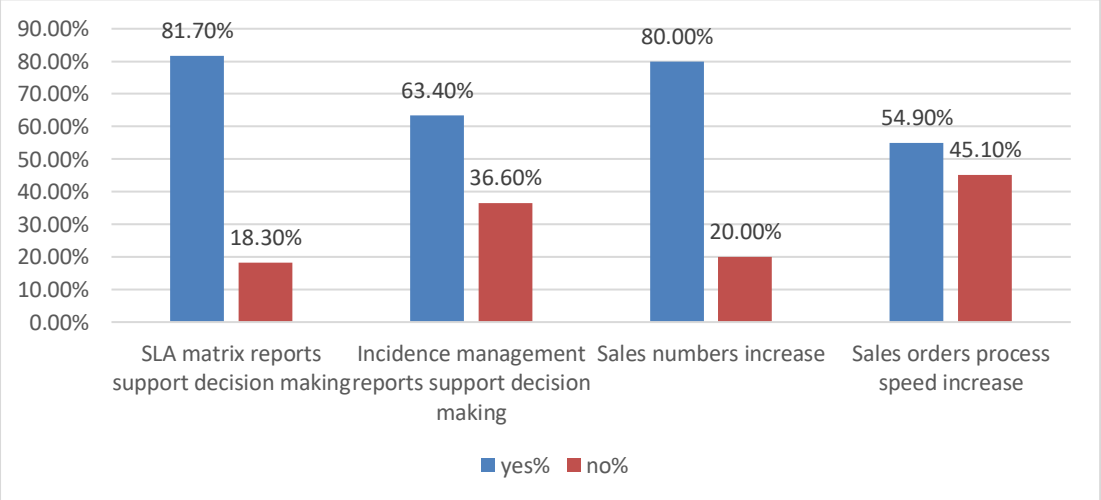


Figure 18: Effect of the Service Management Process in ICT Services Delivery

Source: Author

To establish if the ICT service management support offered by edge systems after the implementation of SKMS has offered continuous support to the business and ICT service delivery. The respondents were requested to respond to this statement "Edge systems ensure that specified conditions are met (or not met), and if not, they raise an alert to the appropriate group by raising a ticket and report an incidence. They in turn offer reports from SKMS; these reports are availability, incidence, new market solutions, change management, ICT service lifecycle and know error database reports."

Table 7: Effect of the Service Management Process in ICT Services Delivery

ITEM	RESPONSE	COMMENTS
Respondent 1	I appreciate the reports however they have too much content that is unnecessary for example ICT service lifecycle changes details while an overview summary will suffice.	It depicts the reports were integral however other respondents had their reservations of the reports being too bulky.
Respondent 2	The reports have been very beneficial during decision making.	Reports have been integral in decision making
Respondent 3	These reports have been integral to ICT service community management since is they are continuously updating on documentation, change management and problem-solving.	
Respondent 4	The reports have been a helpful	

	guide of what happens in the ICT service and have been integral during ICT roadmap and strategic decision making. For example, incidence management reports have easily identified to us the management he problematic ICT areas that require optimization.	
Respondent 5	The reports require interpretation here, and there I believe the availability, new market solutions and know error database reports require maybe an ICT service analyst to present to the management.	The reports were somewhat technical for conceptualization by personnel

The findings depict the organizations have benefited from the use of SKMS in the service management process of ICT services delivery. The major that has been growing by the end users were in reports management that capture all areas implement on SKMS.

5.7 Plan – do –check – act (The Deming Cycle) of the ICT Service

Respondents from edge systems and resolution health opinion on whether the ICT service offered has had continuous improvement through the plan – do- check –act (Deming cycle). The respondents were requested to assess if the incidence has reduced through continuous solution development and offering solution

documentation on the known error database. From the findings as illustrated in figure 7, 49.3% of the respondents indicated that improvement of the frequency of incidence was to a very great extent, 29.6% to a great extent, 14.4% to a less extent while 7.0% indicated not applicable. Therefore, the findings depict the implementation of the known error database and use of the Deming cycle (plan-do-check-act) in the known error has been beneficial to the service offered and incidence management since the end-users and service owner have experienced an improvement in the number of incidences reported.

