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**Enhancing Service Delivery Capability of  
IT- Service Desk:  
The case of Ethio Telecom**

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A thesis submitted in partial fulfillment of the requirements  
for the Degree of Master of Science in Information Science

Addis Ababa University

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**Addis Ababa University**  
**College of Natural Sciences**  
**School of Information Science**

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**Enhancing service delivery capability of IT- service  
desk: The case of Ethio Telecom**

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## Declaration

I, Yodit Terefe, hereby announce that the work described in this study entitled "Enhancing Service Delivery Capability of IT Service desk: The Case of Ethio Telecom" is my own original work and prepared under the guidance of my supervisor, Dr. Tibebe Beshah. It was not submitted for any scholastic achievement at any university.

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This thesis has been submitted for examination with my approval as university advisor.

Advisor's Signature: \_\_\_\_\_

Tibebe Beshah (Ph.D.)

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## Abstract

*People nowadays need different telecom services like telephone network (voice, instant messaging), radio broadcasting system, computer networks, internet etc. Ethio telecom provides this sort of services in Ethiopia. This company creates the IT service desk section to address the IT related concerns of the employee and maintain their business continuity at the back. Most IT service desk enquiries are simple and routine. Analysts overwhelmed by supporting this inquiry have insufficient time to provide support at a high level. Simple and routine inquiries are problems that the user themselves can address if adequate information is given.*

*This work will enhance the IT service desk's service delivery capability by combining the existing system with a platform of self-help resources. A survey was carried out to classify simple and routine inquiries. The questionnaire is adopted from the "information technology help desk to identify the classification of simple and routine inquiries " in Austria (2007) and has been modified to meet the research questions. The analysis result shows that more than 50% of the incoming inquiries recorded in the IT service desk are simple and routine.*

*The result shows that a decrease in incoming inquiry would be expected if sufficient guidance, such as training, online documents, and integration of the current system with the portal of self-help support is provided.*

*A prototype was developed to demonstrate the ability to provide a solution for both simple and routine inquiries. If the user requests simple and routine enquiries, the system redirect him/her to another page where they can solve the problem without interacting to any IT professional.*

*Evaluation result of the prototype show that the user interface is 94 percent attractive, 97.6 effective in improving service delivery ,96 percent users satisfied with the self-support concept,99 percent risk-free and 94 percent context coverage. So, it really enhances the service delivery process.*

**Keywords:** IT service desk, Support model, simple and routine inquiries

## Contents

|                                                     |            |
|-----------------------------------------------------|------------|
| <b>Declaration.....</b>                             | <b>iii</b> |
| <b>Acknowledgment.....</b>                          | <b>iv</b>  |
| <b>Abstract.....</b>                                | <b>v</b>   |
| <b>List of Figures.....</b>                         | <b>ix</b>  |
| <b>List of tables.....</b>                          | <b>x</b>   |
| <b>Acronyms.....</b>                                | <b>xi</b>  |
| <b>Chapter One .....</b>                            | <b>1</b>   |
| <b>Introduction.....</b>                            | <b>1</b>   |
| <b>1.1 Background .....</b>                         | <b>1</b>   |
| <b>1.2 Motivation.....</b>                          | <b>2</b>   |
| <b>1.3 Statement of the Problem.....</b>            | <b>3</b>   |
| <b>1.4 Objective of the Study.....</b>              | <b>5</b>   |
| <b>1.4.1 General objective.....</b>                 | <b>5</b>   |
| <b>1.4.2 Specific objectives .....</b>              | <b>5</b>   |
| <b>1.5 Scope and Limitation of this Study .....</b> | <b>5</b>   |
| <b>1.6 Significance of the Study .....</b>          | <b>6</b>   |
| <b>1.7 Organization of the Thesis .....</b>         | <b>6</b>   |
| <b>Chapter Two.....</b>                             | <b>7</b>   |
| <b>Literature Review .....</b>                      | <b>7</b>   |
| <b>2.1 Overview of service desk .....</b>           | <b>7</b>   |
| <b>2.1.1. Support model .....</b>                   | <b>9</b>   |
| <b>2.1.2. Support level and structure.....</b>      | <b>10</b>  |
| <b>2.1.3. Incident management .....</b>             | <b>13</b>  |
| <b>2.2. Simple and routine tasks .....</b>          | <b>15</b>  |
| <b>2.3. Service level agreement .....</b>           | <b>16</b>  |
| <b>2.4. IT service management (ITSM).....</b>       | <b>17</b>  |
| <b>2.5. Operational level agreement (OLA).....</b>  | <b>18</b>  |
| <b>2.6. Web based self-support system.....</b>      | <b>19</b>  |
| <b>2.7. Overview of Knowledge.....</b>              | <b>21</b>  |
| <b>2.8. Related works .....</b>                     | <b>22</b>  |
| <b>2.9. Chapter Summary .....</b>                   | <b>27</b>  |

|                                                                    |    |
|--------------------------------------------------------------------|----|
| <b>Chapter Three</b> .....                                         | 28 |
| <b>Research Design and Methodology</b> .....                       | 28 |
| 3.1 Research design .....                                          | 28 |
| 3.2 Identify problem and motivation .....                          | 29 |
| 3.3 Define objective of a solution .....                           | 30 |
| 3.4 Design and development .....                                   | 30 |
| 3.4.1 Data collection methods and procedure .....                  | 31 |
| 3.4.2 Data source and sampling .....                               | 32 |
| 3.4.3 Analysis and identification of design element .....          | 33 |
| 3.4.4 Design and development tools and process .....               | 33 |
| 3.5 Demonstration .....                                            | 33 |
| 3.6 Evaluation .....                                               | 34 |
| 3.7 Communication .....                                            | 34 |
| 3.8 Chapter summary .....                                          | 34 |
| <b>Chapter Four</b> .....                                          | 35 |
| <b>Analysis, Findings, and Discussion</b> .....                    | 35 |
| 4.1 Overview .....                                                 | 35 |
| 4.2 Pre-test .....                                                 | 35 |
| 4.3 Response rate .....                                            | 36 |
| 4.4 Demographic characteristics of respondents .....               | 36 |
| 4.5 IT Service desk model, structure basics .....                  | 38 |
| 4.6 Identification of simple and routine inquiries .....           | 39 |
| 4.7 Due to routine tasks total number calls and recorded TTs ..... | 43 |
| 4.8 Expected features and functionality of the new system .....    | 47 |
| 4.9 Incident management .....                                      | 48 |
| 4.10 Discussion .....                                              | 50 |
| <b>Chapter Five</b> .....                                          | 52 |
| <b>Design and Development</b> .....                                | 52 |
| 5.1 Features from gathered design elements .....                   | 52 |
| 5.2 Functional requirements of the proposed system .....           | 52 |
| 5.3 Nonfunctional requirements of the proposed system .....        | 53 |
| 5.4 Systems models .....                                           | 53 |
| 5.4.1 System architecture .....                                    | 54 |
| 5.4.2 Use cases .....                                              | 55 |
| 5.4.3 Class diagram .....                                          | 60 |

|                                     |                                                  |    |
|-------------------------------------|--------------------------------------------------|----|
| 5.4.4                               | Activity diagram.....                            | 61 |
| 5.5                                 | Some functionalities .....                       | 64 |
| 5.6                                 | Prototype demonstration.....                     | 67 |
| 5.7                                 | Evaluation.....                                  | 70 |
| 5.8                                 | Discussion.....                                  | 72 |
| Chapter six.....                    |                                                  | 75 |
| Conclusion and recommendation ..... |                                                  | 75 |
| 6.1                                 | Conclusion .....                                 | 75 |
| 6.2                                 | Recommendation for practice.....                 | 76 |
| 6.3                                 | Recommendation for future work .....             | 76 |
| References.....                     |                                                  | 77 |
| Appendix.....                       |                                                  | 80 |
| A.                                  | Questionnaire .....                              | 80 |
| B.                                  | Evaluation criteria for the proposed system..... | 90 |



## List of Figures

|                                                                         |    |
|-------------------------------------------------------------------------|----|
| Figure 2. 1 IT Support Level structures [3] .....                       | 11 |
| Figure 2. 2 One-level support structure [3].....                        | 12 |
| Figure 2. 3 Two-level support structure [3] .....                       | 12 |
| Figure 2. 4 Three-level support structure [3] .....                     | 13 |
| Figure 2. 5 Incident management activities [18].....                    | 14 |
| Figure 2. 6 Service level agreement [9] .....                           | 17 |
| Figure 2. 7 Customer focused IT service delivery [5] .....              | 18 |
| Figure 2. 8 Nonaka's knowledge spiral [7].....                          | 22 |
| Figure 2. 9 Mechanism to identify simple and routine inquiries [4]..... | 23 |
| Figure 3. 1 overall research steps.....                                 | 28 |
| Figure 3. 2 Design science research cycle [14].....                     | 29 |
| Figure 3. 3 Organizational knowledge .....                              | 31 |
| Figure 4. 1 Response rate.....                                          | 36 |
| Figure 4. 2 gender of the respondents .....                             | 36 |
| Figure 4. 3 Age of the respondents.....                                 | 37 |
| Figure 4. 4 educational background of the respondents.....              | 37 |
| Figure 4. 5 experience of the respondents.....                          | 38 |
| Figure 4. 6 office hour of IT service desk.....                         | 38 |
| Figure 4. 7 service desk model.....                                     | 39 |
| Figure 4. 8 Support level.....                                          | 39 |
| Figure 4. 9 Password related inquiries .....                            | 40 |
| Figure 4. 10 Browser related inquiries.....                             | 41 |
| Figure 4. 11 Outlook related inquiries .....                            | 41 |
| Figure 4. 12 Software related inquiries .....                           | 42 |
| Figure 4. 13 Hardware inquiries .....                                   | 42 |
| Figure 4. 14 Other types of inquiries .....                             | 43 |
| Figure 4. 15 call handled by the analyst.....                           | 44 |
| Figure 4. 16 Number of tickets closed .....                             | 44 |
| Figure 4. 17 User contact .....                                         | 45 |
| Figure 4. 18 Mix of inquiries .....                                     | 45 |
| Figure 4. 19 Total amount of incoming inquiries .....                   | 46 |
| Figure 4. 20 Advantage of the proposed system.....                      | 47 |
| Figure 4. 21 Feature of the proposed system .....                       | 47 |
| Figure 4. 22 Communication channel .....                                | 49 |
| Figure 5. 1 System architecture .....                                   | 54 |
| Figure 5. 2 Use case diagram .....                                      | 56 |
| Figure 5. 3 class diagram .....                                         | 61 |
| Figure 5. 4 Create request .....                                        | 62 |
| Figure 5. 5 Browser related.....                                        | 63 |
| Figure 5. 6 Home page .....                                             | 68 |
| Figure 5. 7 Notification page.....                                      | 68 |
| Figure 5. 8 Trouble ticket status page.....                             | 69 |

|                                      |    |
|--------------------------------------|----|
| Figure 5. 9 Create request page..... | 69 |
|--------------------------------------|----|

## List of tables

|                                                                       |    |
|-----------------------------------------------------------------------|----|
| Table 2. 1 Summary of related works .....                             | 26 |
| Table 4. 1 reason to number of inquiries increased .....              | 46 |
| Table 4. 2 Problems faced when the communication channel failed ..... | 49 |
| Table 5. 1 Use case -Incident registration.....                       | 57 |
| Table 5. 2 Use case -Incident status.....                             | 57 |
| Table 5. 3 Use Case-Post notification.....                            | 58 |
| Table 5. 4 Use case-Post weekly schedule/on duty.....                 | 58 |
| Table 5. 5 Use Case-Shift schedule .....                              | 59 |
| Table 5. 6 Use Case-Password related .....                            | 59 |
| Table 5. 7 Use Case-Browser related.....                              | 60 |
| Table 5. 8 Use case-Outlook related .....                             | 60 |

## Acronyms

*CRM \_\_\_\_\_ Customer relationship management*

*FAQ \_\_\_\_\_ Frequently asked questions*

*HD \_\_\_\_\_ Help desk*

*IR \_\_\_\_\_ Incident requests*

*ITIL \_\_\_\_\_ Information technology infrastructure library*

*ITSM \_\_\_\_\_ Information technology service management*

*IVR \_\_\_\_\_ Interactive voice response*

*KB \_\_\_\_\_ Knowledge base*

*KM \_\_\_\_\_ Knowledge management*

*KPI \_\_\_\_\_ Key performance indicator*

*SR \_\_\_\_\_ Service requests*

*TT \_\_\_\_\_ Trouble ticket*

## Glossary

|                                         |                                                                                                                                                                                                                |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>IT service desk analyst</b>          | An IT professional who helps users to resolve issues related to computer hardware or software                                                                                                                  |
| <b>Interactive voice response (IVR)</b> | It is an automated telephony system that interacts callers, gather information.                                                                                                                                |
| <b>Trouble ticket</b>                   | a file usually contained information about support interventions made by technical support staff, or third parties on behalf of an end user who has reported an incident that is preventing them from working. |

# Chapter One

## Introduction

### 1.1 Background

Ethio telecom has been a government-owned telecommunication operator in Ethiopia for many years since its foundation but at the end of the first decade of this century this monopoly ends, and several telecom operators joined the company. The name ethio telecom was founded in 2010 after France Telecom became Ethiopian Telecommunications Corporation's management because of a government transition strategy [1].

The introduction of telecommunications in Ethiopia has existed since 1894[1]. The operator has passed through different names (brand names) and logos, by different governments that came in power, since the beginning. Settled phone (both wired and wireless), Web (dialup and broadband), mobile (pre-paid and post-paid), CDMA (voice, web and information), and other value-added services (CRBT, SMS, call waiting, call conference and call forwarding) are among the major telecom administrations.

IT service delivery is the process of bringing services to users that include application, data storage and other system-related rights. The quality of IT services is governed by the Operational Level Agreement (OLA) [1].

IT service desk is the first support group and the only contact point during any IT-related assistance of information system division to the internal customers or staff surrounding their day-to-day activities [1]. But if the user's request is beyond the service desk support's capability, they escalate to second level supports or service providers (vendors). A typical service desk handles the grant and revoke service request and solve incidents for the services, in it is either service disruptions or other service.

The service desk is the backbone for the company in supporting the business process by offering great technological support and a large network for service management. In the first

level Ethio-telecom service desk analysts support hardware, software, network and other system-related issues.

## **1.2Motivation**

Information technology plays an important role in the business environment but, the complexity of the system leads to several technical and functional problems faced by the user: -for example network, hardware, software and, system related problems [2]. If the problems are not resolved at the right time the organization lost its productivity that is why organizations give special attention to IT service desk section.

According to different journals, most requests registered in the service desk do not need any specialized knowledge (requests are simple and routine) [2,3]. From the records in-service desk section, service desk analysts support all Ethio telecom staffs around 19,104 and five hundred TTs registered per day. Those trouble tickets are either Service request or Incident-related problems. The service requests are related to new account creation, deletion, add role, update, and relocation. Incident requests (IR) are mostly system failure requests like hardware, software, intranet, and network troubles.

The problems which motivate the researcher to work on this issue are: -

- analysts always handle simple and routine inquiries, so they don't have enough time to give high-level support,
- customers waste their time in the queue to get the support of the analysts,
- the performance of the section is decreased through time and achieving the targeted key performance indicator (KPI) is the difficult task to the IT service desk section.

### 1.3 Statement of the Problem

The number of first-party calls is increasing each year, most calls do not require specialized knowledge [3][4], and most service desk inquiries are associated with login information, username, and password issues. These issues have never been studied in Ethio Telecom. Request offerings depend on the organizational structure, service desk structure, and technological advancement of each company.

Despite less employees help desk (HD) is expected to have more support, Business process re-engineering led the shrinkage of the size of HD because the overall budget has been reduced [3].

A service desk is the first level support to handle IT related issues and telephone services. But most of the recorded trouble tickets are simple and routine. This made the service desk analysts doing the same thing again and again. This leads to the following problems that are currently facing the Ethio telecom service desk environment: -

- The first complaints raised related to Trouble tickets (TTs) delay. The complaints need most requests to be addressed expeditiously but most of the time it's difficult to respond immediately due to different reasons.
- The second problem is TT closed without a solution. Mostly IT service desk analysts are engaged in handling simple and routine tasks, so they don't have time to give high-level support.
- Incident requests are not handled in a structured way.
- Analysts complained that they always reinvent the old wheel (doing the same thing again and again) and have not enough time to give high-level support.
- Users complain about service quality (accessing the hot line number 878): - "Help unavailable when needed" [3] is one of the major reasons for service delivery failure in the help desk environment, which led the customer dissatisfied with the service.

- The incident management team is not integrated with the IT Service Desk Group. Incident management is focused only on the documents and reports of incidents that have occurred.

Previously researches were done to enhance the service delivery capability of IT service desk in different countries. In Ethiopia Melkite [2] attempted to creating a system that automatically assigns trouble tickets to technicians that fulfill ITIL standards, but her research not considered the incident management team. In Austria Leung & Lau [3], conducted a survey to identify simple and routine technical requests. They developed online questionnaires and distributed having 18 questions. The result shows that most of the recorded requests are simple and routine. In Austria Leung [4] further investigated the feasibility of developing a user self-support system. He developed an expert system by using a rule-based approach.

According to recent studies [3][4], IT service desk personnel are no longer available for high-level and constructive help because their time is filled mainly by responding to these basic and repetitive inquiries. While the researcher continues to work to assist the analyst through various mechanisms, some of them are through the creation of service desk structure and support model, service desk has not resulted in any improvement, and the hard work seems to be ineffective.

Despite this, the service desk model, technology development, support level varies from country to country, and once work is not appropriate for all service desk operations. Also, in the telecom sector, there is no study so, it requires further research in the area.

This study different from previous studies, different in approach, different path for enhancing the service delivery process and includes the section incident management practices.

The aim of this research is to enhance the service delivery capability of the IT service desk through designing user self- support portal. Consequently, this work addresses the following research questions:

- What are the simple and routine requests that come on the service desk?



- How can the process be supported by an automated system to enhance service delivery at Ethio telecom?
- To what extent automated system supports the service delivery process?

## **1.4 Objective of the Study**

### **1.4.1 General objective**

The general objective of this thesis is to investigate and design an interactive self-help support portal to enhance the service delivery capability of the IT service desk.

### **1.4.2 Specific objectives**

- Identify features from various literatures to have a better understanding of the study area.
- Examine the present flow of IT service desk activities.
- Investigate the present flow of IT service desk incident management.
- Identify simple and routine technical requests through empirical data.
- Design and develop user self-help support system.
- Evaluate applicability of the proposed system.

## **1.5 Scope and Limitation of this Study**

This thesis mainly focused on assessing the IT service desk first level support and incident management team at Ethio telecom. It assesses the current ITSM system used in the section, identifies simple and routine tasks, and develops an interactive, simple user help support system.

The purpose of this study is to design prototypes through a quantitative assessment. During the research, both primary and secondary data will be collected. Primary data will be collected using questionnaires. Secondary data will be collected from previously published papers and books.

Some evaluation criteria are limited by specific questions. At the beginning, the researcher had a plan to have 100 users to evaluate the prototype. But due to the covid-19 outbreak, only 50 users are participated on it, though there is no missing information.

## **1.6 Significance of the Study**

The output of this research helps the following stakeholders. For the service desk Analysts, the result decreases the number of routine and simple TTs assigned for each analyst, increases the performance of the analyst and given time to give high-level support. For Information system division build the division image, help the company to increase revenue, decrease overall support TT volume, it enables end-users to find answers to simple and most common issues themselves and will decrease ticket volume and reduce IT costs .For the staff (Internal customers) it helps to increase their knowledge in the domain, making IT issues fast and easy to solve, in a way that end-users want to interact, can improve staff satisfaction and confidence. To researchers it also contributes as an input for further research works to enhance all rounded services provided by ethio telecom.

## **1.7 Organization of the Thesis**

This paper is divided into six parts. The first chapter is an introduction that addresses organizational context, motivation, problem statement, study purpose, research question, scope, and study significance are discussed.

The second chapter provides a summary of the most relevant principles in a service desk setting for services. Several literatures relating to service desk style, support level, incident management, simple and routine inquiries, different level agreement, and web-based self-help systems were reviewed in this chapter. The third chapter deals with nature and methodology of the study. As a design science research approach, this chapter describes the design science cycles, data collection method, and data analysis techniques. Chapter four describes data analysis, result, and discussion. Chapter five deals with prototype design based on the requirement gathered and evaluation. Chapter six summarizes the research findings and provides conclusions and recommendation based on the research findings.

## **Chapter Two**

### **Literature Review**

This chapter provides a theoretical background related to the IT service desk and web-based self-support system, as well as reviewed literature. First, this chapter offers a service desk overview that includes a support structure, support model, and incident management. Simple, routine tasks set out in section 2.2. Service Level Agreement is set out in section 2.3. Section 2.4 is about Managing IT Services, and operational level agreement as set out in section 2.5. Section 2.6 offers information about a self-help support portal based on the web. Discussion of knowledge is presented in Section 2.7. Section 2.8 is presenting related works, and Section 2.9 provides a summary of these.

