



**DEVELOPING EXPERT SYSTEM TO SUPPORT
CONSTITUTIONAL INTERPRETATION:
THE CASE OF HOUSE OF FEDERATION**

A Thesis Presented

By

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ORGANIZATIONAL MEMORY: THE CASE OF HoF

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DECLARATION

I, the undersigned, declare that this thesis work is my original work, has not been presented for a degree in this or any other universities, and all sources of materials used for the work have been duly acknowledged.

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LIST OF ACRONYMS

Acronyms

Definition

AI -	Artificial Intelligence
CoCI -	Council of Constitutional Inquiry
CI -	Constitutional Interpretation
CIES	CI Expert System
CoP -	Community of Practice
EHoF -	Ethiopian House of Federation
ES -	Expert System
ESBTs -	Expert System Building tools
IE -	Inference engine
ICTs -	information and communication technologies
KBS -	knowledge-based systems
KIO -	Knowledge intensive Organizations
KM -	Knowledge Management
OC -	Organizational culture
OL -	Organizational Learning
OM -	Organizational Memory
OMS -	Organizational Memory System
R&D -	Research and Development
SRS -	Software Requirements Specification
UI -	User Interface

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ABSTRACT

The beginning of this research indicate that there is poor knowledge exchange and sharing practices among employees and the management of EHoF. HoF is (CI Expert System) service provider is “*ultimate arbiter*” between *Supreme Court (Constitutional right and legal right violators)* and *Constitution right violated people* in the Country, while it has no Knowledge management system. Today Knowledge management is observed as the most important tool surpassing other resources; like land and capital. Vital tacit knowledge, as well as rich expertise and experiences of the Organization’s Employees leaving an organization will also take the knowledge he/she has with him/her, these, huge knowledge resource was flows out and lost.

Knowledge still be loss and not accessible in a modern way, this problem is caused by various factors, due to such as high turnover of employees in search of better job opportunity, insufficient salary, lack of recognition, resignations, and for carrier advancement and as well as death, etc., is various departments of EHoF. The current situation shows that the EHoF delays decisions for years causing people to lack justice; however, this study tried to demonstrate

Research approach: This study follows qualitative research approach. Qualitative research approaches is inquiry in the natural setting, an exploratory study of experience-as-lived and everyday life in the world. These expertises were selected based on their experiences and their exposure to CI Expert System so that the richness of the data can be ensured and a different dimension can be derived with regard to the data collected. The interview was guided by an interviewee protocol consisting eleven (11) questions derived from prior studies conducted in the area of ES. Qualitative (Phenomenological) research Approach is preferred from other types of approach is Easy to collect data (e.g. data is collected y seeing, asking ad watching)

Keywords: Organizational Memory, Expert System, CI Expert System , Knowledge base, user Interface, Inference engine, Knowledge Management, Organizational Knowledge, Organizational Memory system, Knowledge Retention, Organizational memory and Information system

CHAPTER ONE

INTRODUCTION

1.1. Introduction

Definitions: Louis Allen, “Organization is the process of identifying and grouping work to be performed, defining and delegating responsibility and authority and establishing relationships for the purpose of enabling people to work most effectively together in accomplishing objectives.”

The concept of Organizational memory is fundamentally important to organizational learning. The seminal work on organizational memory is Walsh and Ungson’s article published in the Academy of Management Review in 1991[58]. Mäkinen (2006) [58] pointed out, organizational memory can have two facets. On one side in its recorded form, it is "concrete and palpable", but on the other side, it can also be "invisible, mute, fuzzy, and easy to lose" (Huber, Davenport and King 1998) [59] summarize Organizational Memory (OM) as the set of 2repositories of information and knowledge that the organization has acquired and retains. Stein and Zwass (1995) [59] define OM as the means by which knowledge from the past is brought to bear on present activities resulting in higher or lower levels of organizational effectiveness. Walsh and Ungson (1991) [59] define OM as stored information from an organization's history that can be brought to bear on present decisions. Knowledge as objects (things) that can be stored in knowledge repositories (organizational memories) and manipulated (Stein and Zwass, 1995; Wijnhoven, 2000) [60]. It is comprised of unstructured concepts and information that exist in the organization’s culture and the minds of its members, and that can be partially represented by concrete/physical memory aids such as databases. Five “retention bins” of organizational memory were identified by Walsh and Unguson (1991) [61]: *individuals, culture, transformations, structures, and ecology*. Organizational memory represents “*stored information from an organization’s history that the firm can be brought to bear on present decisions*”. There are two perspectives of OM - content and repository perspectives. The content perspective focuses on the information and knowledge that is captured and the context in which it is used. The repository perspective focuses on where and how information and knowledge is stored and retrieved. , (Christine Moorman and Anne S. Miner Day, 1994, p. 38). describes new product