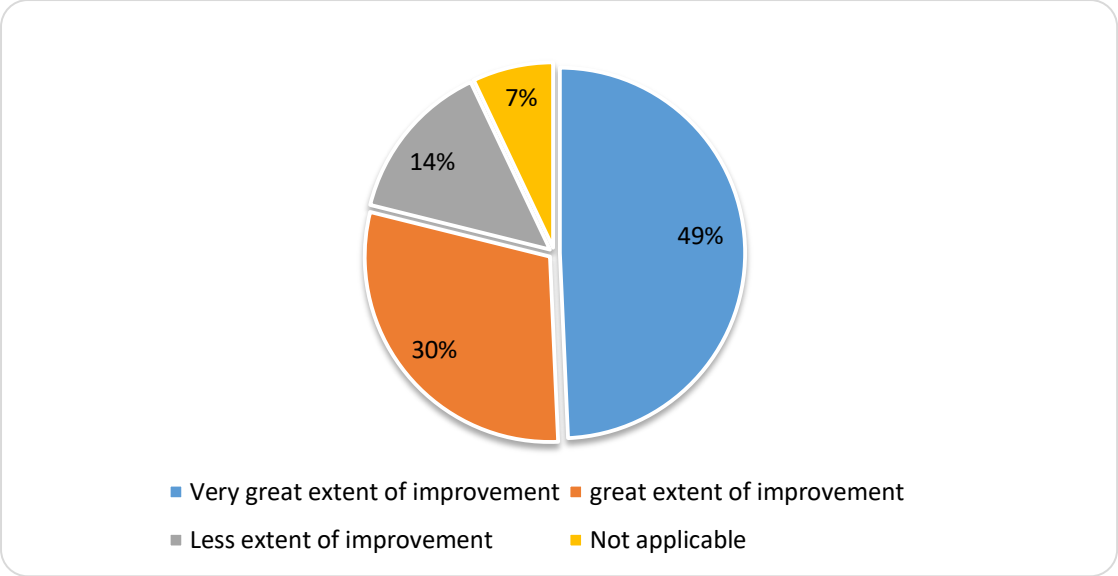


Figure 19: Improvement of ICT Service Because of Plan-Do-Check-Act (Deming Cycle)

Source: Author

Respondents were also needed if edge systems had implemented the Deming cycle (plan-do-check-act) in the ICT service offered. The respondents were also requested to correspond this statement if edge systems were practising it "Monitoring and control of our services is a continual cycle. Thus, we use this tool to monitor the status of our services and key operational activities, therefore, following the Deming cycle".

Samples of their responses are shown in Table 8.

Table 8: Actualize Plan–do–check–act (The Deming Cycle) on the ICT Service

ITEM	RESPONSE	COMMENTS
Respondent 1	After the implementation of SKMS, we have had continuous improvement of the ICT service and communication of the updates and improvements.	There has been a general improvement in ICT service
Respondent 2	There has been a general decrease in the number of ICT incidences maybe it's cause the end-users have a platform refer to, i.e. the known error.	Due to the continuous improvement of the service their lesser ICT issues.
Respondent 3	Well, there has been an improvement in the ICT service offered, but I believe there is still more improvement required. Last week there was a downtime for the internet, but there was no communication and how to access the backup internet.	The service improvement is still not perfect.
Respondent 4	I have enjoyed the ICT service improvement especially our telephony services the number of drop calls is now zero. Awesome job edge systems.	There has been a general improvement in ICT service
Respondent 5	I like the new trend of communication and updates of changes, updates and downtimes. It's making our work easier.	The continuous ICT service improvement has led to ease of work.

The findings depict the respondents have experienced continuous improvement of the ICT services after implementation of the Deming cycle (plan-do-check-act) in SKMS implementation at edge systems.