#### **2.1 Overview of service desk**

In the late 1980s the IT Help Desk feature was familiarized to address the IT-related problem. The users were wasting time searching for help before the IT help desk service was launched. The Service desk has a service level agreement or a operational level agreement. In 1990, the IT Company managed to find IT business management best practices and the IT service desk [3].

IT Service Desk is a modification in support desk born from within the context of IT service management. The definition of operation relates to the management of IT services [18].

The Service Desk is a branch of IT Service Management which typically includes incident management, Customer Request Management, Information Management, Self-Service, Clear Issue Relations, Change Management which Reporting capabilities [5].

The purpose of the section is to enable or quickly adjust the service when the regular service is terminated, “Because the service desk located at the heart of the customer interface”. The service desk has many names as Support Centers, information Center, technical support and help desk[6].

IT service desk is a single point contact for all IT related issues. 60% of the incoming inquiries were resolved by the service desk directly and, the rest requests assigned to second level or third level support. service desk responsibilities include the following[7]:

- Accepting customer request (via telephone, e-mail, portal etc.).
- Recording the incident and receive user feedback.
- A new service or service breakdown occur, it should inform their customers of their current request and status.
- In accordance with the Service Level Agreement, the department's staff will attempt to work on reviewing the requests of users if they are not resolved by this section or forward to the appropriate department.
- Monitoring the implementation of policies in accordance with the Service Level Agreement.
- Managing the life cycle of each service request (active, pending, resolved, and escalated).
- Communicating with users if Service Level agreement is adjusted.

The IT service desk is designed to keep operations running smoothly. And analysts handle everything starting from individuals' technical problems. Generally, the service desk helps the organization through aligning IT with the business process.

According to the ITIL, the service desk is a key function of a service operation for any organization of all sites and has a great role to handle main activities requiring management if organizations want to establish an IT department first looking at the ITIL best practices[4].

As Frantz [8] stated, there are three approaches to resolve incident requests, the options are self-assist, remote and on-site support.

In the case of **self-assist**, users solve their problem by referring to KB, online document, and other related materials. On the other hand, the **remote approach** service desk experts use smart technologies to solve the user's problem by accessing their computers remotely. This system enhances the quality of service delivery. There are two remote access options, remote desktop connection and remote desktop viewer. A remote desktop connection is used for software

installation and the user cannot see what the technician doing. But in the case of the remote desktop viewer, the user can see what the technician doing in his computer, so it has high confidentiality.

Finally, if the remote resolution has failed the technician goes to the user site physically and solves the problem. This option is called the **on-site approach**.

### 2.1.1. Support model

According to Leung [3], Lwu [9] and Leung [10] there are four different support models in the IT service desk structure. These support models are the following.

- decentralized
- centralized
- distributed and
- e-support model.

The *decentralized* help desk can be distributed transparency over several locations from the user perspective. This model was popular in the 1980s. It allows organizations to have more than one help desk[11]. The complexity of a system identifying the concerned help desk and contacting the targeted group was the difficult task for the users. To solve such problems centralized help desk was established. The centralized model has one contact point way of handling requests and this model facilitates timely response and actions. Based on merging different help desks into one, a user only contacts one help desk. The advantage of a centralized help desk is [11]:

- consolidation of a contact point
- a standard way of handling inquiries
- have Service level agreement

A distributed model or a virtual help desk model needed to promote help desk multiple physical locations. Users solve their problems 24/7 by communicating one contact number (hotline number).

Finally, E-support is an interactive support model. All support is given by using the Internet or web as a primary communication channel. Users can use email or web to communicate the help desk. This study aimed for in designing e-support IT service desk.

### **2.1.2. Support level and structure**

The support level represents the domain of technical support based on the company's need. According to Omarsson [10] there are four support levels in an organization.

*Level 1 support:* - it is initial support that solves simple and straightforward problems by taking information from users. Around 70%-80% of the user problems are solved at this level, and they are responsible for escalating unsolved problems to the appropriate level.

*Level 2 support:* -it handles the escalated TT from other levels and solves the problem by using different tools, and techniques. The team has a responsibility to escalate unsolved problems to the next level.

*Level 3 support:* - this team consists of experts and handles the most complex problems that the previous levels cannot solve.

*Level 4 support:* - This is not a universally used level, but in this level an organization will communicate vendors from the outside of the organization. The below picture summarizes the support level. Detail is shown in Figure 2.1 below.

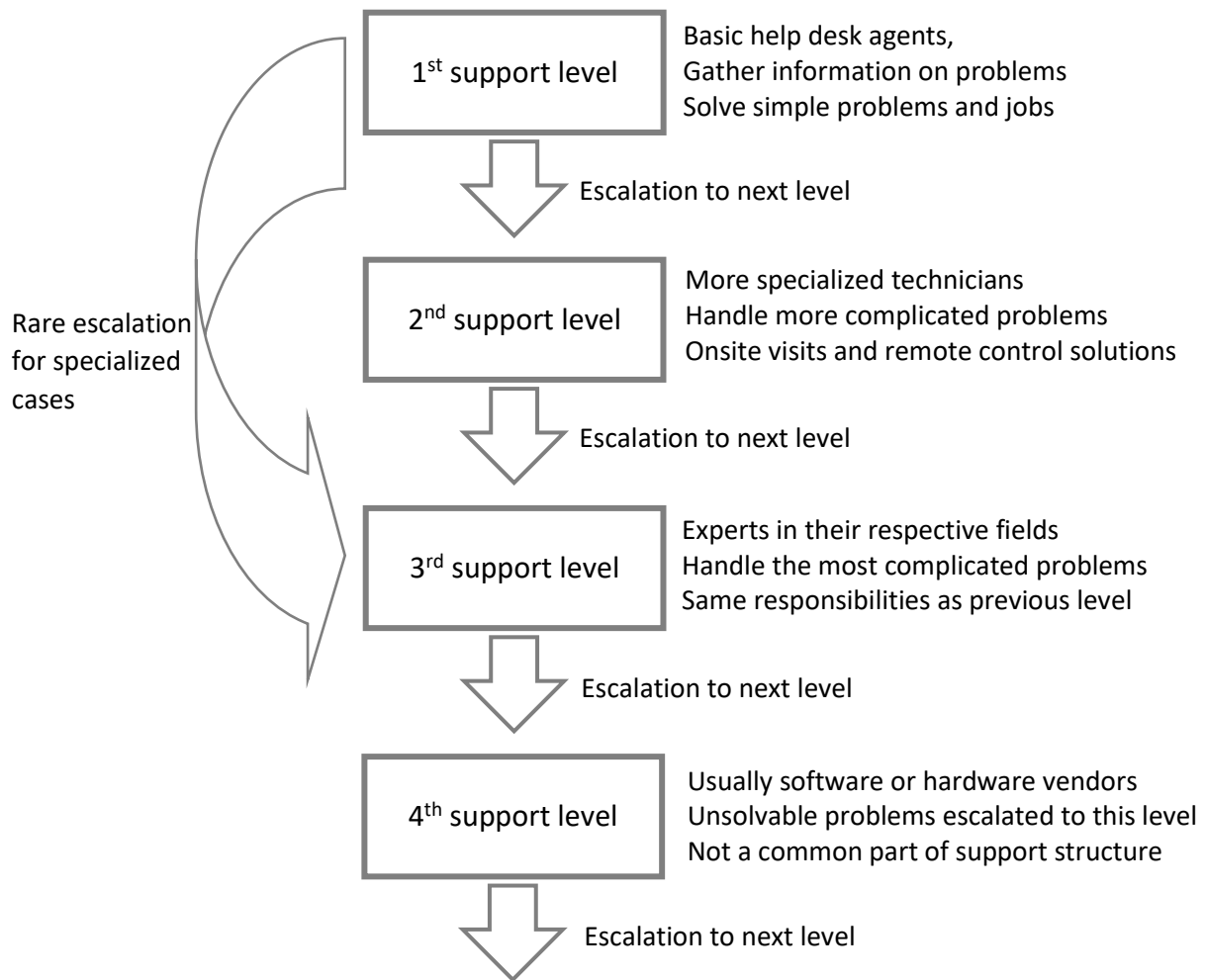


Figure 2. 1 IT Support Level structures [3]

Commonly Help desk support structure is divided into three support lines, first-level support (front line), second level, and third-level support. The front line is the IT service desk, which handles both TT and phone call requests. According to research, most of the incoming enquires of the IT Service desk (around 50%) are simple and routine so they are handled by the front line. But if the problem is not resolved by the capacity of first-line support, it will be escalated to the second level or third level support [3].

**There are three support structures in IT service desk [3].**

1. *One-level support structure*: -which combines all three-level support (first level, second level, and third level) into one but, it is rarely used in today's organization.

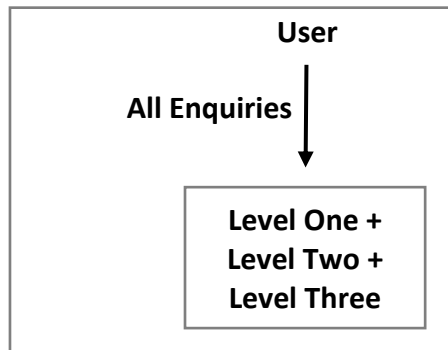


Figure 2. 2 One-level support structure [3]

2. *Two-level support structure*: -The front line supports solve the problems as soon as possible but if the problem is beyond the expertise of the front line, it will be escalated to second level support.

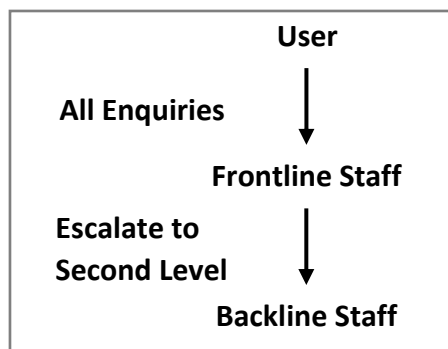


Figure 2. 3 Two-level support structure [3]

3. *Three-level support structure*: -currently, most companies used the three-tier support structure to handle IT-related inquiries. There is first level support to handle requests in the front line if the problem is not solved by this group the TT escalated to the second level support or third level. The below picture shows all the inquiries are the burden of the first support group.



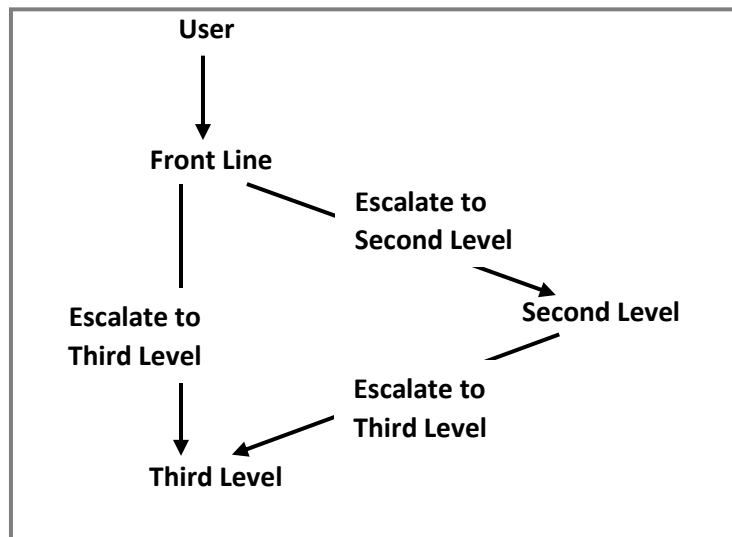


Figure 2. 4 Three-level support structure [3]

### 2.1.3. Incident management

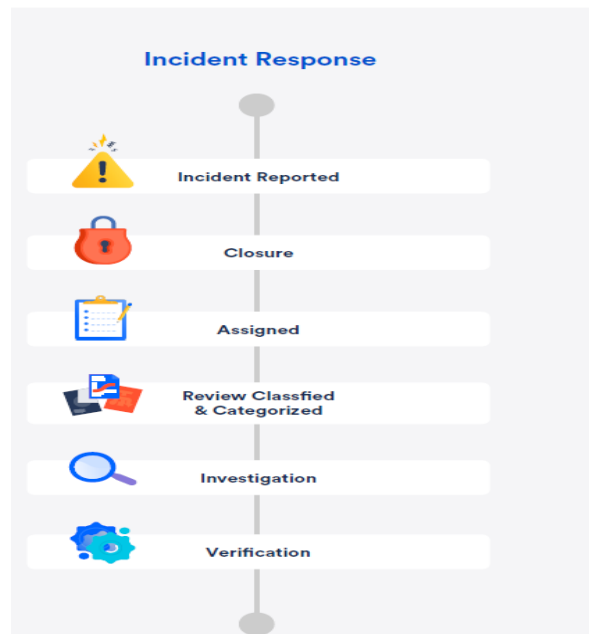
Incidents are unforeseen events or some barriers that affect the quality of service. Incident management is a means of restoring normal business as quickly as possible, thereby reducing the impact of business activities, ensuring the highest possible quality of service and availability [18].

It's one of the main components of ITSM. This process is intended to quickly restore regular service and reduce the impact of businesses. If the service provider cannot be resolved in the first instance, they will grow into the incident management team. Managing the lives of accidents is the responsibility of the emergency management team. The aim of incident management is to restore the system's normal operation, mitigate the impact and provide the best service delivery [18].

**Activities in the incident management process include the following [18].**

- Incident recording
- Incident reporting and communication
- Incident investigation

- Incident ownership



*Figure 2. 5 Incident management activities [18]*

Identifying the incident (Incident recording): - Incidents identified in one of the following ways:

*TT*: -increased the number of registered TT through the portal, email, or another incident registration system.

*Call*: -increased number of calls to the service desk through the hotline number.

*System owners*: It is possible to know the incident happened before the customer submitted the ticket by using system monitoring tools (Alert).

Communicating: -customers stay informed of the incident downtime. First and end a message should be sent via mail or SMS. This communication increases transparency, trust, and it can also reduce ticket volume.

Investigating: -trying to identify what happened because, the customer needs clear justification about the incident and it's necessary for reporting purpose.

Resolution and recovery: -taking a collective approach to resolve the incident.

## **2.2. Simple and routine tasks**

According to Leung, Lau [3] and Leung [4] simple and routine inquiries, are problems that can be resolved by the user if enough information is provided via available sources such as a web site or document.

In the survey result Leung and Lau [3], most respondents believe that if the users get enough information, they solve the problem by themselves such as

- password reset
- Account login problem
- Account suspension
- account setup

The below example gives more detail information about how much time wasted on simple inquiries in the service desk environment. Leung [3] reported the problem like this: -

Monday morning John got a login problem on his email account with the usual password he calls to the IT service desk but, the day was a peak hour because several users changed their mail password in the previous Friday.

Almost all of them forgot their password when they return on Monday. He waits around 5 minutes in the queue, then service desk analyst first level support picks the call. The analyst listens to John's problem, asks some questions like does the num lock on or not, caps lock is disabled or not, and other questions related to the problem because a password is a case sensitive then the analyst asks John to log again but it's difficult to log it shows a similar error password invalid. John knows he changed his password last Friday but, he did not remember the password right now. The analyst goes to the password reset page and asks John's Id and reset it to default. Analyst reminds him to change the default password by a new password due to security reason and the analyst record the problem in the portal and close the conversation. This simple problem waste more than 15 minutes.

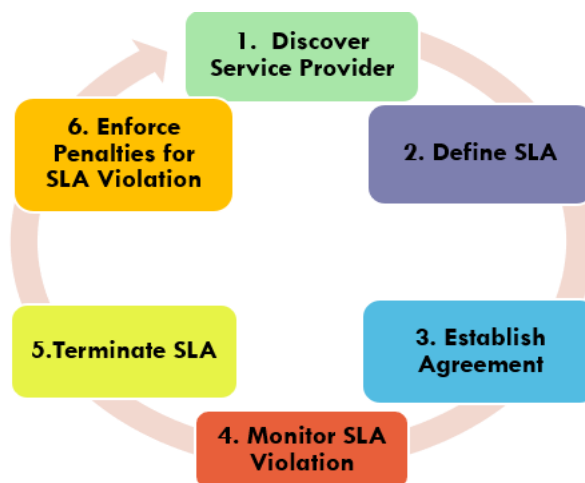
### 2.3. Service level agreement

Service Level Agreement (SLA) is a contract between package providers and internal or external customers. SLA indicates safety level. This focus will strengthen the customers' trust in the service provider [9].

SLAs are formal or ordinary contracts that signify work and any key obligations between two parties. The SLA can be a legal communication between the customer and the external service provider, or the internal benefit communication between the two SLAs within the Company's SLAs is used to identify benefits and address service-level issues [9].

SLA is needed for the creation of a cooperative relationship between company and outside customer to ensure the provision of high-quality service to the customer. The agreement remains valid from the effective date and valid until further notice from the concerned body [9].

Contract negotiation and agreement between a customer and a service provider is the key to ensure a service provider delivers the agreed terms of services. There are different requirements in SLA: - SLA format should be described, the level of the parameter also presented, define which service parameters can be monitored, and when the requirements are not meet penalties should be set [9].



*Figure 2. 6 Service level agreement [9]*

## **2.4. IT service management (ITSM)**

The most widely accepted approach to IT service management, which offers a set of best practices is known as Information technology infrastructure library( ITIL).It provides a framework that is related to services and the interaction of IT staff with users. It's also the management of quality. The following represent characteristics of ITSM [9].

- Focus on relationships with customers (on quality of service)
- Has a great infrastructure using the latest technology.
- The IT department should try to reach a level that allows them to solve the IT service problem more efficiently

According to ITIL a service desk is the primary point of communication between the end user and the IT service provider to organize the activities.

- It increases employee productivity and with a working service desk in place the incident response times are significantly reduced.
- Service desk tools may be used to accumulate operational data to keep tabs after the solution has been implemented.
- Advanced Service Desk Software and Change Management help the organization meet the quality and performance expectations set, which may improve the company's capacity for further investment.

According to Sdi [5] ITSM is IT service quality management that meets business and customer needs. The purpose of the ITSM includes: -

- Create, design, deliver and manage IT business services
- Integrate with business process
- Increase the reliability of service

- reduce risk improve communication
- improve engagement with the service provider
- Create, design, deliver, manage and optimize IT business services from beginning to end (service life cycle)
- Reduce costs and optimize resources
- Increase IT infrastructure and service reliability
- Protect investment and reduce risk
- Improve customer experience and communication.
- Increase business value.

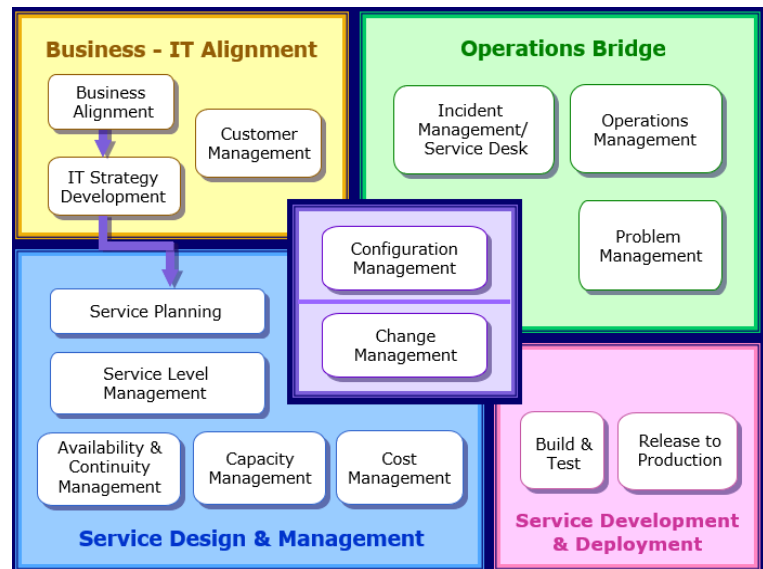


Figure 2. 7 Customer focused IT service delivery [5]

## 2.5. Operational level agreement (OLA)

A contract that defines how different groups in the company plan to provide a service or a set of services, each part of which is responsible for designing and solving IT problems.

OLA is a document that shows the relationship between different departments within an organization. An internal report claimed by the management team. OLA clearly sets out how often it solves problems for IT customers. It can also focus on tasks that should be implemented primarily between the benefit work environment and the 2nd level support (software maintenance) network management.

OLA terms should emphasize the numerical and numerical definitions in the organization's rules and SLAs. There is a strong link between SLA and the process [5].

## **2.6. Web based self-support system**

The World Wide Web offers one way to store, supply, collect, distribute, presenting and use information. Web technology offers a variety of opportunities, such as information availability, ease of use, and flexibility. Provides information management infrastructure to provide secure information and enable users to access the system at any time [12].