development as a "key firm capability involving complex bundles of skills and accumulated knowledge."

The functions of Organization Memory can be broadly categorized into two – representation and interpretation. Representation presents just the facts (or knowledge or expertise) for a given context or situation. Interpretation promotes adaptation and learning by providing frames of reference, procedures, guidelines, or a means to synthesize past information for application to new situations (Sandoe and Olfman, 1992 and Morrison, 1997) [62]. More specifically, the basic functions of OM include perception, acquisition, abstraction, recording, storage, retrieval, interpretation, and transmission of organizational knowledge. OM is seen to have two principle goals: to integrate information across organizational boundaries and to control current activities and thus avoid past mistakes. According to Walsh and Ungson (1991) [63], organizational memory is a critical element for learning and communication in organizations and has the following objectives:

- Serving work by making stored knowledge relevant to the current design task;
- Enabling realization of ideas and concepts, thereby allowing others to share, critique, and extend.

Because organization's employees are not just procedure followers, they continuously improvise. Therefore, it is necessary to encourage them to improvise and synchronize their ideas with internal and external procedures or regulations.

Organizational Memory (OM) can be viewed as abstract or concrete. It is comprised of unstructured concepts and information that exist in the organization's culture and the minds of its members and that can be partially represented by concrete/physical memory aids such as databases. It is also comprised of structured concepts and information that can be exactly represented by computerized records and files.

Sandoe and Olfman (1992) and Morrison (1997) [62] describe these two forms of OM as having two functions, representation and interpretation. (OM) must capture and store knowledge from organization's employees and improvisations that were made by them in order to be used by other employees in similar situations. This enables OM to continuously develop based on new

information and knowledge discovered in the process of organizational learning

Expert systems (ES) has been developed as a branch of AI and contain specialized knowledge for a particular field that only an expert in that field would possess. The system can then be used to make informed decisions and conclusions on a particular situation in that field based on this knowledge as a real expert would. Expert systems are focused on a particular field and are used to replace or assist an expert in making decisions or in verifying an expert's conclusions. Examples of field in which expert systems are applied include law, tax, accounting, automated call centers, medical and education. Yasser A. Nada1st Hossam Meshref,, 2 Nov. 2014 [2], [7]. The United Kingdom's National Health Service has an online tool that allows people to enter their symptoms or ask various health related questions in order to receive advice and information and be directed to a doctor or other health practitioner, where appropriate (José Braga de Vasconcelos, Chris Kimble & Álvaro Rocha, 2003 [1]. The explanation capability of an expert system allows it to explain the rationale followed in arriving at its conclusions Lucien (Millette, Mar 2012) [7]. As a human expert, such as a doctor, should be able to justify their conclusions, so should the system be able to explain how it reached its conclusions. This allows the verification of these conclusions by an expert and can assist an expert in merely confirming a diagnosis without being required to redo the entire diagnosis process (Guy A Boy, 1999) [5].

ES is developed to model the ability of experts in solving the problems and provide users with the services and facilitates that an expert can usually provide. The purpose of this study is therefore, in building CIES that support members of House of Federation to make informed decision.