5.8 Chapter Summary

This chapter has provided an analysis of both qualitative and quantitative results. The results agree that the design and development of an SKMS prototype for edge systems company Kenya in reference to the ITIL v3 framework have been beneficial to service delivery and play a major role in ICT service delivery at edge systems; ICT

service has improved, and work has made easier. The ICT service while in the use of SKMS has created a platform to collect and disseminate information that has been very integral to ICT service provision and offered support during decision making since there is more awareness of the ICT service and after implementation, there has been the continuous improvement of ICT services, ability to track of the bugs and errors and continuous service improvement through the use of the Plan – do –check – act (The Deming Cycle) model.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter summarizes the findings of the study from both primary and secondary sources. The chapter first gives a summary of the findings followed by conclusions and recommendations based on the study findings.

6.2 Summary of Findings

The study aimed to design and develop a service knowledge management system prototype model for Edge System Company an ICT service delivery entity with the view to ensure optimal and improved ICT service is provided. The study concentrated on determining the influence of ITIL in ICT service delivery at edge systems, established the level of user acceptance of ITIL in ICT service delivery. ICT service management process (including plan-do-check-act) in ICT services delivery at edges systems and design and development of a service knowledge management system (SKMS) in reference to ITIL for ICT service delivery at edge systems.

Objective 1: - Influence of ITIL in ICT Service Delivery at Edge Systems

The researcher identified key areas ITIL could offer benefits to Edge System ICT service delivery. The key areas were configuration management, site management incidence management, known error, problem management, change management and ICT service management.

It was established edge systems (service provider) technicians can access how to's when at a site as quickly. Resolution health (client) can also configure ICT services and products quickly and efficiently. These lead to the reduction of the number of calls from assistance from either a technician at the site or the client.

Site visit feedback is the information shared by the technician about the client's site requirements. These could be parts orders, reports, escalations etc. It was established these reduce the duration taken to close a client's request since the technician doesn't wait for the close of business to share feedback about the client's site.

Incidence management means the ability to monitor requirements to support event and incidents detection through automation and can automatically open incident tickets and escalate incident tickets. It was established the mobile is an efficient platform for the end users to raise incidents and allow for quick alters and or communication to the technician for resolution would lead to the improvement of ICT service delivery by having a higher rate of request resolution and incidence reports.

A known error is the known cause of an incident for which a solution and workaround also exists. It was established the availability of the known error database repository on the mobile platform enabled both the technician and the end-user to access solutions and workarounds easily. This was, in turn, identified to play a role in the ICT service delivery to resolution health since engineers could search solutions at the site for quicker resolution.

Problem management is the cause of an incidence that has no solution and has or doesn't have a workaround. It was established offering the technician or resolution ICT personnel an opportunity to search, and document problems and workarounds lead to the improvement of request resolution success, therefore, playing a role in the ICT service delivery.

ICT service management is the implementation and management of quality ICT services that meet the needs of the business. It was established offering a platform to manage incidence and problem, offering solutions for known errors it will lead to

seamless ICT services to resolution health (the client). Therefore, management of the incidence, solutions and problems and having this availed on a mobile platform for ease of access by edge systems (the service provider) meant there is optimal ICT service management.

Objective 2: - Level of User Acceptance of the ICT Service

The researcher identified key areas in which they could gauge the level of ICT service. These key areas, in turn, were used to indicate whether the implementation of the SKMS was to be beneficial to resolution health (the client). The key areas were ease of use of the SKMS platform, efficiency of the SKMS platform, real-time site feedback, ICT service continuity offered, and reports submitted.

The study established that ease of use of the SKMS platform led to user acceptance of the mobile platform. It was established the mobile platform ensures there were follow-up and documentation of resolution incidence, offer information about the product and services through configuration management.

The study further established that availing real-time feedback will expedite the speed of resolving incidences. Technicians do not have to share the end of day reports and orders for client sites. Regarding the efficiency of the SKMS platform, the findings show that mobile offered a convenient and efficient platform to track incidence and track technicians whereabouts. However, the end-users indicated the reports are cumbersome to comb through to get the information they required.