It is an online support system that allows end-users to access information for routine inquiries without the assistance of other representatives, and it is also called 24/7 support. A person can access information and perform routine tasks by referring to KB [12].

Service desk is an interface between an IT system and a user group. Service desk does not mean you are a service provider. The main thing is to discuss how service desk workers culture and employment can be modified to become service focused. Jobs need to be redesigned to become a place of more value and pleasure. Most Of service desks are badly constructed and result in routine, boring work. For example, the tone of voice, attitude, and willingness of the analysts to help the employee all contribute to a positive feeling about the service desk [27].

Assessment metrics (parameters) are also another problem, such as resolution time, average speaking time, average call response and call decline. If customers, ask a question about the level of feeling the customer satisfaction or quality of service is calculated based on the criteria above [27].

Servitization is the production of foreign distribution scripts [27]. This includes offering mirrors for regular breaks to workers to enable them to smile during transactions. Automation means creating an automated solution without a human intervention system will pass it to the automated capability and solve its own problem. A web-based customer self-service system empowers users by giving direction on how to solve a certain problem without service representatives. It gives step by step mechanism to troubleshoot system-related problems by themselves. Co-production allows other people to do the job. Creating a service desk collaboration involves having customer access to the same tools as service desk workers plus other frequently asked questions capabilities via the blog and automated process solution.

With the advancement of technology, the design and development of a web-based intelligent service desk is expected from IT departments to meet customer needs and satisfaction. Web-based help desk system or web technology provides an interactive platform that organizations can access anytime. Customers can access the online knowledge database via web-based such as internet explorer or other browsers. If the problem cannot be resolved using online help desk function the customer can fill his/her request and send to the service desk analyst for further support. Web services help to save costs by eliminating the expense of telephone charges. web-based help desk environment consists of 4 major functions [18]; -

1. *Web-based recovery tool* - As the customer service (or knowledge) database contains customer service records that serve as the records of problems and solutions, a web-based recovery tool is required to access remote clients and service engineers. And these service records can be accessed from the database using different methods. You can do some recovery techniques. It helped to guarantee versatility for example, customers may remember all filter points clearly selecting or referencing the status of the errors displayed.  
Such verification checks can be retrieved afterwards. They are used to solve the problem. It can be used to provide a hypertext-based system alongside the program. Users with additional support information if asked to explain the process.
2. *machine translation*: - This web-based help desk environment is used to provide service for non-English users. Most of the services are recorded in English so it's difficult to use the system by non-English speaking users. To support these kinds of customers an online translation of service records from English to other language is necessary such service is known as machine translation. Such service eliminates the needs to create additional service database of individual content.
3. *video conferencing support*: - Problems that cannot be resolved by using knowledge database or intelligent faulty diagnosis, the user need help from service center directly by using video conferencing tool to communicate engineers.



4. *Intelligent fault diagnosis*: - In traditional help desk system identification of machine fault depends on support engineers. This method has a problem with maintaining a pool of expert service engineers. Instead of depending on engineer developing an intelligent fault diagnosis tool that captures the experts' knowledge to assist machine fault problems. Technology is available to make it accessible and searchable to customers. A knowledge base or competent published information archive that contains solutions and recurring questions. That helps them resolve their issues without the assistance of a live customer service agent. Web-based self-service features automated diagnostic software that establishes each user's system's settings and configurations. Capabilities such as these provide users with valuable information and additional tools that can help them troubleshoot their problems.

This form of self-assisted desk call resolution provides a considerably improved experience and frees resources while reducing costs of incident handling [7].

## **2.7. Overview of Knowledge**

Knowledge is a magic word it is not easy to define but, related to creativity, development, and achievement. "knowledge is the most independent source of power" [7].

Knowledge is power and knowledge sharing is power gaining. If the knowledge is not shared, it lost its power. Nonaka [7] categorized knowledge into two tacit and explicit. Each of this knowledge also, classified as internal and external.

Tacit knowledge refers to something that you know, that is not documented and hard to explain. Internal tacit knowledge is called know-how; for example: - "things like looking left and right before crossing the street, checking the water temperature before going to it "[13].

Explicit knowledge is found explicitly in a document, manual and stored in an electrical database. Internal explicit knowledge in a document but knew it without reading (Someone told you). External explicit knowledge is a documented knowledge acquired through reading [10].

The Nonaka model has 4 process models which are socialization, externalization, combination, and internalization [7]. He defines the two types of knowledge which are tacit and explicit knowledge. Tacit knowledge a knowledge that is found in the human mind and, its intangible asset of the person and the organization. It adds value to the organization. “We know more than we can tell” as a result it needs a suitable environment where such knowledge can be shared. Nonaka’s knowledge spiral model shows how knowledge created in an organization.

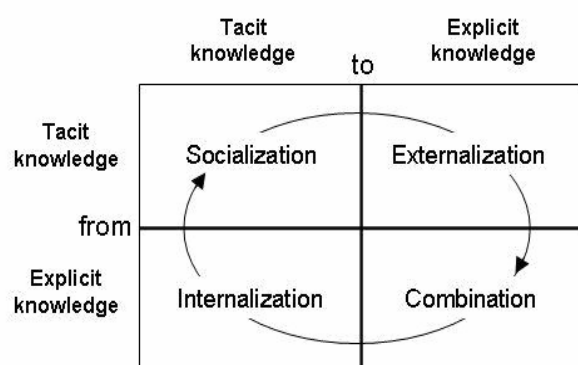


Figure 2. 8 Nonaka’s knowledge spiral [7]

Socialization is a method of transferring tacit knowledge to tacit knowledge. Externalization is a method of converting tacit knowledge to explicit knowledge. Combination is a method of combining explicit knowledge with explicit knowledge and internalization is a method of transferring explicit knowledge to tacit knowledge. Tacit knowledge is found in the human mind as moral, judgment, value, and principle.

## 2.8. Related works

### Service Desk Program based on ITIL V3 with Incident Identification, arrangement, and Technician Assignment [2]

The study conducted by Melkite [2] was aimed at creating a program that automatically assigns trouble tickets to technicians that meet ITIL requirements. The researcher categorizes a customer addressed problem into three. The first: there was no centralized way to manage requests (both SR and IR), the complaints were not registered in the system, and the application-related problems were handled separately.

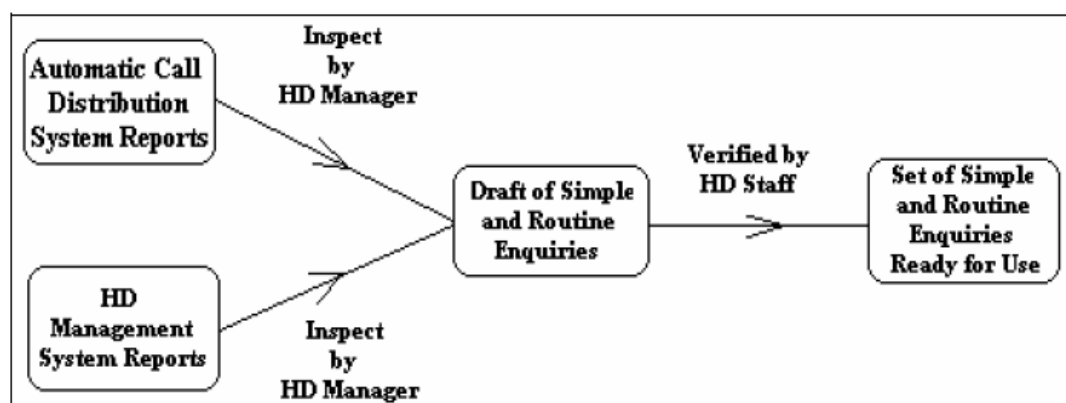
Secondly, the system did not follow any international standard. The third problem related to the assignment of technicians to incidents. Most of the incidents go unassigned and incidents also assigned to the wrong team.

The general objective of the research was to develop an ITIL based service desk with automatic assignment of technicians. As a method, the research used requirement collection, literature review, and using text classification model to design a web-based application. When a user reports an incident, the system extracts a description and generates a pattern to identify a suitable resolver group.

#### **Development of web-based user self-help knowledge management system [4]**

Leung aimed to investigate the feasibility of developing a web-based user help knowledge management system by applying software agents to improve the support process of routine and simple technical inquiries in the help desk.

There was a survey in the form of questionnaires to identify simple and routine tasks, the paper proves most of the incoming inquiries of the IT service desk are simple, and routine so, they don't want any specialized knowledge. The researcher proposes a framework to improve the support process, decrease the overload of HD, to identify simple and routine inquiries. and used two techniques the HD management system and automatic call distribution.



*Figure 2. 9 Mechanism to identify simple and routine inquiries [4]*

### **Information technology help desk survey: to identify the simple and routine inquiries [3]**

N. K. Y. Leung and S. K. Lau[3] aimed to present the result of a survey that identifies the classification of simple and routine technical inquiries in the help desk environment.

Around 18 questions were developed and distributed via mail. And the result shows most of the respondents believe that if enough information provided to users: they can solve the problem by themselves such as password, account login problem, etc...

### **Relieving the overloaded help desk [17]**

N. Leung and S. Lau [17] conducted at investigating the Help desk past and its current challenges. Implementing the Knowledge Management (KM) approaches and the Knowledge Management System (KMS) lets help desk (HD) handle its knowledge effectively. In addition, the combination will relieve the overloaded HD by moving some of the responsibility for troubleshooting on to the users.

### **Service quality in a service desk environment [27]**

This research done by S. Conger, aimed to show three key problem areas: the development of the service desk, co-production, and new methods of knowledge management. To boost the consistency of service delivery parameters, the average speaking time must be reached, beginning with a good voice tone, and politeness, to support the employee.

The below table 2.1 summarizes the related works., It includes methodology and critique of the related papers.

| Author                                     | Aim                                                                                                                              | Approach     | Finding with gap                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Melkite Paulo's(2016)</b>               | Design and develop an ITIL based service desk with automatic assigning of technicians to improve the current ITSM of the company | Mixed        | <ul style="list-style-type: none"> <li>❖ Design a system that automatically assign trouble ticket to technician</li> <li>❖ Totally the IT Service desk incident management Process not considered.</li> <li>❖ Not considered about simple and routine inquiries</li> </ul>                                                                      |
| <b>N. K. Y. Leung, (2007)</b>              | Investigate the feasibility of developing a web-based user help knowledge management system                                      | Mixed        | <ul style="list-style-type: none"> <li>❖ The IT incident management process not considered</li> <li>❖ The tier summary of all his papers in the service desk has the incorrect misinterpretation. Both arrows are one-directional in the pictures, but it does not work.</li> <li>❖ It does not work for all service desk structure.</li> </ul> |
| <b>N. K. Y. Leung and S. K. Lau (2006)</b> | Aimed to present the result of a survey that identifies the classification of simple and routine technical inquiries             | Quantitative | <ul style="list-style-type: none"> <li>❖ Classify the routine inquiries and deliver as an input for developing web-based user knowledge management by N. K. Y. Leung, (2007)</li> </ul>                                                                                                                                                         |

|                              |                                                                                              |             |                                                        |
|------------------------------|----------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------|
| <b>Nelson and Sim (2006)</b> | Aimed at demonstrating the applicability of knowledge management on service desk environment | Qualitative | ❖ Just focused on the field of information management. |
| <b>S.Conger (2013)</b>       | Aimed at perfecting the service desk by achieving the standard of service delivery           | Qualitative | ❖ Focused on quality assurance                         |

*Table 2. 1 Summary of related works*

## 2.9. Chapter Summary

The service desk has been described briefly in all the articles. It is the backbone of the organization by aligning IT with the business and assure the business continuity by giving IT-related assistance from individual customers level to large sections.

The organization has a different support structure to deliver IT services. Journals described this structure as tiers like one-tier, two-tiers, and three-tiers. Currently, organizations used the two-tiers service delivery structure but, all inquiries are first handled by the IT service desk front line support.

Almost all of the reviewed works show, most of the inquires in IT service desks are simple and routine so if the users get enough information they solve the problem by themselves and service desk analysts get time to give high-level support and increases company productivity.

The collected simple inquiries are available in the user self-help support system with their appropriate solution and the users themselves solve their problem without the involvement of the IT service desk analyst. The proposed system can give relief for the analysts from many simple inquiries.

From the different papers, it's clear that OLA signed between sections and SLA is signed between the organization and outside customers.

Previously done researches enhance the service delivery capability of the IT service desk through different mechanisms. The first one is through creating a suitable system for users that automatically assign trouble tickets to a technician this decreases the time wasted for a single TT. The second one is through developing knowledge base systems and checking the feasibility of using them. Although the researcher continues to work to assist the analyst by different strategies, some of them are through the development of the layout of the service desk and support model, there is no change in the service desk and the hard work seems to be inadequate so it requires more work.

## Chapter Three

### Research Design and Methodology

This section presents the research design and methodology employed to conduct this study, such as research design, data gathering tools, sampling procedure, data analysis, design, and development. This research aims to identify simple and routine inquiries and develop user self-help support portal. The study is, therefore, to design an artifact. Questionnaires are used to collect data.

#### 3.1 Research design

The research nature requires a problem-solving approach, so the researcher uses design science as a methodology. This approach has two paradigms, designing and evaluating [15], the design step to create an artifact, and evaluation is a process of assessing the artifact produced using various evaluation metrics. The image below Figure 3.1 shows the overall steps for the research to be done.

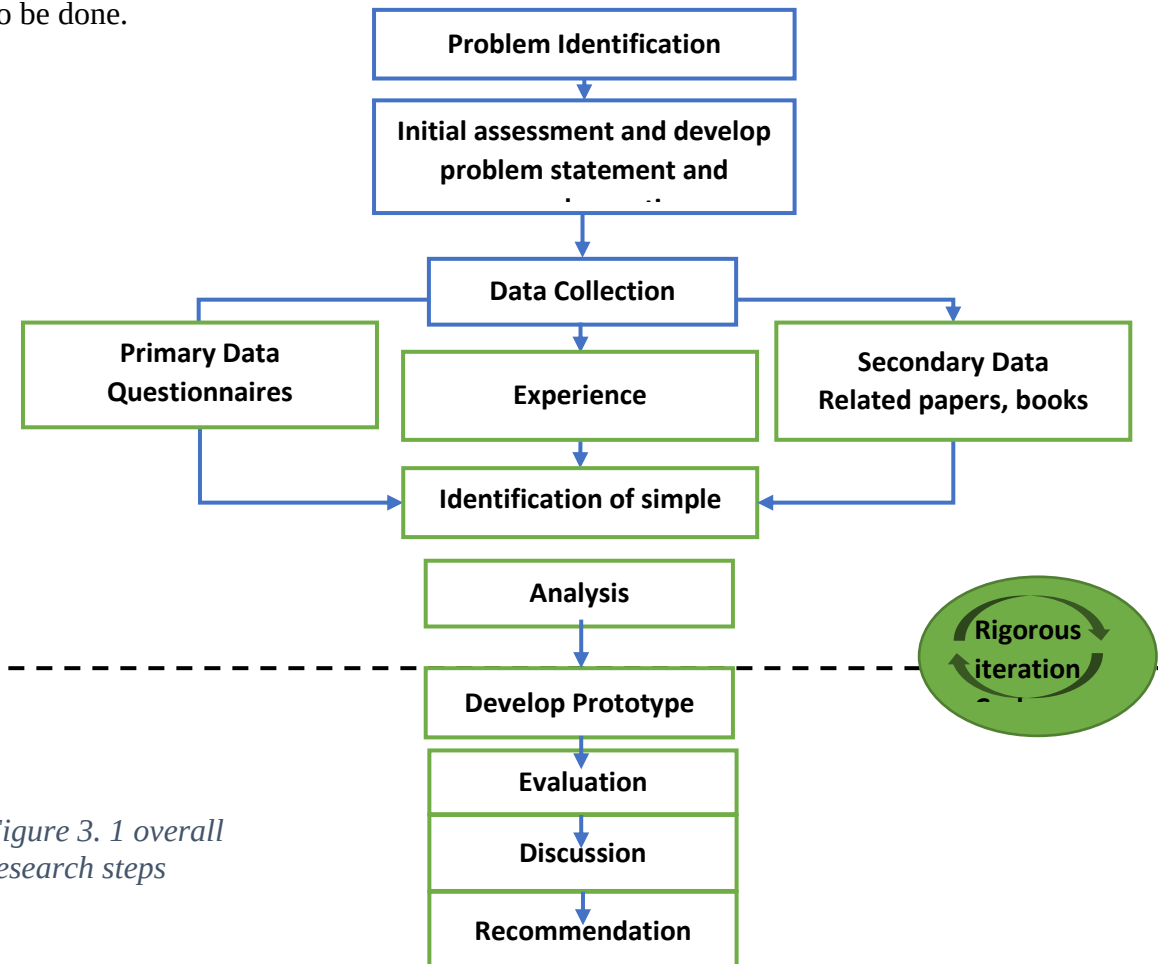


Figure 3. 1 overall research steps



Figure 3.2 presents design science research process recommended by Piffers et al. [14].

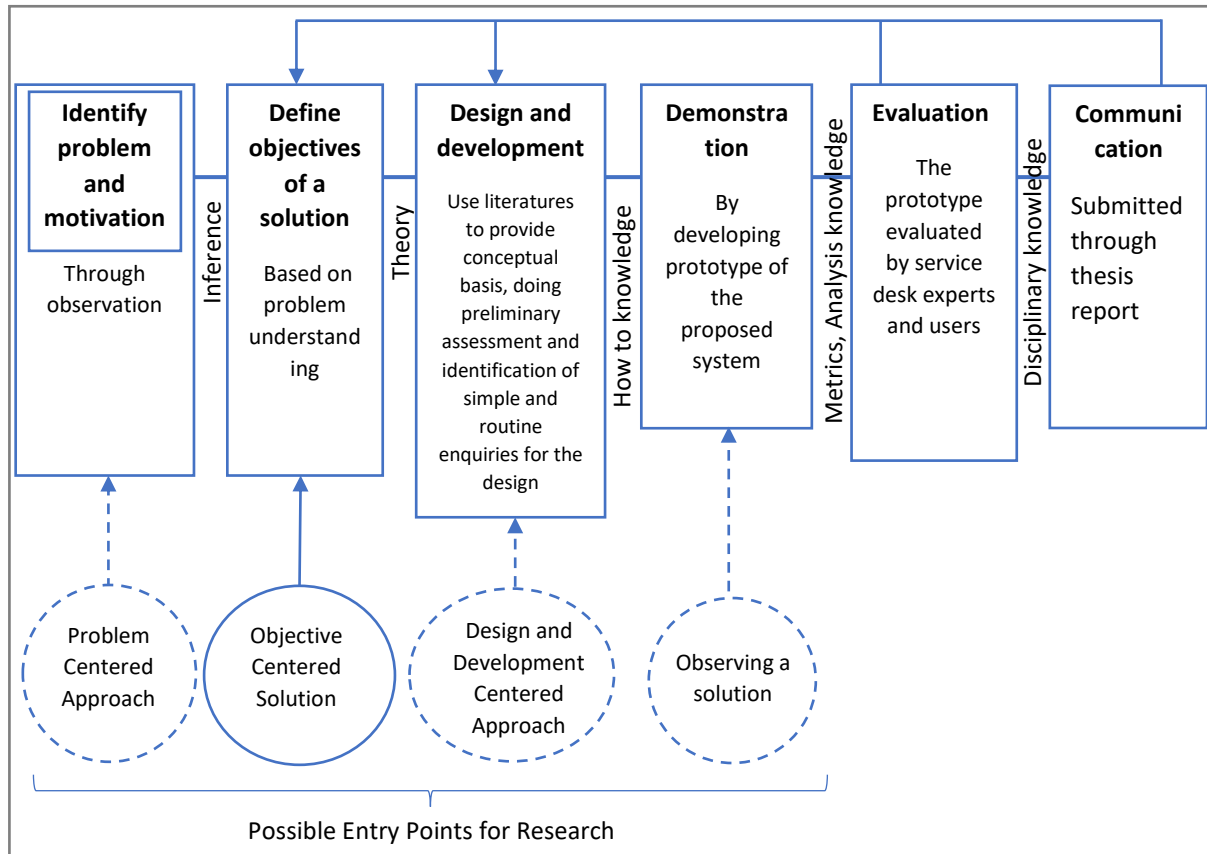


Figure 3. 2 Design science research cycle [14]

### 3.2 Identify problem and motivation

This step requires the Internal and Conceptual Process. Design science research contributes to facilitating research to address the kind of problem faced by IS experts. In this phase, the problem is identified through different mechanisms [14]. The problem was identified through observation and informal discussion with analyst on the section. Literature was also consulted to substantiate the problem. All incoming inquiries are first handled by service desk first level support before escalated to a high-level. Analysts are overwhelmed by answering phone calls that come by hotline number 878.

All Ethio telecom staff around 19,104 permanent employees granted access to this hotline number and send their problem through the service desk portal; but most of the inquiries are simple and routine do not need specialized knowledge. When enough information is given, they solve the problem by themselves.