1.2. Background of the Study

Ethiopian House of Federation (EHoF) is established in 1995 according to the Federal Constitutional article 61 and proclamation 251/2001 [4] Consolation of the EHoF and the definition of its power duties, and responsibilities. The Ethiopian House of Federation /EHoF/ is Political organization and the second chamber /assembly/ of the Ethiopian Federal Democratic Republic /EFDR/ next to Ethiopian House of Peoples' Representative /EHoPR/ which is one of the governmental authorities of Federal Government of Ethiopian giant organization according to

the political organization. The EHoF is composed of representatives of Nations, Nationalities and people of Ethiopia. Each Nations, Nationalities and people shall be represented in the House of the Federation at least with one member. One additional representative for each one million of its population should represent each Nations or Nationality. Members of the EHoF shall be elected by the state Councils and the state councils may themselves elect representatives to the EHoF or they may hold elections to have the representatives elected by the people directly. (The Constitution of the Federal Democratic Republic of Ethiopia, Article 55, 21st August 1995) [4]

EHoF has various tasks to be performed, which include constitutional interpretation, conflict prevention between regional states, providing constitutional awareness, resolving disputes or misunderstandings that may arise between States, determining the division of revenues derived from joint Federal and State tax sources and the subsidies that the Federal Government may provide to the States intergovernmental equitable growth. It also organize the Council of Constitutional Inquiry, promote the equality of the peoples of Ethiopians enshrined rights in the constitution and promote and consolidate their unity based on their mutual consent. It exercises the powers concurrently entrusted to it and to the Ethiopian House of Peoples' representatives (EHoPR).

The EHoF is composed of five major structures – CI Expert System and Identity Affairs Issue Standing Committee; Democratic Unity, Peace Building and Constitutional Awareness Standing Committee; General Purpose Grant Distribution Affairs Standing Committee; Federation Secretariat Office and Audit Services Directorate. Each of the have their own Directorate. Our major focus is Constitutional Interpretation and Identity Affairs Standing Committee and its corresponding Directorate since it is a structure that provides major service to the public through constitutional interpretation and ensuring the timely provision of justice to the wider public. It has the power to promote the equality of the Ethiopian people enshrined rights in the constitution. EHoF is expected to provide fair and timely decisions to the people applying to it claiming that their right is violated by breaking the Constitutional Law at the Supreme Court. Experts assigned for this task make such decision. The area requires wealth of cumulated legal expertise, knowledge and experiences.

1.3. Statement of the Problem

Ethiopia has failed to develop its own jurisprudence of CI Expert System. The FDRE Constitution also contains explicit provisions on CI. It has also established the institutional framework necessary to discharge such function. It mandates the HoF is the ultimate arbiter of constitutional matters between Court and Constitutional right violated people in the Country. Moreover, it has established an auxiliary body, which conducts Council of constitutional inquiries to present its findings in the form of recommendations to the House. Therefore, since 1995 [4], HoF established and got the power to interpret the Constitution interpretation issue, *from 117 issues asked for the CI in a year, only two (2) cases were accepted for the CI*. The bulk of cases, however, are rejected due to lack of the need for constitutional interpretation. Such decisions should be well supported with justifications and be easily understandable by the parties to the cases. The parties who have the right to approach the CoCI/HoF should be aware how the constitution should be applied and interpreted. In addition, there should be clarity as to the methods of constitutional interpretation for the public at large (Musitefa Nassir, 2018) [3]. As far as methods of CI Expert System were concerned, the proclamation simply instructs the HoF to identify and implement principles of CI Expert System, which it deems necessary for the proper examination and decision of constitutional cases.

The above stated situation of CI Expert System signify that there is huge demand for building Expert System on past knowledge and expertise applied in CI Expert System to establish a clear and uniform principles and support CoCI and HoF in maintaining consistency in the application of the principles. It can also help to create awareness about CI Expert System among the wider public. Such accumulated knowledge and experience can also improve the effectiveness and efficiency of the interpretation system and contribute in the reduction of mistakes in the interpretation.