Evidence of ICT service continuity included client reporting of incidence; ease of configuring solutions by and access to known error repository for faster issue resolution. in addition, the study established that edge systems (the service provider) were able to get accurate information about the ICT services management, feedback

from resolution health (the client), support of the business by the ICT services through its use. This allowed edge systems (the service provider) to identify room for improvement of the ICT service offered easily. Therefore, implementing the Deming cycle (Plan, do, check, act).

Objective 3: -Contribution of ICT Service Management Processes Continue to Support the ICT Services in Service Delivery

The researcher identified key reports that could measure the impact of ICT service management on the business and service delivery. The mobile platform has a varied number of reports to inform the business and service delivery of what is happening on the ground to allow analysis, re-strategising and decision making. These reports were incidence rates and turnaround, resolved incidences and turnaround duration, feedback rate, service and products downtime, site orders turnaround and site technicians number of visits. The reports also allowed the ICT service delivery entity and business to request custom ad-hoc reports to meet the business objectives where need.

The above-identified reports offered information about the ICT services being offered. The news was used fully by the service provider (edge systems). The service provider was able to identify key areas of improvement of the services being offered to the client (resolution health).

Plan – do –check – act (The Deming Cycle) on the ICT Service

The researcher identified areas in which the mobile application (SKMS) facilitated the implementation of Plan-Do-Check-Act (demining cycle). This was established from the services and production solution offering there was continual service improvement.

The Plan was achieved when end users shared feedback about the ICT services and products there were using. Also, this was accomplished when the incident was reported for resolution.

The Do was achieved by the service provider sourcing various solutions to the issues identified above and test and determine the most suitable solution that will be presented to the end-user. This is the solution development process.

The Check was achieved by the service provider by testing, analyzing the above results and identify what they have learned. This will be a known error and a problems workaround.

The Act was achieved when the feedback on services and products and the incidences reports were reviewed by the service provider and solution offered from them. Whereby the solution on the service and product was an improvement of the same the incidence was either appraised to a known error or a problem with a workaround.

To ensure the improvement of the services is continual, these areas were implemented continual service monitoring of the services, products and incidences monitoring. Some critical services and products had real-time monitoring while others there were reports to create to pick the incidences reported by the end-users.

Objective 4: Design and Development of a Service Knowledge Management System (SKMS) in Reference To ITIL for ICT Service Delivery at Edge Systems

The researcher designed and developed a prototype mobile application SKMS in reference to the research gap identified. The SKMS mobile application 1st prototype was tested by the respondents and the following recommendations were done site visit reports, preventative maintenance reports and site visit orders which will offer

documentation of the activities offering platform to advise the business how to continuously improve on the ICT service delivery. Change requests to aid in tracking in the case of unexplained systems interruption and include approval management. A dashboard that will have all the modules and downtime alerts announcement area to ensure the user can view all the technical issues that require widespread communication and have an adverse effect on productivity. It was observed SKMS mobile application platform was used to aid in the ICT service delivery so as to use ITIL framework to improve on the ICT service delivered whereby there was the ability to have the following; approval management for change requests, peripheral requests and funds reimbursement for the technicians in the field in a centralized platform that did not require them to report to the office. The SKMS also to have incident management, known error management, problem management that also offered documentation for future reference and ensured quick resolutions of issues. The SKMS also offered the ability for report management where the client resolution health and the entity Edge systems were able to extract information on the incidence trends, user feedback and areas where the ICT service could be improved on this ensured continuous service improvement.

6.4 Conclusion

ITIL is an essential and influential centre of gravity in information technology (IT) service management (Betz, 2013). ITIL framework if implemented offers clarity and visibility into the overall accessibility of underlying ICT service delivery components including information systems, applications and operational processes. It becomes possible to make informed business decisions about ICT services and ICT resources investment to provide a cost-effective solution to address the service level requirements from customers and identify the value IT service adds to the business

(Jihong Zeng, 2008).

Kenya has increased the number of ICT services providers; however, a few have implemented ITIL in the provision of their services since mobility for their personnel is imperative during services provision. The SKMS mobile platform enables the services provider to implement ITIL in their services provided with ease and enjoys access to real-time data of the services being offered to the customers always. ICT service management about the ITIL framework leads to improvement of the service. The service providers who have many site technicians SKMS allows them to enjoy the benefits of ITIL in service provision.