### **3.3 Define objective of a solution**

Objective of a solution artifact is improving service delivery ability of IT service desk based on problem understanding. This is done through literature review, observation, and questionnaires to define the requirements for designing the prototype.

### **3.4 Design and development**

Piffers et.al [14] define the design and development phase in such a way that, it is a phase to develop an artifact by splitting the problem into parts to answer the complexity of the problem.

The design and development of the system are based on the data collected through questionnaires and observations from the organization. The data analysis result gives, what are the simple and routine inquiries in a service desk environment so, the requirement is formulated, and the prototype designed.

According to Philipp, Olga, Marten, & Udo [12] help desk is composed of help desk support staff and technical equipment, but the actual axis of the overall support process is knowledge. When a user requires technical support, s/he usually lacks enough IT related knowledge to carry on her/his duty. This is the responsibility of the HD workers to help address the issue using information that exists in some sort of archive, such as the human brain, database, or technical manual. Considering the enormous amount of knowledge needed, the implementation and standardization of a systematic process for managing technical knowledge within the HD setting is necessary. For this to happen, we must have a detailed understanding of how knowledge is handled alongside HD evolution.

By using Nonaka's externalization, combination, and internalization model to create a new model that is relevant to the research requirement [7]. Service desk analysts solve the problem

using implicit and explicit knowledge that means mixing the information they have in mind with the knowledge that is explicitly found in a text, so that this knowledge is stored in the user self-help portal. If the user needs assistance for this easy and regular query, the program switch to the self-help portal and the user solve the problem himself, so this pattern is mastered and the user also be able to perform basic IT-related problems in order to build organizational knowledge. The description is shown in Figure 3.3.

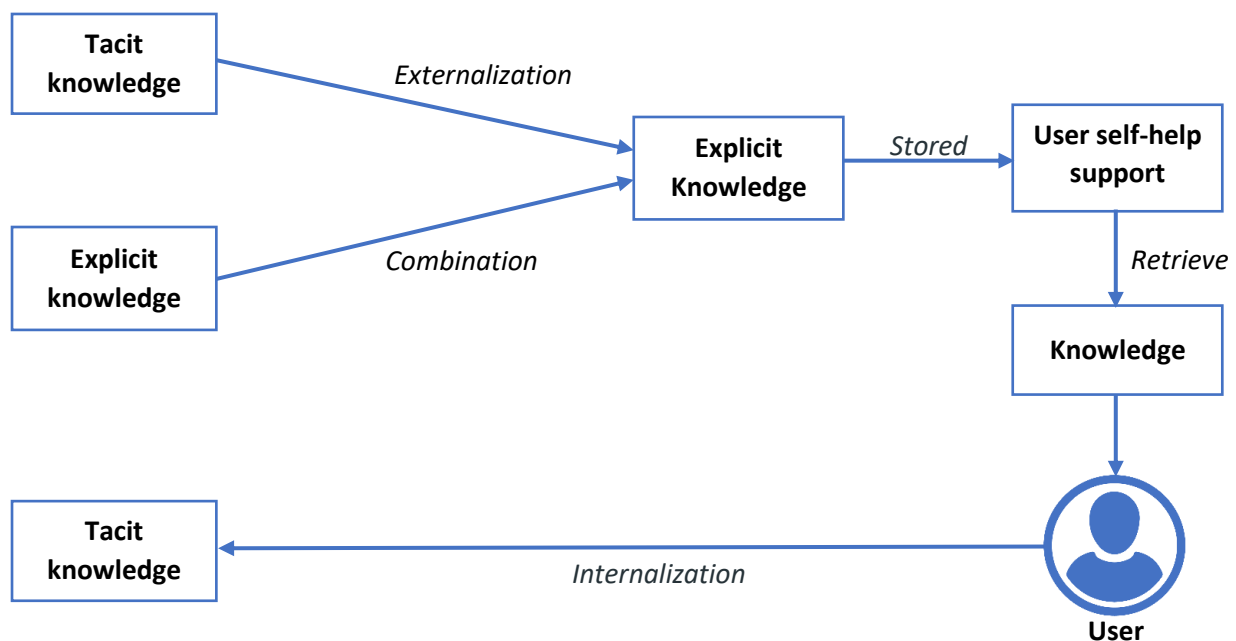


Figure 3. 3 Organizational knowledge

### 3.4.1 Data collection methods and procedure

#### Primary data (Questionnaires)

Questionnaires are used to collect information about simple and routine inquiries that come on the service desk. The questions are adopted from the "information technology help desk to identify the classification of simple and routine inquiries "[4] and had been modified to meet the research requirements. There are more than 29 questions on the questionnaires.

## Secondary data

To build a conceptual background of the research books, journal articles and other materials found on the internet related to IT service desk, service delivery, support model, a support structure, simple, and routine inquiries are reviewed.

Related works reviewed to get a deeper understanding of IT service desk first level support structure, support level, simple inquiries, incident management, and fundamental concepts related to this work. A review of web-based user help support system done and discussion with IT service desk analysts made to recognize the simple and routine inquiry pattern.

### 3.4.2 Data source and sampling

The study area is the Ethio telecom IT service desk, the targeted population are all IT service desk analysts around 20 and from 19,104 permanent employees(users) the researcher selected 100 of them who need IT service desk assistance to evaluate the proposed system rigorously.

Purposive Sampling(non-probability) is found to be suitable, as it is important to identify technical experts. The sample size of the population selected based on the total population size [23]. The evaluators chosen are from the Corporate subsection of the IS department. The formula below for calculating sample sizes.

$$n = \frac{N}{1+(N \times e^2)} \quad \text{Where.}$$

n = sample size

N= Number of populations

e= Tolerance at desired level of confidence, take 0.05 at 95% confidence level

How the formula is used is shown below

$$\frac{133}{1+(133 \times 0.05^2)} = 100$$

Based on the above sampling technique 100 evaluators participate.

Data was gathered twice, one for design, and the other for assessment. Although the prototype was planned to be evaluated by 100 users, only 50 users evaluated it.

### **3.4.3 Analysis and identification of design element**

The questionnaires are collected using the google form. Descriptive statics used by frequency distribution to define the basic functionality of the data. It includes simple sample summaries, and measures for graphical analysis.

### **3.4.4 Design and development tools and process**

The prototype design and development were based on previous literature, data collected from the company using a questionnaire, and observation.

There were two iterations during the evaluation of the prototype. The first assessment was carried out by 11 service desk analysts. The second evaluation was performed by corporate team members. Before the second iteration was carried out, the researcher adjusted the first iteration comments.

## **3.5 Demonstration**

To solve a problem and an early assessment task, it is a process of proving the effectiveness of the system. Prototype demonstration is performed based on the development of a prototype. This allows users by using materials to solve simple, routine inquiries. The test case was performed by choosing two simple and routine inquiries, a configuration issue with outlook and CRM password. When the user attempts to log the problem ticket, the system redirects it to the other page and the user solves the problem by himself/herself.

The presentation consists of the research process's high-level journey through addressing identified gaps, being presented with proposed solutions, and forwarded specifications. Archive lost is one of the easy and regular technical inquiries from the results of the study so the researcher shows how the problem is solved by the customer himself by integrating the information derived from the mind (tacit knowledge) analysts and the knowledge contained in the manuals here is the details. First the user open the outlook application and click on the file

menu→account setting→once more account setting→data files→add→users→double click on name→in search bar write “.pst” and you get your archive file.

The second show case is when the user gets BICP problem. First open the Firefox window and click on the option tab and click on the Advanced Certificates. Click servers’ button and add exception. Attach this IP (10.204.162.21) and press certificate obtain. Select confirm protection exception to address requests relevant to BICP.

### **3.6 Evaluation**

“Evaluation is the vital part of the study process”. The business environment sets out the criteria on which the artifact evaluation is based. This environment requires the technological infrastructure that itself installed incrementally by introducing new IT artifacts"[14]. The prototype is rigorously evaluated by the user who needs help from the IT service desk.

### **3.7 Communication**

It's the final stage of the design science process, this study is submitted through a thesis report, and presentation to the IT service desk section. The study result discussed with analysts and service desk supervisors for further action.

### **3.8 Chapter summary**

This chapter explained the methodological approaches used in this study and briefly discussed a suitable approach for shaping and achieving the anticipated aim of the research which include problem identification, data collection, analysis, identification of requirements, and design.

## **Chapter Four**

### **Analysis, Findings, and Discussion**

#### **4.1 Overview**

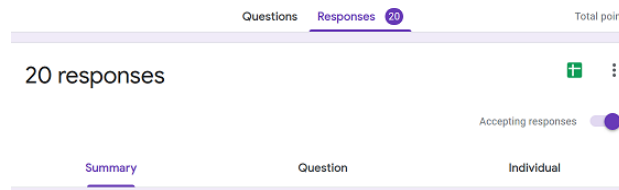
This chapter contained details of the presentation of data analysis, interpretation, and discussion of findings. Descriptive analysis was used, which includes frequencies and percentages. The analyzed data was presented in frequency, percentage tables, and charts to understand the findings of the research. The data collection has been held via questionnaire from March 9 to April 1, 2020. All IT service desk partners participated in filling out the questionnaire using the Google Form tool. Each query item has a mandatory field for the next question section.

#### **4.2 Pre-test**

The relevance of the inquiry has been undertaken to ensure its relevance to the target population. The questionnaire was distributed to two employees from the IT service desk for the final 10% of the population for the final research. By using experimental test feedback, the questionnaire was modified to improve the transparency of questions. For example, there is a question in Part Two: How many users support your service desk during the day? It's ambiguous, so the researcher made a few improvements.

Since the related question in software is not clear to viewers, the researcher has corrected some words. The question related to the General Problem Ticket Registration is ambiguous, so the tickets to the General Problem Ticket have been changed.

### 4.3 Response rate



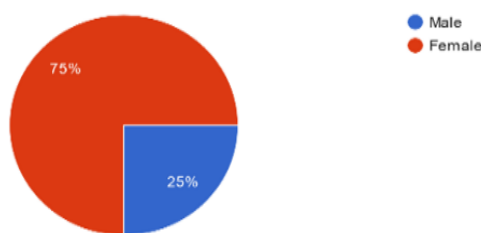
*Figure 4. 1 Response rate*

For all IT service desk analysts using Google Form, a questionnaire containing 29 questions was distributed to 20 employees. There was a complete response with 100% return rate.

### 4.4 Demographic characteristics of respondents

This section contains results on social and demographic characteristics of respondents. This includes gender, age, education, and work experience.

About 75% of the IT service desk staff are female and 25% are male (Figure 4.2). This finding indicates that the majority of workers are women and, naturally, women are capable of performing many tasks at once, and the section is more favorable for women than men.



*Figure 4. 2 gender of the respondents*



From respondents answer the analysis indicates 80% of the analysts are between 20 and 30 years of age. 15% are between 31 and 40 years old, and only 5% are between 40-50 years. Therefore, the analysis shows that the IT service desk section has many young professionals.

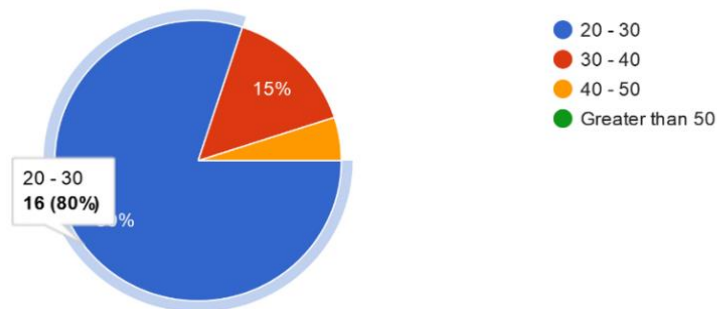


Figure 4. 3 Age of the respondents

Depending on the background of the participants, the results of the study indicate that 20% of the respondents in the study had a master's degree. 80% have undergraduate degrees. The findings show that the IT Service Desk has a highly educated population and a large group of highly capable employees.

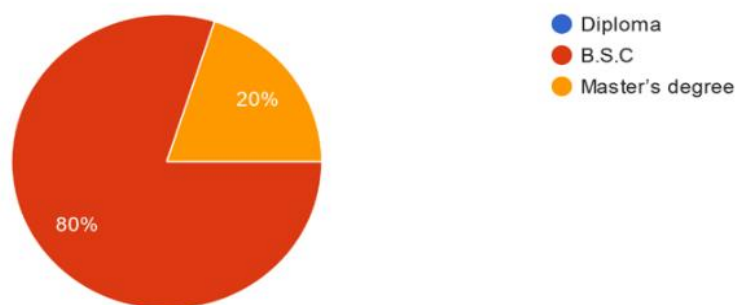
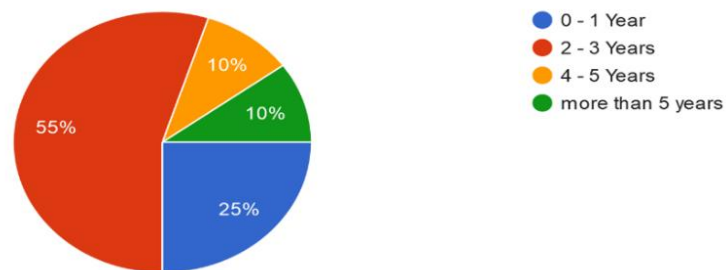


Figure 4. 4 educational background of the respondents

In terms of participants' work experience, 55% worked in the IT service desk for 2-5 years and 25% worked under 1 year. 10% worked in 4-5 years and 10% worked for 5 years. The results show all the top professionals involved in the study.



*Figure 4. 5 experience of the respondents*

Generally, this demographic information indicates that all domain experts participate in the survey and understand the questions easily.

#### **4.5 IT Service desk model, structure basics**

The study indicated that IT service desk was open during office hours (8:30 to 5:30 PM), and the results indicated that there were no options to serve internal customers outside of office hours.



*Figure 4. 6 office hour of IT service desk*

According to the survey, 90 percent of respondents said that the IT Service Desk is the only place available for any IT related support and that no other department supports such requests.

10% also choose a decentralized model. The results show that IT service desk is the only and only part of IT support for IT problems.

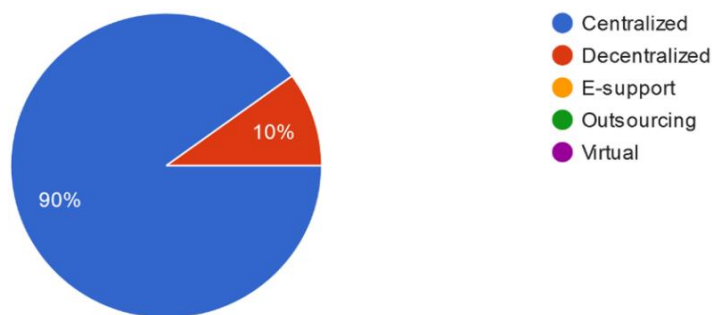


Figure 4. 7 service desk model

Corresponding to the survey, 60% of respondents said that the IT Service Desk has one support structure, and 40% of respondents say that the IT Service Desk has a two-tier support structure.

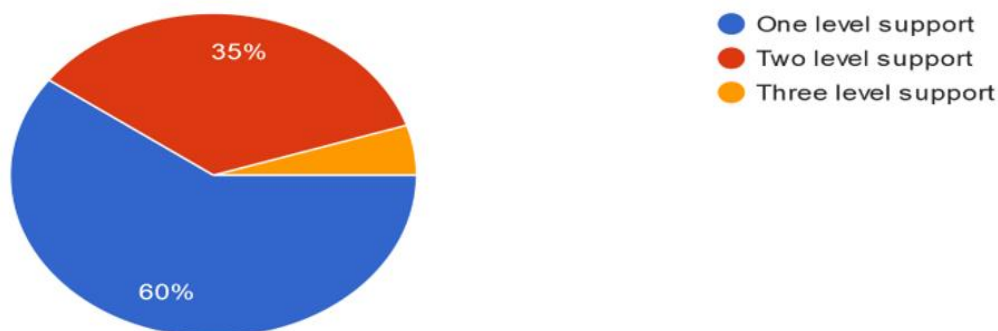
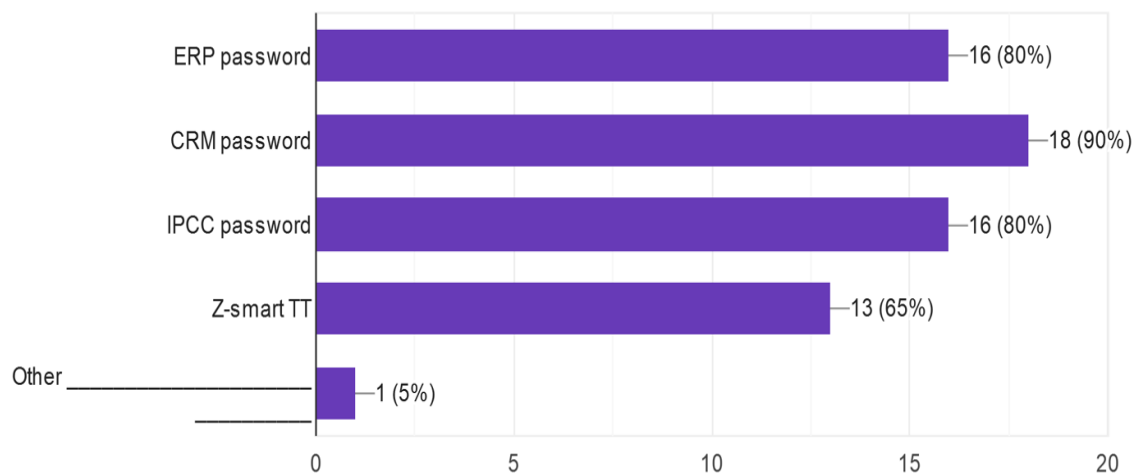


Figure 4. 8 Support level

#### 4.6 Identification of simple and routine inquiries

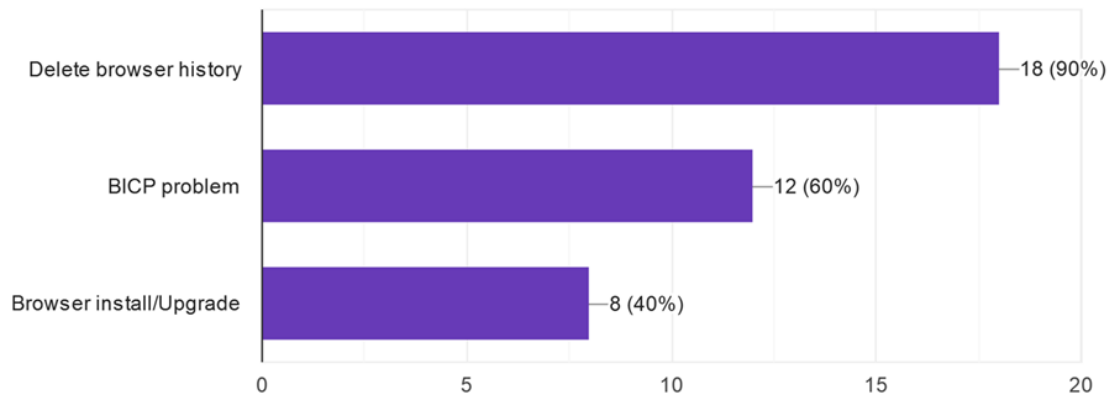
According to the 20 respondents report, 16 of respondents said users can solve ERP passwords, 18 of respondents said users can solve CRM passwords, 16 of respondents said users can solve

IPCC passwords and 13 of respondents said users can solve z-smart TT passwords if the user has sufficient guideline. If we develop the most secure system, the result show that all password-related problems resolved by the user.



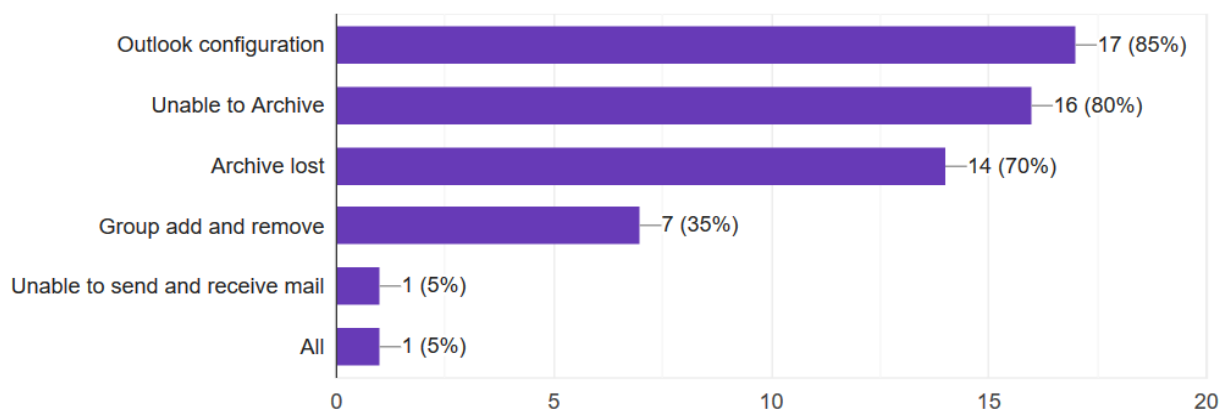
*Figure 4. 9 Password related inquiries*

According to the survey, 18 respondents said that if the user has sufficient information about the browser history problem, it can be resolved by the user themselves. Additionally, 12 respondents said if the user has enough guideline to solve the BICP problem, the user fix it. Issues related to browsers are resolved by the user if we have provided certain resources.