Technology doesn't just support the business - technology powers the business and helps drive growth" This emphasizes the importance of ICT to empower business activities and decision making.

6.5 Recommendations

The study recommends ICT service providers should ensure they implement new technology for ICT service management.

Objective 1- Design and Development of a Service Knowledge Management System (SKMS) in Reference to ITIL for ICT Service Delivery

The SKMS mobile platform could be implemented to offer ICT service management through the reference of the ITIL framework. This will enable the ICT service provider to cope with the fast-evolving ICT service world and improve their daily operations in ensuring efficient ICT services, improve the level of ICT service acceptance, continual service improvement and better decision making that provides the clients' needs are met.

Objective 2- Influence of ITIL in ICT Services Delivery

Based on the findings of the study ITIL plays a significant influence in the ICT service delivery of ICT service providers. When ICT services are offered in reference to the ITIL framework continual service improvements, known error platforms, tracking and follow through of incidences, problem management and workarounds and some of the benefits that are achieved. The ICT service provider access real-time information from the client's site will allow quick decision making.

Objective 3 - Effect of the Service Management Process (Including Plan-Do-Check-Act) in ICT Services Delivery

Continual service improvement is achieved through Plan – do –check – act (The Deming Cycle) on the ICT service. It is recommended the incident once resolved should be recorded as a known error and if a workaround is identified this should be recorded as the problem for future reference since s per the findings the availability of known error and workaround provides the opportunity for quick solutions of raise issues. Therefore improving on the ICT service delivery. The users need to provide feedback on the ICT services at edge systems entity used to improve on the ICT service delivery, therefore, offering a platform to identify user needs.

Objective 4 - Level of User Acceptance of ITIL in ICT Service Delivery

The findings depict the mobile platform offers a centralized platform to allow technicians in the field to document their activities which are timesheets, claims and calendar views of events. The platform also provides a centralized platform for incident management, problem management and known error management that aids in the ease of use of the ICT services, therefore, improving the level of user acceptance of the ITIL framework in ICT services delivery since it ensures ICT

service improvement. The SKMS also is easy to use and user-friendly which leads to the improvement of the level of user acceptance.

Lastly from the findings, it is noted that SKMS mobile platform offers the opportunity to improve and manage the ICT services efficiently at hand still ensure there is in ICT service continual improvement. It is, therefore, imperative to implement the platform for ICT service providers.

6.6 Suggestion for Further Research

This study investigated the development and implementation of a service knowledge management system (SKMS) about the ITIL framework in ICT service delivery. Further research should be done on ITIL education of the benefits it offers to the ICT service management, how ICT organisations can harness this to ensure optimal services, how they can use this to fine-tune over ICT services process and not limited to the ones related to the clients as per the study.

Further study can also be done on the ITIL adoption in Kenya and the challenges faced during the adoption. As well as, analysis of the organisation that has adopted ITIL their success and how they overcame their challenges.

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Appendix I: Questionnaire

Dear Sir / Madam

I am conducting a study entitled “development and implementation of a service knowledge management system about information technology infrastructure library framework (ITIL) in information communication technology service delivery (ICTSD)."

Service Knowledge Management systems (SKMS) is a platform that offers knowledge, information and interaction between consumer and client on the solution provided. It references the Information Technology Infrastructure Library (ITIL) framework which is the most recognized framework for service management in the world and aids with best-practice guidance on the facilitation of quality IT services, the processes, roles and the continual measurement and development of the quality of IT service conveyed both from a business and a customer perception.

Attached is a self-administered questionnaire that is essential for determining the level of implementation of a service knowledge management system about ITIL in information communication technology service delivery. Please take a few minutes to complete the questionnaire below. You have my own and expert assurance that all responses will remain secret.

Yours Sincerely,

Caroline Mungai

Instructions :

Please tick the boxes appropriately.

Where the spaces are provided, briefly indicate your answer.

Section A - General Question

- Kindly indicate your gender: -

Male ☐ Female☐

- Please indicate your Age.

AGE	**Tick where necessary**
Below 25yrs	
26-30 yrs.	
31-40 yrs.	
Above 51yrs.	

- Please indicate the organisation you work for……..
- Please indicate your Designation in your organisation……..
- Please indicate your Department/Division……
- Please mention your working Experience.

Tick as appropriate.

0-5yrs	
6-10yrs	
11-20yrs	
Above 21yrs	

To be answered by Resolution health personnel

Section B - Influence of ITIL in ICT service delivery.

- Did you successfully report an incident?

Yes ☐

No ☐

- Did the resolution on the known error database resolve your issues?

Yes ☐

No ☐

- If yes, did you ask for assistance or was the resolution straightforward?

Yes ☐

No ☐

- Is the process of reporting an incident up to the resolution efficient?

Yes ☐

No ☐

- To what extent are the processes and functions below impacting overall service delivery of resolution health to its customers after implementation of SKMS? Use the key below:

(1- Not applicable, 2- to a less extent, 3- to a moderate extent, 4- to a great extent, 5- to a very great extent)

	5	4	3	2	1
Request Fulfillment	[]	[]	[]	[]	[]
Change Management	[]	[]	[]	[]	[]
Know error Management	[]	[]	[]	[]	[]
Helpdesk Management	[]	[]	[]	[]	[]

- After implementation of SKMS were there success factors in the incidence management, change management, know error management, reports, service management and continuity management, describe with your words the effects, it had the above areas

  ……

  ……

  ……

To be answered by edge systems personnel

- Are you aware of your organisation effort to implement the ITIL framework in the management of ICT service?

Yes ☐

No ☐

Section C- ICT service management processes in ICT sieves on service delivery

- 'Edge systems ensure that specified conditions are met (or not met), and if not, they raise an alert to the appropriate group by raising a ticket and report an incidence. They in turn offer reports from SKMS, these reports are availability, incidence, new market solutions, ICT service lifecycle and know error database reports.'
- Please advise if there has been continuous ICT service support according to the above statement.

……..……

……..……

…….

- Illustrate how the use of SKMS mobile application has resulted in cost reduction in operations at edge systems

……..……

…….

…….

To be answered by edge systems personnel

- Is the incidence life cycle to the solution offering information required for decision making by the business?

Yes ☐

No ☐

- If no, please share recommendation……
- Is the SLA matrix report displaying the current service offered in actuality?

Yes ☐

No ☐

- Has the SKMS mobile application improved the sales agent productivity?

Yes ☐

No ☐

- Has it improved the speed at which orders are placed by sales agents and processed?

Yes ☐

No ☐

Section D - The effect of the service management process (including plan-do-check-act) in ICT services delivery

- Has the frequency of incidences reduced due to the availability of the known error database articles that have been implemented in reference to the Deming cycle (plan-do-check-act)?

Status	**Tick where necessary**
A very great extent of the improvement	
the great extent of the improvement	
Less extent of the improvement	
Not applicable	

- 'Monitoring and control of our services is a continual cycle. Thus, we use this tool to monitor the status of our services and key operational activities, therefore, following the Deming cycle."
- As per the ICT service offered experience, please advise if the above statement has been adhered to

……

……

……..

Section E - Level of user acceptance of the ITIL in ICT service delivery

- Illustrate if the SKMS applies to any of the below: -

	Yes	No
Met your performance expectations	[ ]	[ ]

Ease of use	[ ]	[ ]
Met efficiency expectations	[ ]	[ ]
Offered service continuity	[ ]	[ ]
Met expected benefits	[ ]	[ ]

- "SKMS will make work easier, efficient, ensure ICT service continuity and offer exceptional reports" Did the SKMS platform meet the above criteria……
  ……..