*Figure 4. 10 Browser related inquiries*

Results of the survey indicate that if the user has enough information, they can solve the problems below. 17 respondents claimed that outlook configuration problems could be solved by the user, 16 respondents indicated that the user could solve the archive problem; 7 Respondents also indicated that the user could solve group add / remove inquiries.



*Figure 4. 11 Outlook related inquiries*

The analysis indicates that users related to the software have only the right to a software upgrade. All other requests related to software installation require an admin account.

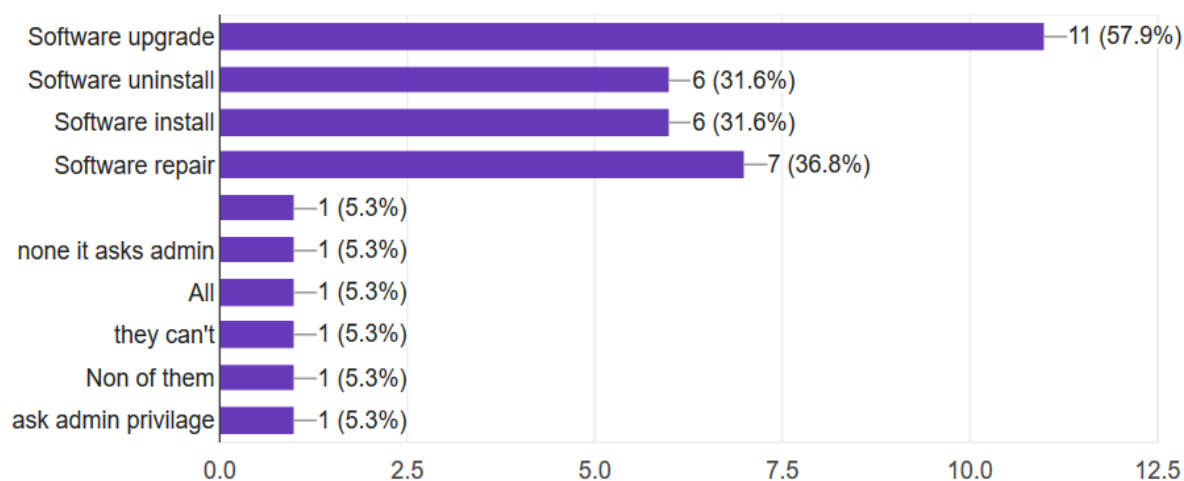


Figure 4. 12 Software related inquiries

The survey results show that not all hardware-related questions are solved by users themselves.

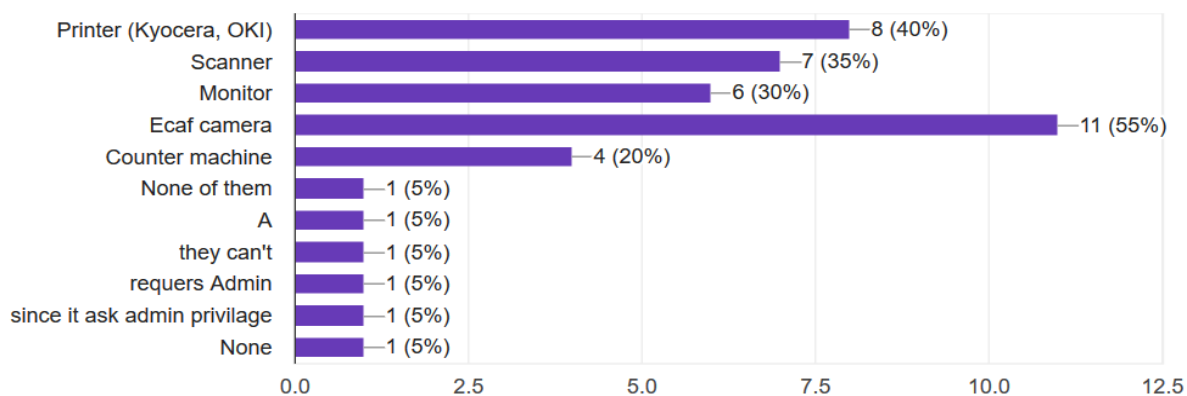


Figure 4. 13 Hardware inquiries

The study shows that if the user has enough information from other similar issues, the user can solve the problem himself, 12 Respondents said website delays could be solved by the user, 10 respondents said the user could solve the website access question, 12 respondents said the user could solve the problem associated with the missing file and 6 respondents said that the user could solve the corrupted file problem.

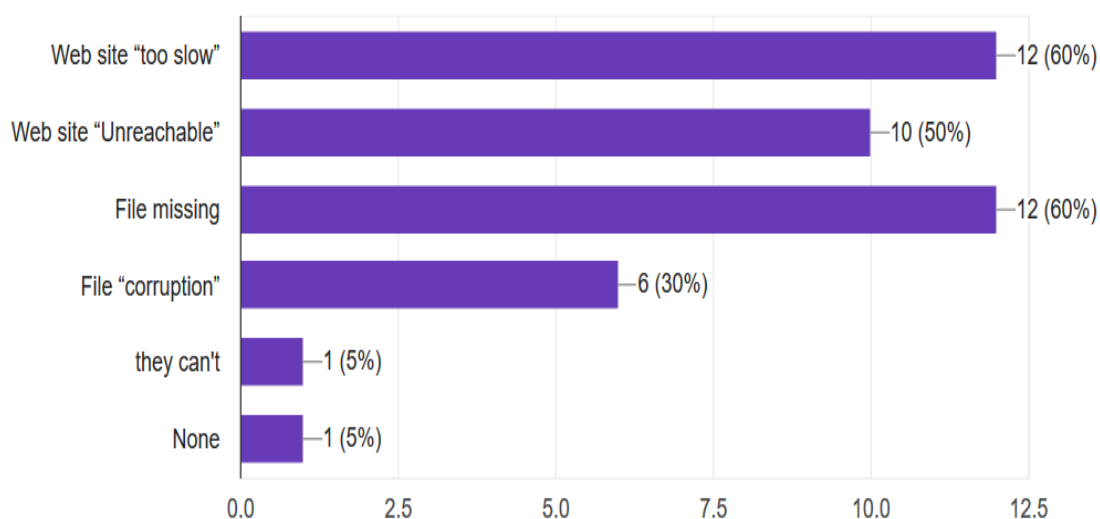
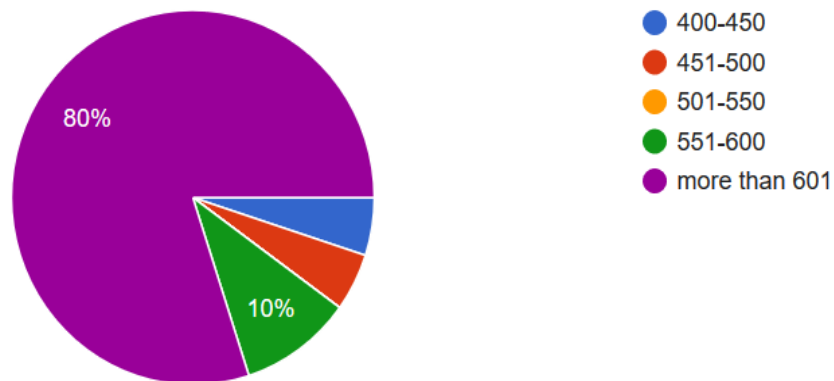


Figure 4. 14 Other types of inquiries

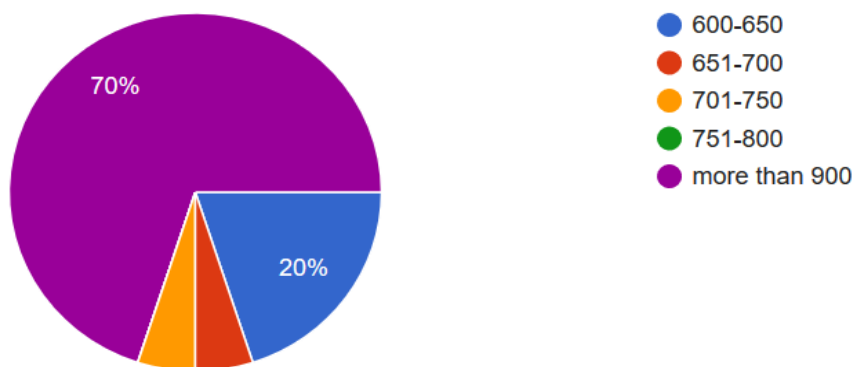
#### 4.7 Due to routine tasks total number calls and recorded TTs

According to the survey, 80% of respondents received more than 601 calls, and the rest received less than 600 calls in the last three months. The results indicate that customers receive service through mobile number 878 and service desk employees face unnecessary pressure.



*Figure 4. 15 call handled by the analyst*

Of the 70% of respondents have closed more than 900 tickets for the past three calendar months and 30% of respondents have closed less than 900 tickets. This shows that the number of trouble tickets registered in the IT service desk is large.



*Figure 4. 16 Number of tickets closed*

Based on the result, most requests are made by creating trouble tickets and 878. Walk-in customers are small, but they come face-to-face with problems such as local admin request, domain re-request, domain re-connection, and computer reliability (when their computer loses trust).



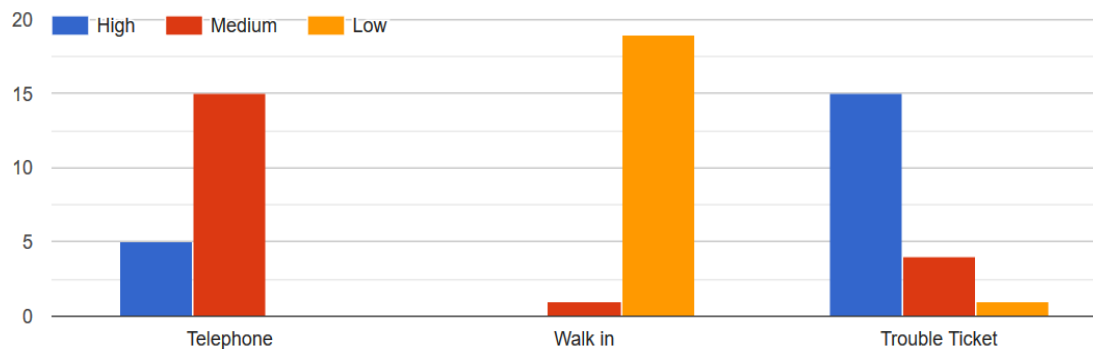


Figure 4. 17 User contact

Most registered problem tickets are resolved in the first place and support from vendors is low on Ethio Telecom every day. The study revealed that password-related and software-related questions were recorded more often than others.

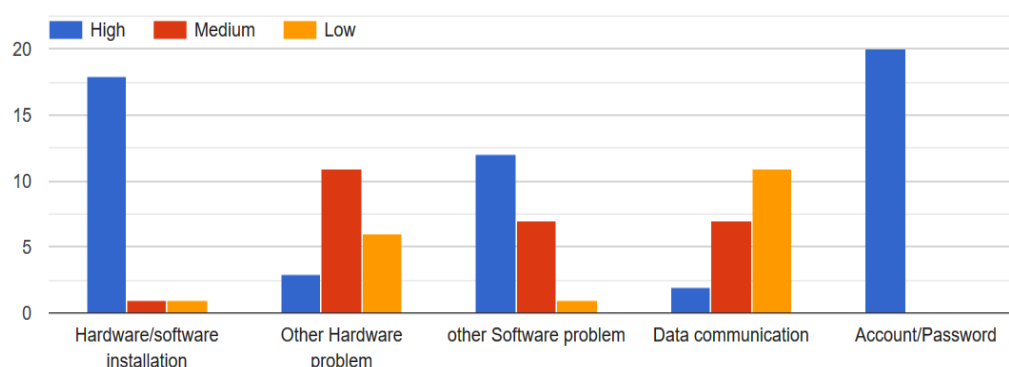


Figure 4. 18 Mix of inquiries

85% of respondents said that the number of inquiries has increased over the past 6 months and the remaining 15% said no change. The main reasons for the overall increase in inquiries are due to password-related inquiries, system fluctuation, system failures and lack of user self-help

portal. They also mention global system incidents and product licensing issues Table 4.1 provides the details below:

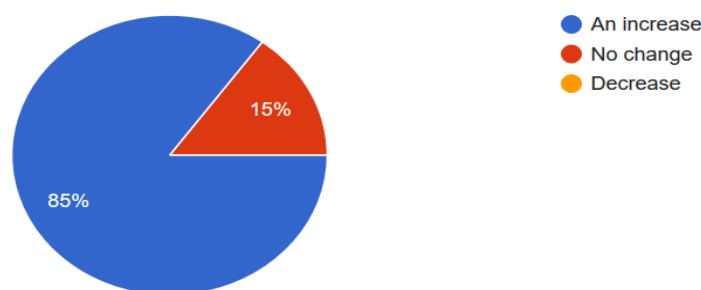


Figure 4. 19 Total amount of incoming inquiries

| Reason                                                                                                                                                                             | respondents agreed |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Deployment of new systems, system failure and lack of self-support portals.                                                                                                        | 16                 |
| There were many system incidents.                                                                                                                                                  | 15                 |
| Frequently the system fails, there is no system to help the client solve simple issues.                                                                                            | 18                 |
| System fail due to different reasons and Microsoft license problem.                                                                                                                | 13                 |
| staff's call and create trouble ticket for every problem they faced, most of the services accessed by company employee is not automated, users didn't get enough information.      | 17                 |
| Password error and system fluctuations                                                                                                                                             | 18                 |
| Password related problems are increasing                                                                                                                                           | 19                 |
| staffs are not interested to solve problems by their on solution, there is no enough guideline, Making a call is an easy option for them instead of solving problems by them self. | 17                 |

Table 4. 1 reason to number of inquiries increased

#### 4.8 Expected features and functionality of the new system

The new system has enabled the user to solve ERP password, CRM password, Z-Smart TT password and other incident related inquiries by his own. The analysis shows that the following advantages achieved: - to reduce the number of problem tickets registered in a day, reduce the number of calls transferred through the hotline number, and achieve the proposed KPI.

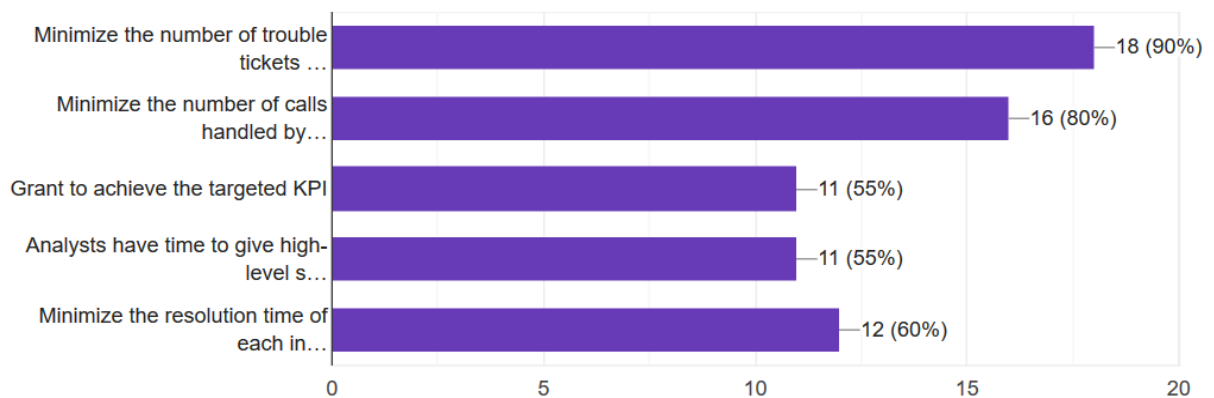


Figure 4. 20 Advantage of the proposed system

Many respondents believe that integrating the current system with the user's self-help portal may improve the quality of IT service delivery.

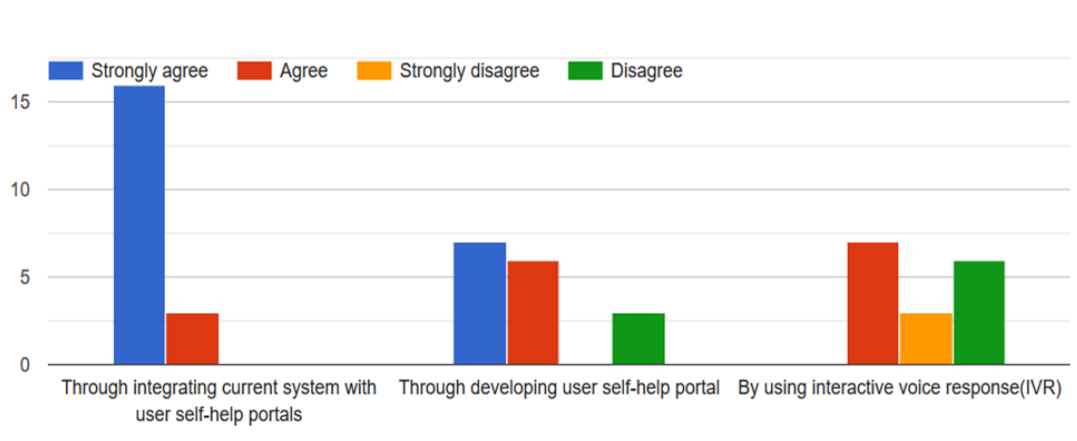


Figure 4. 21 Feature of the proposed system

## 4.9 Incident management

The results show that the responsibility of the incident management team is to investigate, classify, send out communications, and conduct preliminary investigations of the incident.

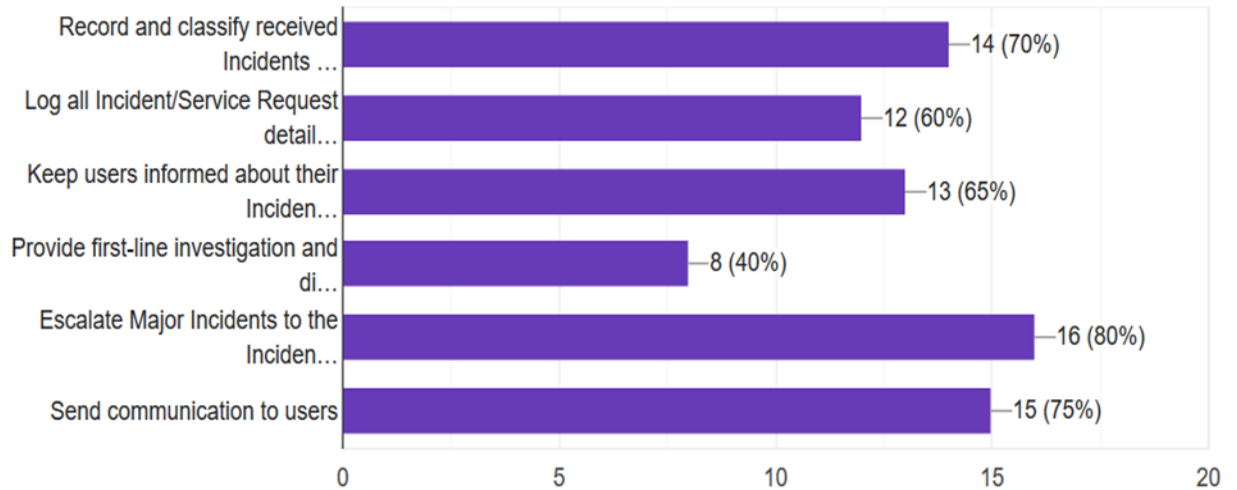


Figure 4. 1 Role of incident management team

Results of the survey show that email is the only channel of communication, but if email service is interrupted It can cause the following problems listed by analysts such as increased number of trouble tickets recorded in the system, analysts handle more calls and difficult to send first message incident .Table 4.2 provides the details below:

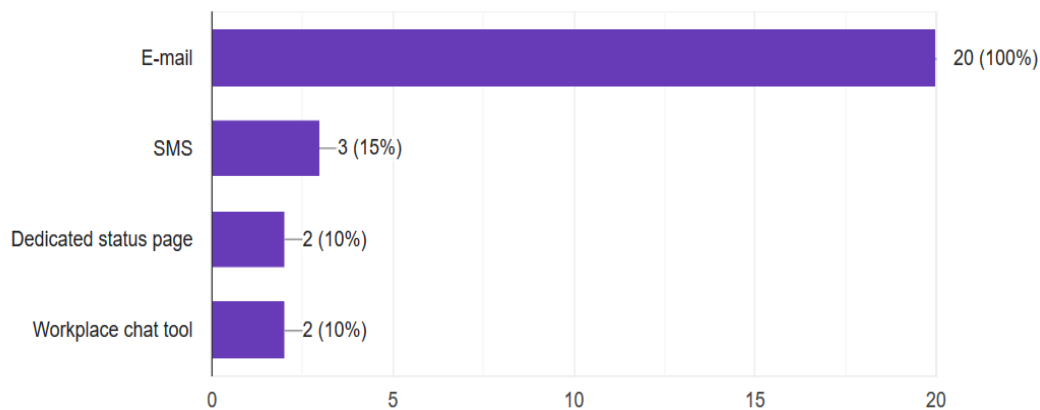


Figure 4. 22 Communication channel

| Problems                                                                                                                                                                                                                   | respondents agreed |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| It's hard to send information to employees.                                                                                                                                                                                | 18                 |
| unable to address customer, miss communication and because our job is customer focused its hard to create peace full work ground with them and there will be over workload on our side, this will create stress and so on. | 17                 |
| The number of tickets registered in the system increases and the number of calls increases.                                                                                                                                | 19                 |
| Handling more calls.                                                                                                                                                                                                       | 19                 |
| The number of tickets registered in the system increases                                                                                                                                                                   | 19                 |

Table 4. 2 Problems faced when the communication channel failed

The analysis result indicates that the analysts of the IT service desk are in high workload due to supporting easy and routine inquiries. simple and regular inquiries grouped into four. First categories related to login (such as CRM password, ERP password and z-smart TT password). From the second category related to outlook (such as incapable of archiving, missing archive and unable to set automatic replay). The third is linked to, browser history, BICP, and browser

upgrade. The last category is related to software installation. This needs an admin account which is a simple inquiry, but this action is constrained by company policy.

#### **4.10 Discussion**

The survey result reveals the ratio of employees to customer 1:1000 and the result shows that workers at the service desk suffer from heavy workloads also show service desk staff handling significant numbers of queries using both TT and hotline number due to easy and routine inquiries. Demand for services keeps on growing. This finding is similar to survey (Leung & Lau's).

Based on the review of the literature in Chapter 2 Most incoming inquiries are simple and routine, solved by first level support. Thus, by integrating systems with self-help platform all passwords related inquiries (CRM, ERP, Zsmart TT, IPCC) solved by the user. By offering online tips for outlook related issues such as (unable to archive, missing archive and automatic replay) solved by the user. While few respondents accepted that the user himself would fix the issue through hardware and software-related issues. The respondents also cited this explanation Not all workers have an administrator account, so the user himself cannot solve the problem associated with any software program. Users are not supposed to have the capacity and experience to repair hardware problems, but users will solve the problem if there is a troubleshooting manual available.

The result shows there is no coordination between the incident management team and the employees at the service desk. As we can see from the study, the incident management team only monitors and sends messages when the mail system functions but, according to the summary in chapter two, incident management is beyond that. The team will monitor the incident status, provide input to system owners, investigate the cause for the accident.

Mail is the only communication channel, but journals describe different communication methods in an organization such as SMS, dedicated status page, chat tool and self-support

notification page. If mail service fails, the number of trouble tickets registered on the portal will increase as well as the number of calls treated by analysts.

Generally Reducing the number of incoming requests and providing related electronic documentation increases the quality of service.

## **Chapter Five**

### **Design and Development**

This chapter discusses the proposed solution, and illustrates the information needed to demonstrate the process. Based on information gathered from 20 service desk employees, users need the functionalities listed below from the new system.

#### **5.1 Features from gathered design elements**

The elements of design are drawn from the analysis. The service desk is centralized method of handling requests all inquiries are registered in the portal. Password related, browser related outlook inquiries, software installation are the top simple and routine enquiries recorded.

For global incidents, the incident management team sends communication via mail, but mail is the only channel and if it fails, the number of recorded trouble tickets and the call handled by the analyst will increase.

#### **5.2 Functional requirements of the proposed system**

The functional criterion defines the interaction between the system and its users. Users include people who interact with the system and external systems. Based on the summary of the above the following are the functional criteria defined: -

##### **1) Incident registration**

- The system should be able to register incidents and service requests (existing requirement)
- The system should automatically redirect to the appropriate page when users request for simple and routine inquiries (new identified requirement chapter 4 section 4.6)
- The system should provide the privilege for the user to see the status of the incident either it is active, pending or resolved. (existing requirement)
- The system should enable to show request category (new identified requirement)



## 2) Incident management

- The system should allow documenting the occurrence of an incident and time to resolve a global incident. (new identified requirement)
- The system should enable the admin to Post notification when a global incident happened (new identified requirement).
- The system should enable the admin to Post on\_duty\_staff list (new identified requirement).
- The system should be able to Post shift schedule (new identified requirement)

## 3) System integration

- The system allows users to reset their (CRM, ERP and Z-smart TT password by themselves (new identified requirement)
- The system enables users to solve browser related problems by their own (new identified requirement)
- The system enables users to solve outlook related problems by themselves (new identified requirement)

## 4) Operational level agreement

- The system should allow OLA to be described and Edited
- The system should display alert when OLA breaches

## **5.3 Nonfunctional requirements of the proposed system**

In a conversation with users, the researcher asked for certain features to be implemented in the new system, the answer lies in the Non-functional requirement listed below: -

- User-friendly: -Interactive user interface.
- Scalable: -easily integrate additional requirements.
- Portability: -User shall access the system from any operating system with a browser.

## **5.4 Systems models**

This section explains how the functionalities collected from service desk analysts have been converted into model.

### 5.4.1 System architecture

The prototype web-based self-help portal is accessible to users and service desk staff in any browser Simply by clicking Http://localhost:8080 / wamp/www/liv/. The system component resides in wamp server's web application. The prototype can be triggered by users and service desk workers via the web browser where the host is the name of the computer on which the tool resides or an Internet protocol (IP) address. Port refers to the port number that wamp operates. The name of the database is GPA and has around four tables. The figure below shows the overview of the prototype architecture.

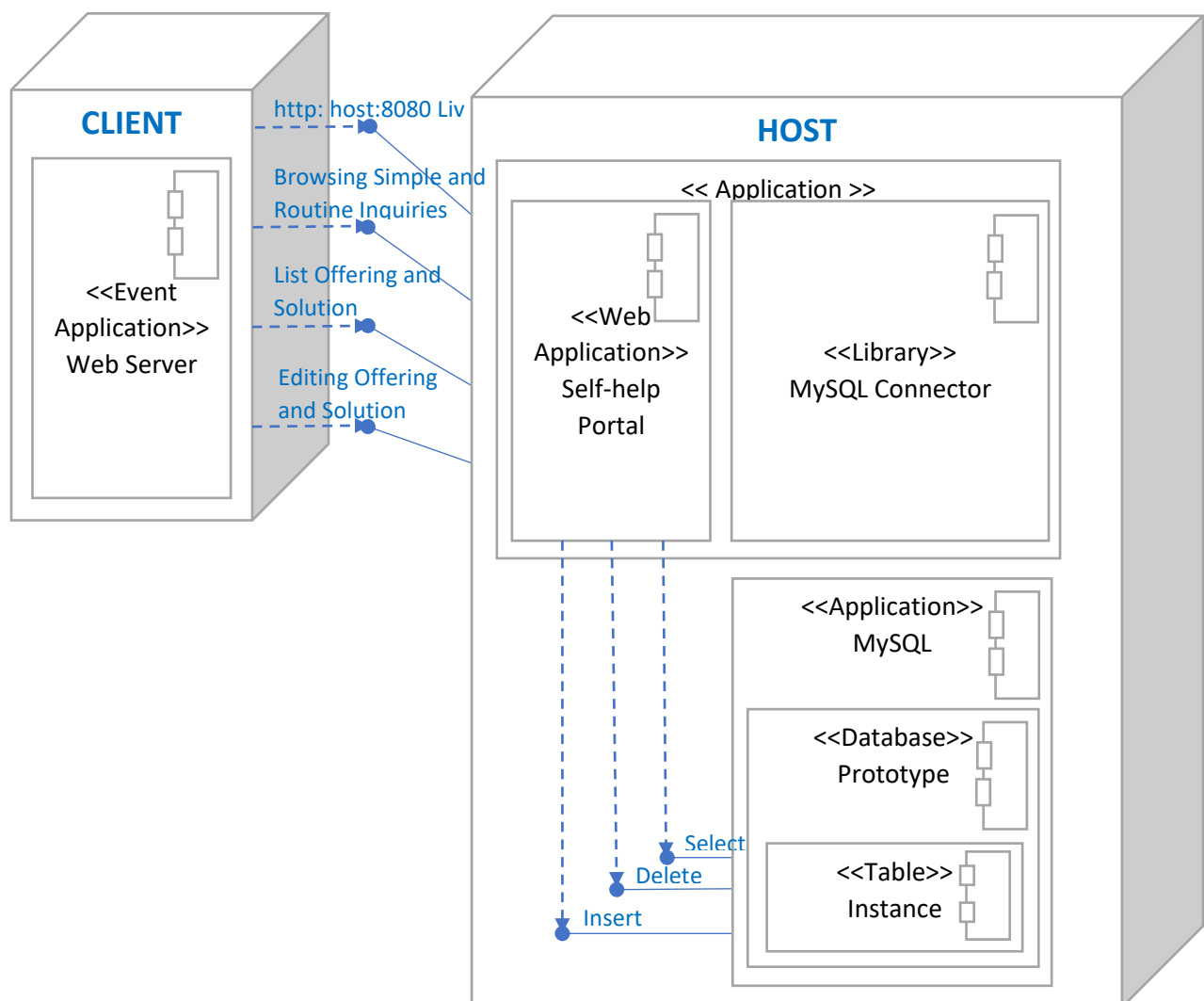


Figure 5. 1 System architecture

### 5.4.2 Use cases

A use case diagram is a graphic representation of the interactions between device components. A use case is a approach used to define, explain and coordinate system requirements in system analysis [20]. Actors identified based on the collected questionnaire, through informal discussion and observation of the current system.

**Actors:**

**Customers:** - The customer is someone who calls for a service or reports a problem by using TT system.

**Analysts:** - Analyst or technician at first level, manage any form of inquiry and provide a solution for any IT related services.

**Incident administrator:** -Incident management team leader and send any required follow-up during the time of the global incident.

**Manager:** - The manager's role is to define OLA and acknowledge user feedback related to delivery of the service.

**Vendor:-** organization that assists ethio telecom in the event of severe problems

These use cases are found to be essential considering the functional requirements. The below figure 5.2 shows roles carried out by different actors.

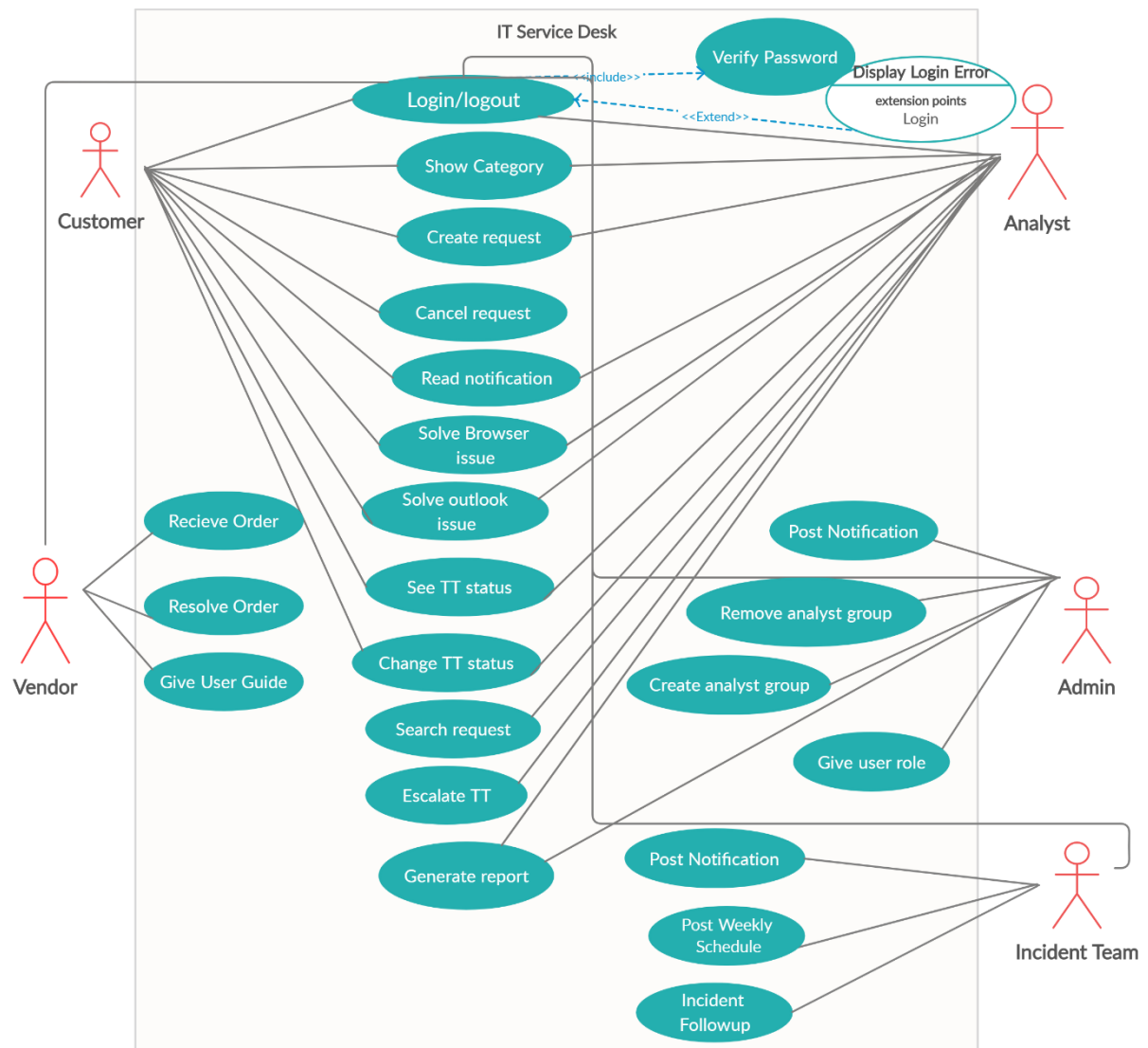


Figure 5. 2 Use case diagram

## Use case description

### Use case -Incident registration

| Name                          | Register incidents/service requests                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Primary Actor</b>          | Customer, Analysts                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>            | An actor should be able to register incidents/service requests                                                                                                                                                                                                                                                                                                                                                            |
| <b>Pre-condition</b>          | An Actor is logged in                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Basic course of action</b> | <ol style="list-style-type: none"> <li>1) The actor clicks on create request link</li> <li>2) The system display list of offering category</li> <li>3) The actor selects one from the list of offerings.</li> <li>4) The system displays a registration form</li> <li>5) The actor fills the form</li> <li>6) The actor clicks on “Submit” Button</li> <li>7) The system saves the information on the database</li> </ol> |
| <b>Post condition</b>         | Incidents/service requests will be registered                                                                                                                                                                                                                                                                                                                                                                             |

Table 5. 1 Use case -Incident registration

### Use case -Incident status

| Name                          | Check incident status                                                                                                                                                                                                                                                                                                                |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Primary Actor</b>          | Customer, Analysts                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b>            | An actor should be able to check incidents/service requests status                                                                                                                                                                                                                                                                   |
| <b>Pre-condition</b>          | An Actor is logged in                                                                                                                                                                                                                                                                                                                |
| <b>Basic course of action</b> | <ol style="list-style-type: none"> <li>1) The Actor click on Trouble ticket menu and then click status from the drop-down box</li> <li>2) The system displays a search form</li> <li>3) The Actor insert phone number and click on “Search “Button</li> <li>4) The system displays the full information of the created TT</li> </ol> |
| <b>Post condition</b>         | Incidents/service requests status will be checked                                                                                                                                                                                                                                                                                    |

Table 5. 2 Use case -Incident status

### Use case-Post notification

| Name                  | Post notification                                                 |
|-----------------------|-------------------------------------------------------------------|
| <b>Primary Actor</b>  | Incident admin                                                    |
| <b>Description</b>    | An actor should be able to Post notification for global incidents |
| <b>Pre-condition</b>  | An Actor is logged in admin account                               |
| <b>Post condition</b> | Notification on the global incident will be Posted                |

Table 5. 3 Use Case-Post notification

### Use case-POST weekly schedule/on duty

| Name                          | Post weekly on duty list                                                                                                                                                                                                                                             |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Primary Actor</b>          | Incident admin                                                                                                                                                                                                                                                       |
| <b>Description</b>            | An actor should be able to Post weekly on duty list                                                                                                                                                                                                                  |
| <b>Pre-condition</b>          | An Actor is logged in admin account                                                                                                                                                                                                                                  |
| <b>Basic course of action</b> | <ol style="list-style-type: none"><li>1) The Actor click on Post weekly on duty list</li><li>2) The system displays a form</li><li>3) The Actor attach the file</li><li>4) The Actor click on “Submit “Button</li><li>5) The system displays the schedule.</li></ol> |
| <b>Post condition</b>         | Weekly on duty list will be Posted                                                                                                                                                                                                                                   |

Table 5. 4 Use Case-Post weekly schedule/on duty

### Use case-Shift schedule

| Name                 | Post weekly shift schedule                             |
|----------------------|--------------------------------------------------------|
| <b>Primary Actor</b> | Incident admin                                         |
| <b>Description</b>   | An actor should be able to Post weekly shift schedule. |
| <b>Pre-condition</b> | An Actor is logged in admin account                    |

|                               |                                                                                                                                                                                                                                                                              |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Basic course of action</b> | <ol style="list-style-type: none"> <li>1) The Actor click on Post weekly shift schedule</li> <li>2) The system displays a form</li> <li>3) The Actor attach the file</li> <li>4) The Actor click on “Submit “Button</li> <li>5) The system displays the schedule.</li> </ol> |
| <b>Post condition</b>         | Weekly shift schedule will be Posted                                                                                                                                                                                                                                         |

*Table 5. 5 Use Case-Shift schedule*

#### **Use case-Password related**

| <b>Name</b>                   | <b>Password related inquiries</b>                                                                                                                                                                                                                                                                                                            |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Primary Actor</b>          | Customer                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>            | The system allows customers to reset their (CRM, ERP and Z-smart TT password by themselves                                                                                                                                                                                                                                                   |
| <b>Pre-condition</b>          | An Actor is logged in                                                                                                                                                                                                                                                                                                                        |
| <b>Basic course of action</b> | <ol style="list-style-type: none"> <li>1) The Actor click on create request menu</li> <li>2) The system displays list of offering</li> <li>3) The Actor select CRM, ERP or Z-smart TT password</li> <li>4) The system redirects to password reset page</li> <li>5) The user writes his mail address and the system send password.</li> </ol> |
| <b>Post condition</b>         | Password reset inquiries will be solved by the customer.                                                                                                                                                                                                                                                                                     |

*Table 5. 6 Use Case-Password related*

#### **Use case-Browser related**

| <b>Name</b>          | <b>Browser related inquiries</b>                                             |
|----------------------|------------------------------------------------------------------------------|
| <b>Primary Actor</b> | Customer                                                                     |
| <b>Description</b>   | The system allows customers to solve browser related inquiries by themselves |

|                               |                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Pre-condition</b>          | An Actor is logged                                                                                                                                                                                                                                                                                                               |
| <b>Basic course of action</b> | <ol style="list-style-type: none"> <li>1) The Actor click on create request menu</li> <li>2) The system displays list of offering</li> <li>3) The Actor select Browser related list of offering</li> <li>4) The system redirects to the browser related tip</li> <li>5) The user himself the browser related problem.</li> </ol> |
| <b>Post condition</b>         | Browser related inquiries will be solved by the customer.                                                                                                                                                                                                                                                                        |

*Table 5. 7 Use Case-Browser related*

#### **Use case-Outlook related**

| <b>Name</b>           | <b>Outlook related inquiries</b>                                                                                                                                                                   |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Primary Actor</b>  | Customer                                                                                                                                                                                           |
| <b>Description</b>    | The system allows customers to solve Outlook related inquiries by themselves                                                                                                                       |
| <b>Pre-condition</b>  | <ol style="list-style-type: none"> <li>1) An Actor is logged</li> <li>2) The actor select outlook related from list of offering</li> <li>3) The system redirect to outlook related tips</li> </ol> |
| <b>Post condition</b> | Outlook related inquiries will be solved by the customer.                                                                                                                                          |

*Table 5. 8 Use case-Outlook related*

### **5.4.3 Class diagram**

The diagram below is a type of static structure diagram that describes the layout of a service desk system by showing the different classes of the system, its attributes, operations (or methods) and the relationships between objects. There are different actors participating in the system in this class diagram and each actor plays his or her own role in the system. User (End-user), Analyst and Admins are able to access both the SCSM console and the self-support portal, users and analysts to create requests and analysts and administrators to manage the requests and the system. User and vendor can contact Analysts using either IPCC or E-mail.