Appendix 2: Site Visit Reports

Client Name	
Type of visit	
Description	
Date of visit	
Time in	
Date and timeout	
Client Feedback and verification	
Technician Name	

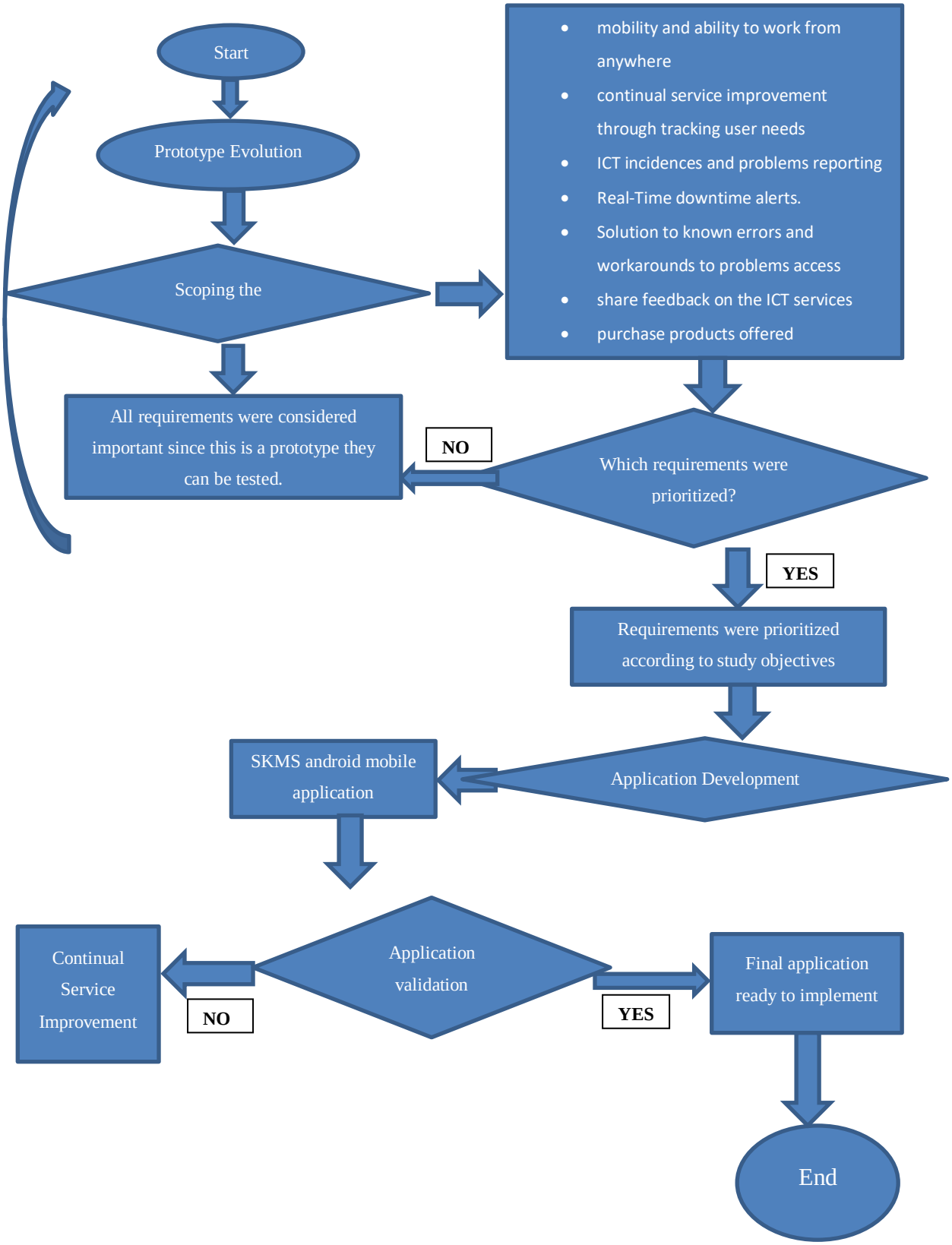
Appendix 3: Preventative Maintenance Reports

Client Name	
Item Serviced	
Patches applied if any.	
Parts replaced if any.	
Technician Recommendation	
Time in	
Timeout	
Client Verification and feedback	