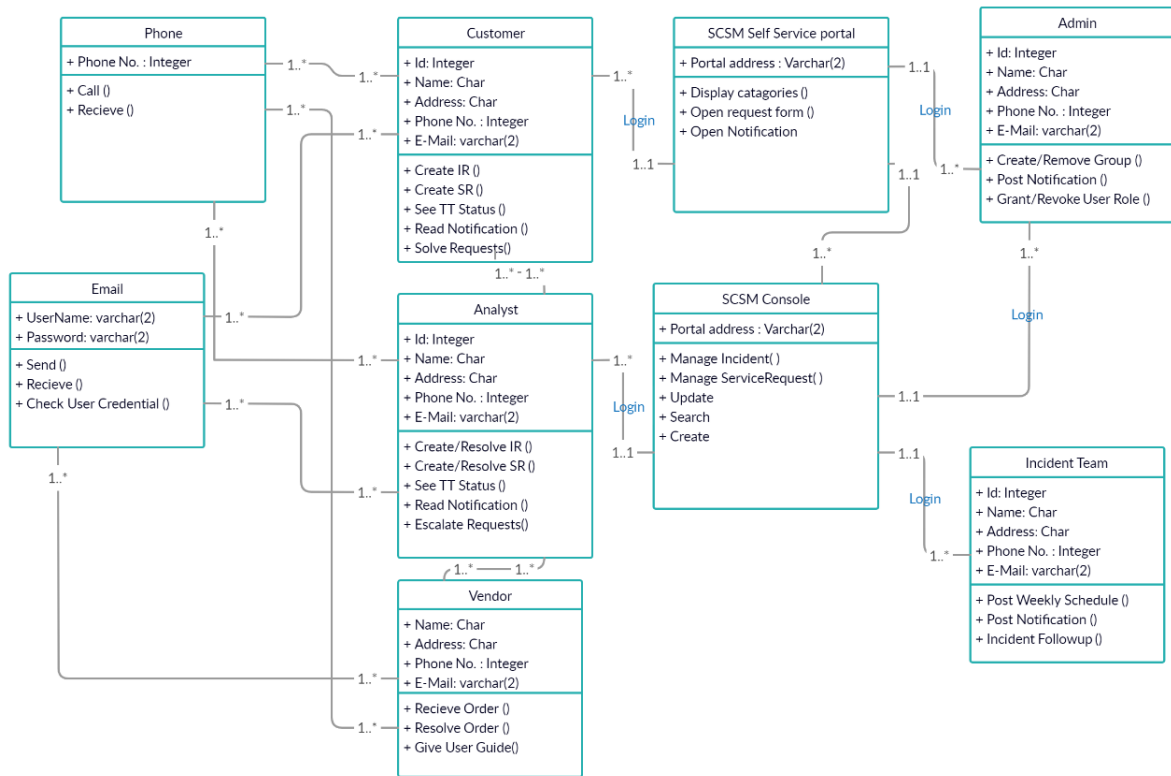


Figure 5.3 class diagram

#### 5.4.4 Activity diagram

To explain basic activities, two processes create requests and browser-related activities discussed below. The activity diagram below shows the registration of requests. First, the user logs to the system using his username and password. If the input is a true user log to the portal, pick one from the list of deals, fill out the form and submit the form.

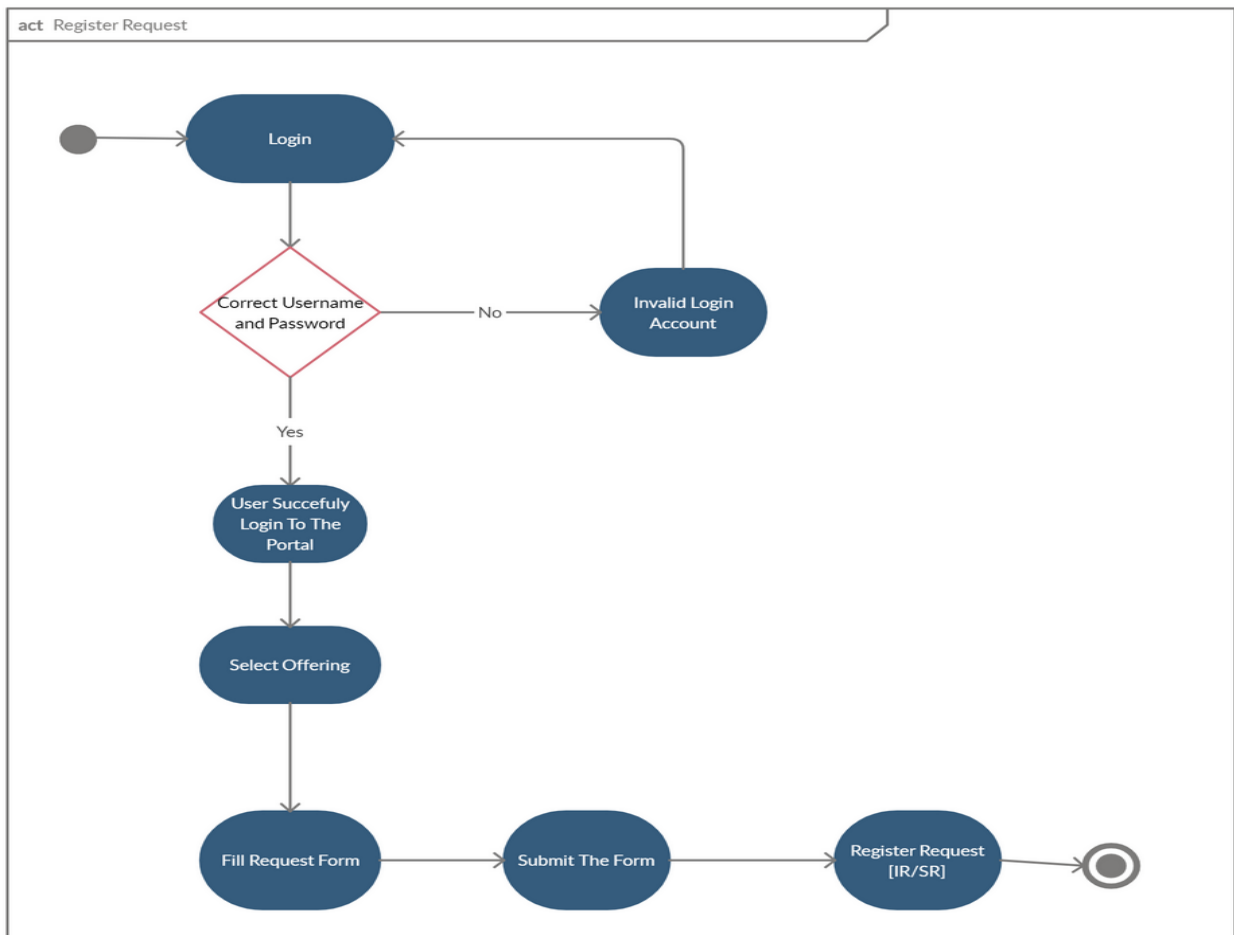


Figure 5. 4 Create request

## Browser related

The following activity diagram displays requests linked to browsers. First, the user uses his username and password to log into the system. If the input to the portal is a true user log, select browser related from the offering list. And the system is redirecting tips relating to the browser.

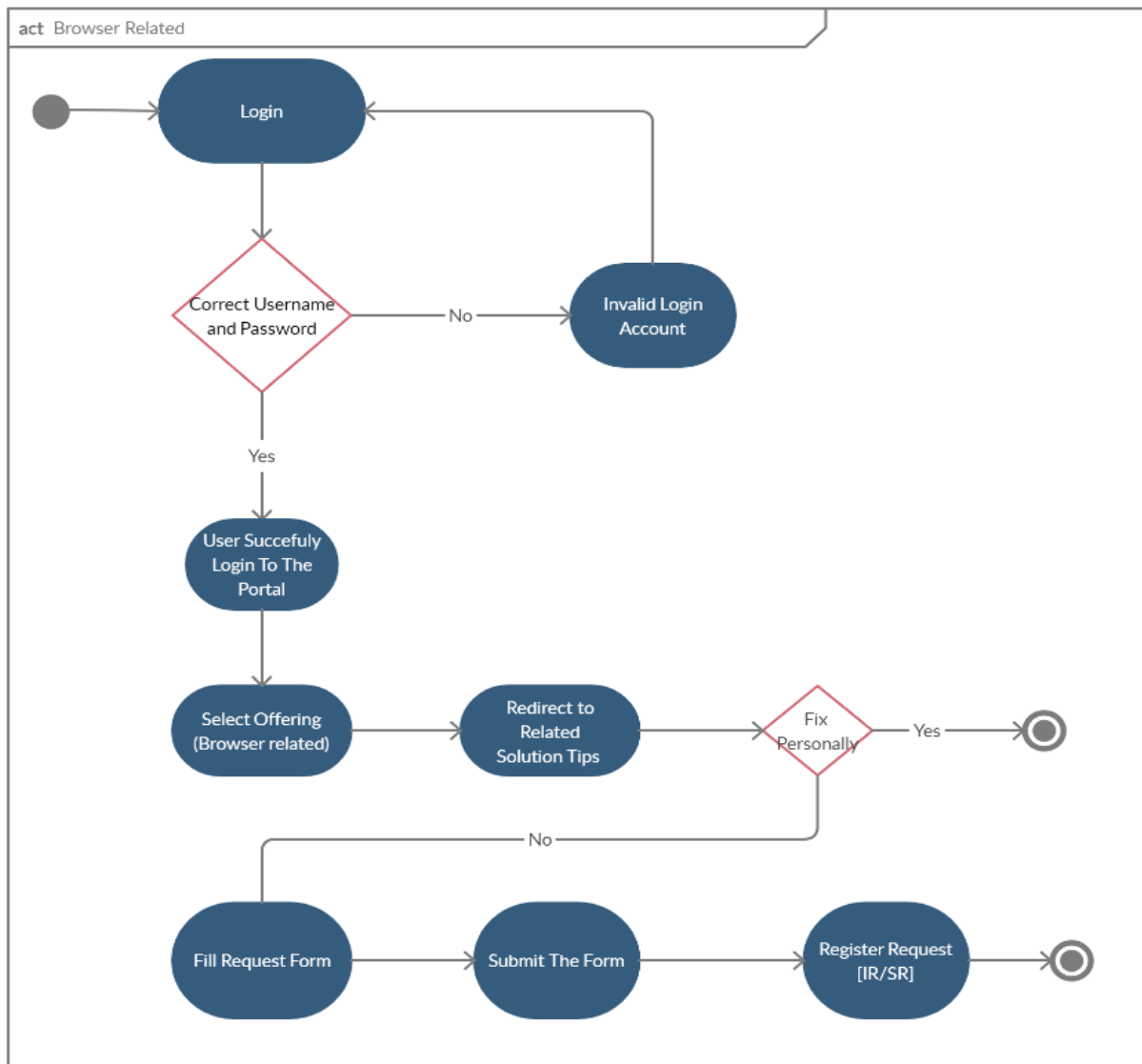


Figure 5. 5 Browser related

## 5.5 Some functionalities

Algorithm 5.1 shows how the system authenticates when the user logs in. The system checks whether the user is registered in the active directory and validates it for logging in to the homepage. Otherwise if the username or password is incorrect the error message displayed.

```
BEGIN  
  
    Read username  
    Read password  
    IF username exists THEN  
        If password is correct, THEN  
            Display the self-help portal home page  
        Else  
            Display wrong password message  
    ELSEIF username and password do not exist  
        Display Login failed message  
        Re-route user to log again
```

*Algorithm 5. 1 – steps used to check login credentials*

Algorithm 5.2 shows when the user comes to the user support portal to record his problem, if it is a simple and routine inquiry, the system will redirect the user to the portal to solve his problem without the involvement of the IT expert, but if his request requires high-level support, the system will display the form and the user will fill it out and submit the button to save in the database.

*Attributes:*

*TT Number, Status*

*Operations:*

- *Create*

*BEGIN*

*Receive a request*

*If the request is simple and routine,    Then*

*List of offering tips displayed*

*Else*

*Display create request form*

*Save the request into database:*

*Give unique ID for Service request and Incident request:*

*END*

*Algorithm 5. 2 – Algorithm to process trouble ticket*

Algorithm 5.3 shows when the user is required to check the status of the already registered trouble ticket. If the request ID exists, the system displays the status and if it does not exist, the request displays error message.

```

BEGIN

    Load Request Database
    Search request id from the database
    If request is found, Then
        Display the status of the request
    Else
        Display request does not exist message

END

```

*Algorithm 5. 3– To view status of request*

Algorithm 5.4 indicates that users first search the incident notification page before initiating an incident if the incident happens globally. Users do not create requests until they are further notified by the incident management team

```

BEGIN

    IF global incident happens, Then
        Display notification from Notification database

END

```

*Algorithm 5. 4 – display notification*

According to the Algorithm 5.5, the system supports shift workers see its weekly schedule. And responsible person in duty.

*BEGIN*

*Load Request Database*

*Search weekly on duty list*

*If request is found, Then*

*Display weekly schedule page*

*Display weekly on-duty list*

*Display shift schedule*

*END*

*Algorithm 5. 5 – to view weekly schedule*

## **5.6 Prototype demonstration**

A prototype is “a simple working model of a software development product, usually produced for testing purposes or as part of the process of development”. In the production of systems, a basic version of the system is designed, tested, and then reworked as required until a suitable prototype is obtained from which the full system or product can be produced [25].

Prototype is a rapidly implemented program which contains only a small portion of the expected functionality of a complete system. Based on the above algorithm and the analysis, the prototype is demonstrated.

The aim is to gather requirement to obtain an early feedback. The system has been developed to help both service desk inquiries and incident management process. To access this portal first, the user uses their Desktop username and password to go to the intranet page and click on the service desk portal and will get the page below (Figure. 5.6) There are different menus create request, notification, weekly schedule and trouble ticket status.

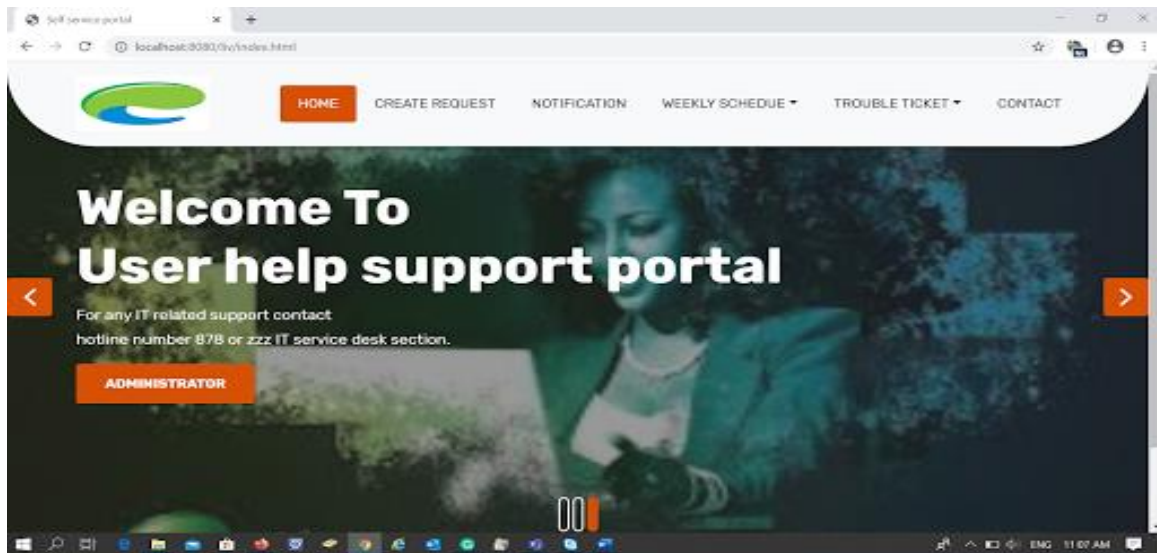


Figure 5. 6 Home page

The notification page in Figure (5.7) creates awareness of the incidents to users and specifically notifies the cause of the incidents and the time of resolution, thereby decreasing the amount of TTs generated and reducing the volume of call that comes into the service desk.

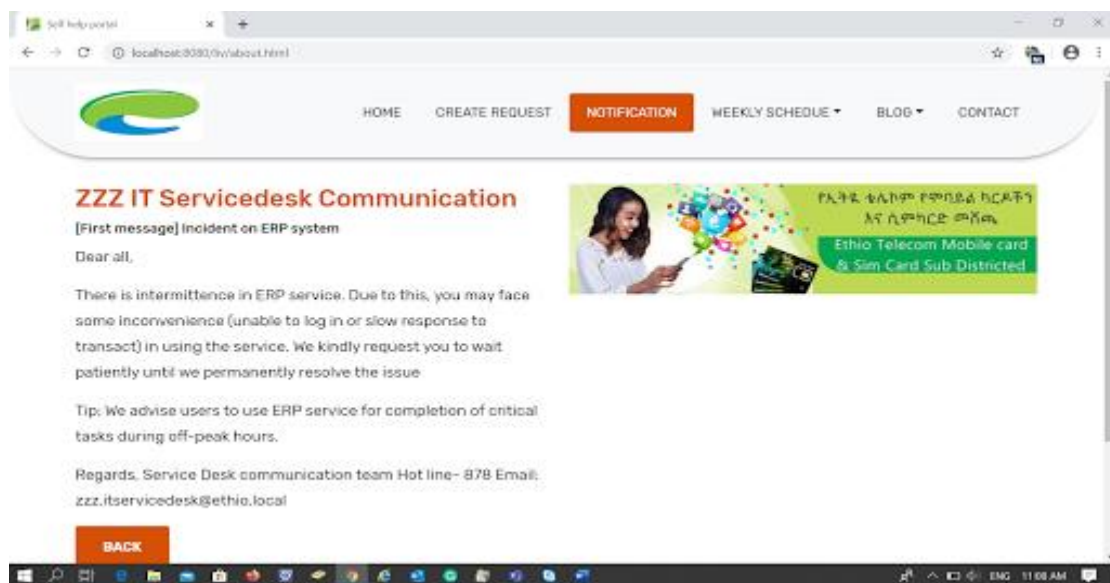


Figure 5. 7 Notification page



For example, in (Figure 5.8) if the users need to check the status of their already registered TT, the user will click on the ticket status menu and enter their phone number. And the system display request detail.

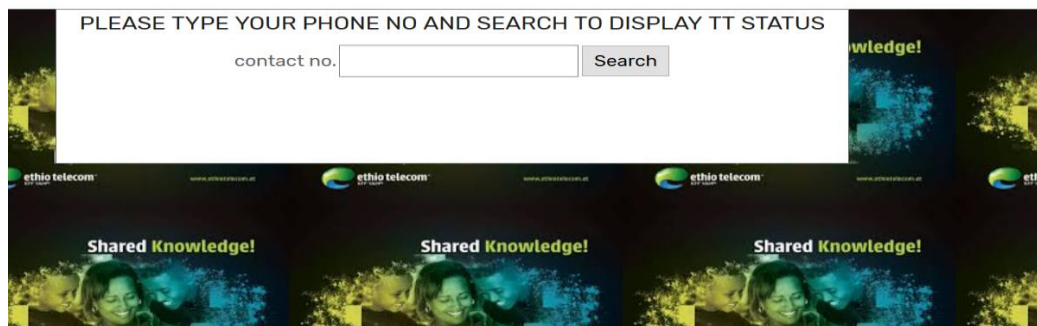


Figure 5. 8 Trouble ticket status page

Figure (5.9) displays a page on which the user makes requests for both service requests and requests for incidents. For account-related requests, the user fills out his information and must add the access restriction form.

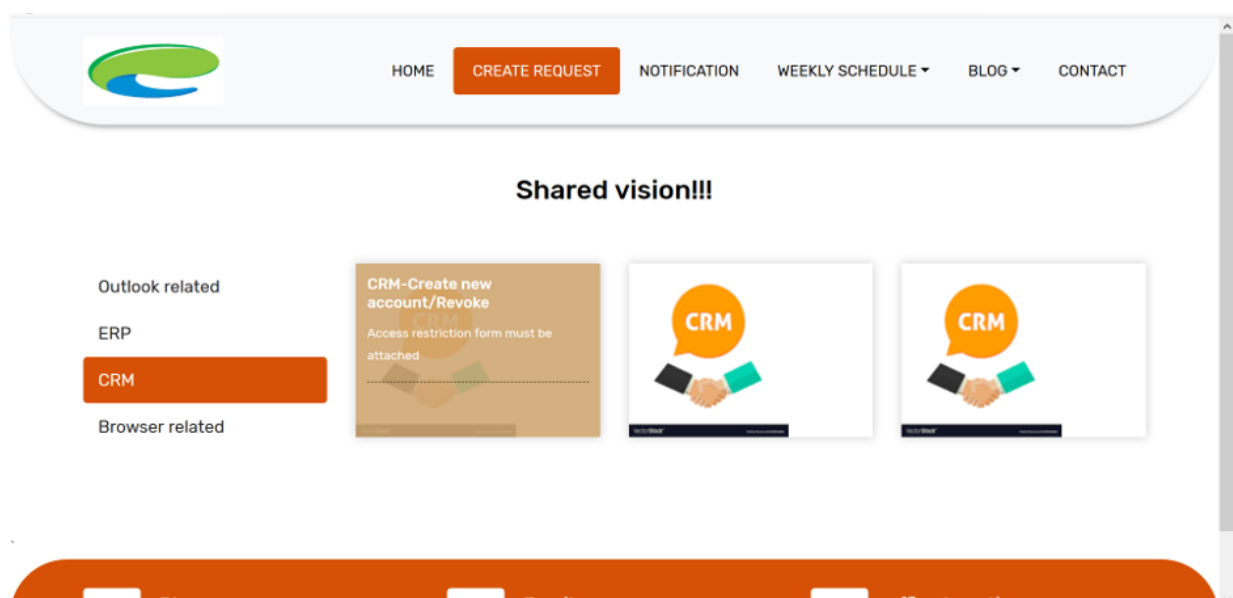


Figure 5. 9 Create request page

## 5.7 Evaluation

Evaluation of design science research attempts to assess the progress made by designing, creating an artifact of relation to the defined problem and the design objectives. This is a step to observe how successful and effective the artifact is and iterate back to the design process it's done during demonstration phase. This evaluation is guided by evaluation criteria [21].

The prototype has been evaluated including requirements by domain experts working in the IT service desk for 2-3 years, which are 11 , They reflect the inclusion of weekly schedules in the portal, as most schedules shared informally via telegram due to interruption of the mail system. And there is also comment on why the researcher uses the Gmail to demonstrate prototypes rather than Ethio mails. The researcher accepts the idea of a weekly schedule and goes to the requirement part and adds as a new requirement. Generally positive feedback was reflected, and this feedback is considered as a first assessment level

Later, by incorporating relevant reflected input and including them on the modified prototype, participants were invited to evaluate the prototype based on the evaluation criteria adopted from the usage consistency model.

According to ISO / IEC 25010, "Quality in use is the degree to which specific users can use a product or system to satisfy their needs in order to achieve specific objectives." It categorizes the properties of quality in use in different contexts of use as effectiveness, performance, risk-free, satisfaction and contextual coverage. So, evaluators from the prototype test these properties.

The prototype was evaluated by a total of 50 participants from the Information System division corporate operation subsection the outcome of the application evaluation is summarized for each of the features and sub-features as shown in Table 5.9

| Evaluation criteria                                                                                                  | Performance |    |   |   |   |
|----------------------------------------------------------------------------------------------------------------------|-------------|----|---|---|---|
|                                                                                                                      | 5           | 4  | 3 | 2 | 1 |
| User interface aesthetics                                                                                            |             |    |   |   |   |
| <b>1) How do you rate the portal's user interface ease of use?</b>                                                   | 39          | 10 | 1 |   |   |
| <b>2) How do you rate the portal's help and documentation?</b>                                                       | 33          | 14 | 3 |   |   |
| <b>3) How do you rate the portal's consistency?</b>                                                                  | 32          | 13 | 5 |   |   |
| Efficiency                                                                                                           |             |    |   |   |   |
| <b>4) How do you evaluate the system enable the user to accomplish tasks more quickly?</b>                           | 31          | 18 | 1 |   |   |
| <b>5) How do you rate the system flexibility to interact with?</b>                                                   | 39          | 11 |   |   |   |
| <b>6) Has it really enhanced the service?</b>                                                                        | 49          |    |   |   | 1 |
| <b>7) How do you measure Portal in enhancing service quality in comparison with the previous one?</b>                | 30          | 17 | 3 |   |   |
| <b>8) Rate the degree to which this portal decreases the 878 queues for easy queries and supports them</b>           | 33          | 16 | 1 |   |   |
| Satisfaction                                                                                                         |             |    |   |   |   |
| <b>9) The degree to which a user is satisfied if a user can solve the problem on his own and increase knowledge?</b> | 35          | 13 | 2 |   |   |
| Freedom from risk                                                                                                    |             |    |   |   |   |
| <b>10) Rate degree to which the portal mitigates the risk of time consuming simple and routine inquiries</b>         | 36          | 14 |   |   |   |
| Context coverage                                                                                                     |             |    |   |   |   |

|                                                                                                                                           |    |    |   |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------|----|----|---|--|--|
| <b>11) Measure how well the system helps Shift workers in solving their problems by using the Self-Help portals outside office hours.</b> | 30 | 17 | 3 |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------|----|----|---|--|--|

*Table 5. 9 Evaluation result*

The outcome of the evaluation of the prototype shows that the user interface is 94 percent attractive, 97.6 percent efficient, 96 percent users satisfied with the concept of self-support, 99 percent risk-free, and 94 percent context coverage. Based on this assessment, we may infer that users could easily navigate through the portal and find the various functionalities very helpful. We can also see that the capacity to provide services will also be enhanced.

The research aims to improve the service delivery capability, so the evaluation results indicate when the user solves simple and routine inquiries that benefit all stakeholders. Analysts at the service desk were motivated to give high-level support rather than simple inquiries.

Also, the concept of knowledge sharing practice is improved because the user himself solves the problem by checking related tips on offer. Journals states that we know more than we can tell so this platform improves the practice of knowledge sharing all over the organization.

If users solve simple and routine inquiries without involving the analyst, the KPI targets can be easily met, and the analyst be motivated to work on the root cause of the incident by working with the incident management team and other system owners

## **5.8 Discussion**

The research's aim is to enhance the IT service desk's service delivery capability and to improve the support process for simple and routine inquiries.

Research question number one says what are the easy, routine inquiries that come up on the IT service desk? The results of the analysis show that all password-related inquiries (CRM, ERP, IPCC and Z-smart TT), from outlook-related inquiries (unable to archive, lost archive, unable

to set automatic replay and configuration of emails problem), from browser-related inquiries (BICP, browser history and browser upgrade) are the most relevant ones.

The second research question says How can the process be supported by an automated system to enhance service delivery at Ethio telecom? The integration of the current system with the self-help portal allows the user to solve simple and routine queries.

Let us consider three scenarios to illustrate the functionality. In the first scenario, if the user loses his CRM password, he first logs into the portal and selects create a request from the menu and selects the CRM password from the offer list. The system redirects to the CRM page because the CRM password is easy and routine from the survey result and the system show forget the password link and the user writes his email in the form and the system sends password automatically. This functionality enhances the ability to deliver service by giving the analyst time to give a high level instead of resetting user password. Journals also mention most of the queries recorded in the IT service desk relate to user login information.

Second scenario, if the user has lost his archive file, the user first logs in to the system and selects to create the request menu and select the lost archive from the list of offers related to the outlook. The system is redirecting the user's self-help tip to get the file back.

Third scenario, mail is the only communication channel and from the survey, mail system is fluctuated most of the time. On duty weekly and global incident notification is sent via mail. If mail is interrupted there is no other mechanism for user communication. The current portal of self-help support has the notification functionality notifying users that they do not have to create TT for this global incident until further notice.

The research is different from Melkite and Leung's previous works as both studies do not include incident management teams and it is not relevant to all service desk systems. Let us address it one by one. Melkite paper aims to create ITIL normal automatic assignment of problematic ticket (TT) to technician applying this study to Ethio telecom does not change anything if the generated TTs in a day are 1000 this TT distributed to 20 analysts and they get

50 trouble ticket (TTs). The analysts aim to finish the already allocated TTs, not service quality.

IT service desk analyst assists more than 600 calls from the study outcome and handles more than 900 trouble tickets in the last three calendar months. From the findings, 50% of incoming inquiries recorded in the IT service desk are simple and routine, so this study helps analysts to decrease the amount of issue tickets assigned to each analyst by half as the customer addresses basic and regular inquiries by recommending self-support tips to enhance the service delivery process so that the analysts are eligible for high-level and constructive assistance.

This research is also distinct from Leung's analysis because its analysis is not in the telecommunications sector simple and routine inquiries differ from country to country and organization to organization. so, it enhances the service delivery process by reducing the number of troubleshooting tickets registered on the portal and reducing the number of calls handled by the analyst. As the notification functionality of the new system notifies the user early about the status of the global incident by posting the first message and incident end message.

This work contributes by providing a standardized way to manage all incident requests by integrating knowledge of different experts and storing it for easy and frequent inquiries in the portal to enhance service delivery process. Contribute to the development of organizational awareness by creating knowledge-sharing activities as the customer addresses the issue himself and shares it with colleagues. This also helps to distinguish the trend of easy and routine inquiries from the reported requests for service and inquiries on accident.

## **Chapter six**

### **Conclusion and recommendation**

This chapter concludes the paper by presenting the study's conclusion and recommendation based on the research findings. The chapter also presents potential suggestions for future research.

#### **6.1 Conclusion**

The IT service desk section at Ethio telecom aligns business with IT. Without an IT service desk, all the staff and the company lose efficiency and income. Generally, it is the place of development of the division image.

Many of the IT-related inquiries are handled by first-level assistance from the IT service desk. Inquiries reported in this section are routine and basic. This study describes those easy and routine inquiries via questionnaires, and those inquiries identified as most password related, outlook-related, browser-related, and some software installation during research. After that the requirement was identified and prototype design was started by sharing ideas with service desk analysts on how to solve these kinds of problems by using Nonaka 's method of knowledge sharing to build organizational knowledge.

The system is designed to reduce the section 's load and give the service desk analysts a suitable environment for providing high-level support.

The program automatically redirects the user to the appropriate page for basic and routine inquiries, enabling the user to answer his / her query on his / her own to increase employee productivity and enhance high-level support resolution time.

In addition to that by using the notification page of this system in a structured way increases effective communication throughout the organization.

## **6.2 Recommendation for practice**

This study offers some valuable details on how service desk young professionals struggle by managing basic and routine inquiries for Ethio telecom workers and senior officials. The proposed self-help platform design offers a general guidance to strengthen the IT service desk's service delivery capability. The researcher recommends that the company to update program installation and IE policies directly. When employees install browsers and other protected programs on their laptop.

To get the proposed organizational knowledge throughout the organization first create awareness for all staff before creating TT and calling to the hotline number, first check out if it can be fixed by referring resources and online support from self-help portal. It requires a willingness from all the workers to consider new ideas and practice of sharing knowledge, rather than hoarding knowledge.

## **6.3 Recommendation for future work**

While this research provides new insights and shows valuable lessons concerning the IT service desk, some limitations are worth mentioning as they open paths for future research.

The researcher proposes future research to develop the ability to provide service in another new direction or to enhance it through models and frameworks.

The researcher also suggested exploring additional security problems relating to client policies be investigated for further study.

The study was limited first level support. Future study has to consider second level and vendors. Conducting future study in other sectors would enable researcher to obtain an overall picture of the phenomena.



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## Appendix

### A. Questionnaire

This research is conducted to meet the master's degree of Information System requirements. The purpose of this survey is to examine the support process of the current service desk, identify simple and routine inquiries on the service desk, and develop user support portals to improve the IT service desk's service delivery capability and give analysts sufficient time to deliver high-level support.

The study is for academic ends only. Your involvement in this study and the data obtained will be strictly confidential. The answers you send will be used solely for research purposes. Your truthful, genuine and timely response is necessary if this study is to be fulfilled. In addition, your honest answer to the questionnaires will benefit your company too.

Taking part in this study is voluntary. Therefore, I kindly ask you to carefully give your answer to all the questions. Thank for your kindly cooperation.

Part I general information of respondents  
\* Required

1. Gender \*

*Mark only one oval.*

- ☐ Male  
☐ Female

2. Educational Level \*

*Mark only one oval.*

- ☐ Diploma
- ☐ B.S.C
- ☐ Master's degree
- ☐ Other:
- 

3. Your work experience in IT service desk \*

*Mark only one oval.*

- ☐ 0 - 1 Year
- ☐ 2 - 3 Years
- ☐ 4 - 5 Years
- ☐ more than  
5 years

4. Age :

*Mark only one oval.*

- ☐ 20 - 30
- ☐ 30 - 40
- ☐ 40 - 50
- ☐ Greater than 50

*Skip to question 5*

Part II. The following questions are prepared to know Ethio telecom service desk support structure

5. How many individual users does your service desk support in a day?

---

6. What is your service desk operational hour?

*Mark only one oval.*

- ☐ Office Hour
- ☐ Shift

7. Which one describe your Service desk?

*Mark only one oval.*

- ☐ Centralized
- ☐ Decentralized
- ☐ E-support
- ☐ Outsourcing
- ☐ Virtual

8. Which one described your service desk support structure?

*Mark only one oval.*

- ☐ One level support
- ☐ Two level support
- ☐ Three level support

9. Does your current service desk use the following system or software?

*Check all that apply.*

- ☐ Automatic call distribution
- ☐ Interactive voice response
- ☐ Remote control systems

Other: ☐ \_\_\_\_\_

part iii about simple and routine inquiries

10. Assuming the user has enough guidelines, which of the following password problem(s) should the user attempt to solve before using the service desk:(Check all that apply)

*Check all that apply.*

- ☐ ERP password  
☐ CRM password  
☐ IPCC password  
☐ Z-smart TT  
☐ Other \_\_\_\_\_

11. Assuming the user has enough guidelines, which of the following outlook problem(s) should the user attempt to solve before using the service desk:(Check all that apply)

*Check all that apply.*

- ☐ Outlook configuration  
☐ Unable to Archive  
☐ Archive lost  
☐ Group add and remove

Other: ☐ \_\_\_\_\_

12. Assuming the user has enough guidelines, which of the following browser problem(s) should the user attempt to solve before using the service desk:(Check all that apply)

*Check all that apply.*

- ☐ Delete browser history  
☐ BICP problem  
☐ Browser install/Upgrade

Other: ☐ \_\_\_\_\_

13. Assuming the user has enough guidelines, which of the following software problem(s) should the user attempt to solve before using the service desk:(Check all that apply)

*Check all that apply.*

- ☐ Software upgrade
- ☐ Software uninstall
- ☐ Software install
- ☐ Software repair

Other: ☐ \_\_\_\_\_

14. Assuming the user has enough guidelines, which of the following Hardware problem(s) should the user attempt to solve before using the service desk:(Check all that apply)

*Check all that apply.*

- ☐ Printer (Kyocera, OKI)
- ☐ Scanner
- ☐ Monitor
- ☐ Ecaf camera
- ☐ Counter machine

Other: ☐ \_\_\_\_\_

15. Assuming the user has enough guidelines, which of the following other problem(s) should the user attempt to solve before using the service desk?

*Check all that apply.*

- ☐ Web site "too slow"
- ☐ Web site "Unreachable"
- ☐ File missing
- ☐ File "corruption"

Other: ☐ \_\_\_\_\_

16. What is the total number of incoming telephone calls logged per for the past three calendar months?

*Mark only one oval.*



☐ 400-450

☐ 451-500

☐ 501-

☐ 550

☐ 551-

☐ 600

☐ more

than 601

Other:

17. What is the total number of Trouble ticket individually closed for the past three calendar months?

*Mark only one oval.*

☐ 600-650

☐ 651-700

☐ 701-

☐ 750

☐ 751-

800

more than

900

18. Of your total user contact, what percentage is via: \*

Mark only one oval per row.

|                | High                  | Medium                | Low                   |
|----------------|-----------------------|-----------------------|-----------------------|
| Telephone      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Walk in        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Trouble Ticket | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

19. Of your total inquiries received by the Help desk, what percentage is \*
- Mark only one oval per row.

|                                   | High                  | Medium                | Low                   |
|-----------------------------------|-----------------------|-----------------------|-----------------------|
| Resolved by first level support   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Resolved by sechond level support | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Resolved by vendors               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

20. What mix of inquiries does your Help desk get in each of the following areas: \*
- Mark only one oval per row.

|                                | High                  | Medium                | Low                   |
|--------------------------------|-----------------------|-----------------------|-----------------------|
| Hardware/software installation | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Other Hardware problem         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| other Software problem         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Data communication             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Account/Password               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

21. Over the past 6 months, has your help desk experienced \_\_\_\_\_ in the total amount of incoming inquiries?

*Mark only one oval.*

- ☐ An increase  
☐ No change  
☐ Decrease

22. What are the three main reasons for the above selection?

\_\_\_\_\_

23. Is there any automated system to support simple and routine inquiries in the service desk environment? \* *Mark only one oval.*

- ☐ Yes      *Skip to question 24*  
☐ No      *Skip to question 25*

Support system

24. How can the process be supported if your answer was "Yes" for the above section?

*Check all that apply.*

- ☐ User help support system  
☐ Interactive voice response(IVR)

Other: ☐ \_\_\_\_\_

Features and functionality

25. What advantage do you expect from this new system?

*Check all that apply.*

- ☐ Minimize the number of trouble tickets registered on the system
- ☐ Minimize the number of calls handled by analysts
- ☐ Grant to achieve the targeted KPI
- ☐ Analysts have time to give high-level support
- ☐ Minimize the resolution time of each incident

26. What features might enhance the service delivery for simple and routine inquiries?

*Mark only one oval per row.*

|                                                                | Strongly agree        | Agree                 | Strongly disagree     | Disagree              |
|----------------------------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Through integrating current system with user self-help portals | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Through developing user self-help portal                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| By using interactive voice response(IVR)                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

#### Part IV Questions related to incident management

27. What is the role of incident management team?

*Check all that apply.*

- ☐ Record and classify received Incidents and undertake an immediate effort
- ☐ Log all Incident/Service Request details, allocating categorization and prioritization codes
- ☐ Keep users informed about their Incidents' status at agreed intervals
- ☐ Provide first-line investigation and diagnosis of all Incidents and Service Requests
- ☐ Escalate Major Incidents to the Incident and/or Problem Manager
- ☐ Send communication to users

Other: ☐ \_\_\_\_\_

28. What are the main communication channels for incident communication in your organization?

*Check all that apply.*

- ☐ E-mail
- ☐ SMS
- ☐ Dedicated status page
- ☐ Workplace chat tool

Other: ☐ \_\_\_\_\_

29. Could you list the problems you have faced while utilizing one of the above communication channels?

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## B. Evaluation criteria for the proposed system

The criteria for evaluating the proposed user self-help platform are adapted from ISO / IEC: 25010:1011 standard in use model. Thank you, dear participants, for evaluating the prototype in advance, based on the criteria given in the table below. The following Likert scale values 5=Excellent 4= Very good 3=Good 2=Satisfactory 1 =Poor .Please express your level of satisfaction on the proposed system by putting a() mark in the box corresponding to the level of satisfaction.

| Evaluation criteria                                                                                 | Performance |   |   |   |   |
|-----------------------------------------------------------------------------------------------------|-------------|---|---|---|---|
|                                                                                                     | 5           | 4 | 3 | 2 | 1 |
| <b>User interface aesthetics</b>                                                                    |             |   |   |   |   |
| 1) How do you rate the portal's user interface?                                                     |             |   |   |   |   |
| 2) How do you rate the portal's ease of use?                                                        |             |   |   |   |   |
| 3) How do you rate the portal's help and documentation?                                             |             |   |   |   |   |
| <b>Efficiency</b>                                                                                   |             |   |   |   |   |
| 4) How do u evaluate the system enable the user to accomplish tasks more quickly?                   |             |   |   |   |   |
| 5) How do rate the system flexibility to interact with?                                             |             |   |   |   |   |
| 6) How do you evaluate the system easy to use?                                                      |             |   |   |   |   |
| 7) How do you evaluate this system enhance the service?                                             |             |   |   |   |   |
| 8) How do you measure Portal in enhancing service quality in comparison with the previous one?      |             |   |   |   |   |
| 9) Rate the degree to which this portal decreases the 878 queues for easy queries and supports them |             |   |   |   |   |
| <b>Satisfaction</b>                                                                                 |             |   |   |   |   |

|                                                                                                                                    |  |  |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|
| 10) The degree to which a user is satisfied if a user can solve the problem on his own and increase knowledge?                     |  |  |  |  |  |
| <b>Freedom from risk</b>                                                                                                           |  |  |  |  |  |
| <b>11)</b> Rate degree to which the portal mitigates the risk of time consuming simple and routine inquiries                       |  |  |  |  |  |
| <b>Context coverage</b>                                                                                                            |  |  |  |  |  |
| 12) Measure how well the system helps Shift workers in solving their problems by using the Self-Help portals outside office hours. |  |  |  |  |  |