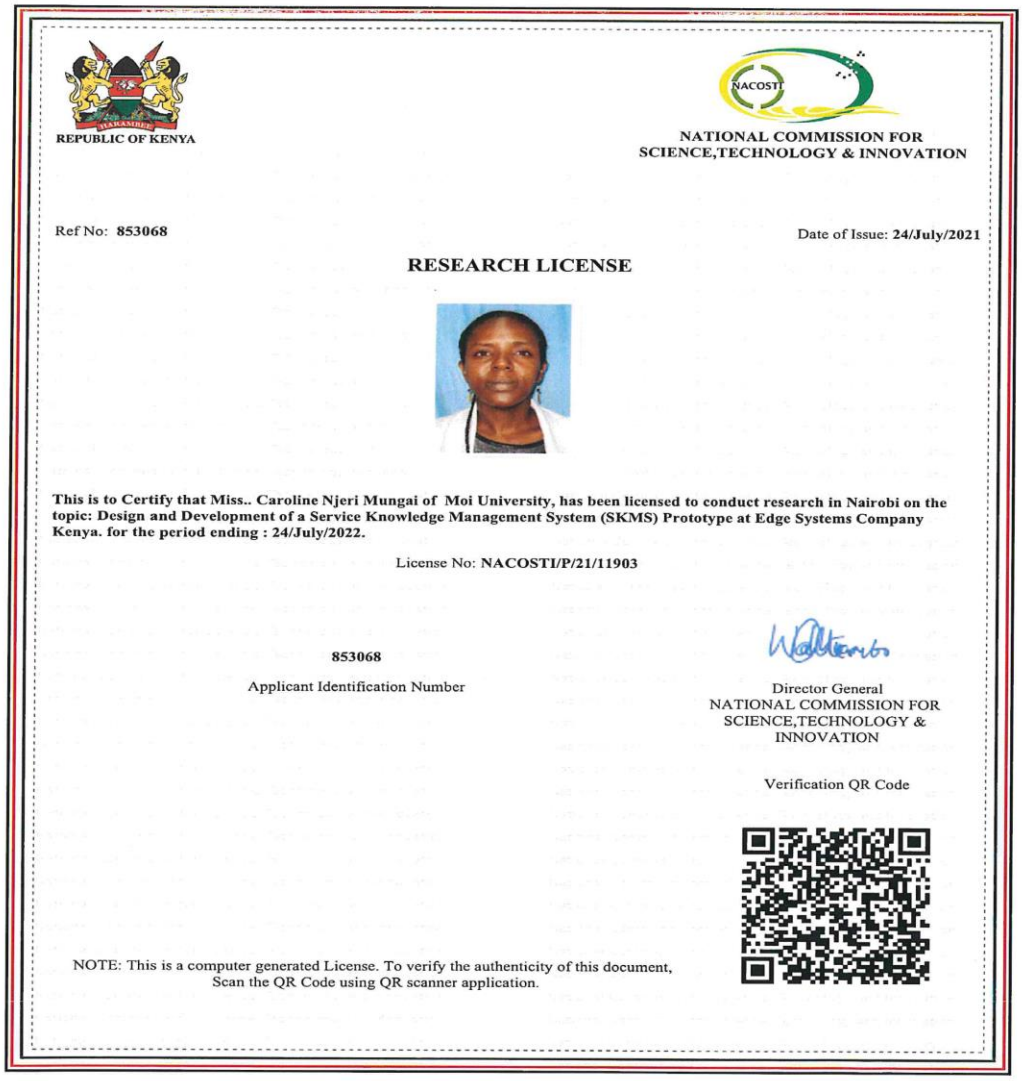
Appendix 4: Site Visit Orders

Date of request	
Site name	
Peripheral requested	
Reason	
Service	
Workarounds are implemented before supply.	
Justification	

Appendix 5: Application Development, Evolution Prototyping Flow Chart



Appendix 6: NACOSTI



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This is to Certify that Miss.. Caroline Njeri Mungai of Moi University, has been licensed to conduct research in Nairobi on the topic: Design and Development of a Service Knowledge Management System (SKMS) Prototype at Edge Systems Company Kenya. for the period ending : 24/July/2022.

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