Knowledge management in service providing organizations and firms is the most sought after aspect today. One of the key aspects of knowledge management is knowledge *retention*. Knowledge lies with the employees in an organization. As it is stated above, the EHoF is expected to provide timely solution to the public's legal and Constitutional right given by law was violated by breaking the law, at the lower and Supreme Court. However, the current

situation shows that the EHoF delays decisions for years causing people to lack justice. One of the factors causing this problem is a huge loss of knowledge as well as rich expertise and experience in various departments of EHoF because of high turnover of employees in search of better job opportunity and for carrier advancement as well as due to insufficient salary and lack of recognition. Employees leaving an organization will also take the knowledge he/she has with him/her. Preliminary investigations also indicate that there is poor knowledge exchange and sharing practices among employees and the management of EHoF. Hence, knowledge management (knowledge retention) is important aspect for knowledge and experience intensive tasks of EHoF like CI Expert System and provision of timely legal decision for the public. There is a need to develop a system that supports the extraction and codification of the knowledge of key employees who are involved in the legal decision-making. Therefore, this study aims at exploring and supporting potential of *CI Expert System*.

1.3.1 Overview of the Expert system

Starting in the late 1950's and early 1960's, computer programs were written with the explicit goal of problem solving [Giarratano89]. Knowledge-based expert systems are one manifestation of the applications that trace their roots back to those early programs. Knowledge-based expert systems are computer systems that have expertise in a given domain and are useful when analyzing and processing large amounts of data in a short amount of time [Grosan11] [Dabbaghchi97]. They use knowledge that has been gathered and stored within the knowledge base in order to solve problems in the specific domain for which they were created. [64] .

Organizations are always at risk of losing experts in key areas within their business processes or service providing areas due to turnover for a better salary, illness, death, etc. Knowledge-based expert systems help Ease such risks by taking the knowledge obtained by experts, also called problem domain experts, over the course of their careers and storing it within a knowledge base. A knowledge-based expert system can also reduce the amount of time problem domain experts will require to solve problems in the problem domain. A problem domain is a specific area of business process for which a knowledge-based expert system is created to support.

1.3.2 Organizational Memory

Organizational memory (OM) has been defined as the means by which organizations store knowledge for future use (Huber, 1991). Stein and Zwass (1995) who define OM as the means by which knowledge from the past is brought to bear on present activities thus resulting in increased levels of effectiveness for the organization give a similar definition. Although organizations do not have brains, they have intentionally or unintentionally constructed memories. OM becomes a corporate asset by capturing, organizing, disseminating, and reusing the knowledge created by its employees (Conklin, 2001). [66]

Walsh and Ungson (1991) developed the structure of organizational memory as acquisition, retention, and retrieval and postulated the existence of five storage bins that compose the structure of memory within organizations and one source outside of the organization being *individuals, culture, transformations, structures, ecology* and *external archives* (cited in Ji and Salvendy, 2001). An alternative approach is developed by Cross and Baird (2000) who identify the components of OM as individual memory, personal relationships, databases, work processes and support systems, product and services.

A number of authors like Argyris and Schon (1978) have stressed how OM development can produce habitual decisions and actions, which emphasize shortterm operational efficiency over long-term strategic effectiveness (cited in Berthon et al., 2001). Lehner and Maier (2000) also stress the function of OM in connecting past and present decision-making situations.

OM is a general term implying that knowledge may be stored in a variety of repositories, both human and artifact (Robey et al cited in Walsh and Ungson, 1991). It is known that decision makers do not only store and retrieve hard data but they make use of the soft information in the form of tacit knowledge and expertise. Obviously, it is a difficult task to ask company members to share such information since they may not desire to give up valuable information for fear of losing their individual competitive edge. Then an inevitable solution arises:

Establishing information systems to store and retrieve such collective knowledge in order to preserve tacit knowledge and further promote OL. At this point, the necessity of technological means comes out.

Some of the Papers reviewed were good in all aspects, while, Some of the Papers reviewed was no proper organization of articles or thesis papers some were no methodologies and evaluate their Application.

1.4. Research Question

This research work is set up or conducted to answer the following basic research questions.

1. How do we extract the required knowledge for developing CIES that can be used for Constitutional Interpretation?
2. Can be enhance features used for creating appropriate model that bring better Performance than the existing way of identification?
3. What are the appropriate modelling and inference techniques to implement the CIES for CI identification?

1.5. Objective

1.5.1. General Objective

The general objective of this study is to develop a Constitutional Interpretation expert system to support decision suggestion services and timely provision of solution to the violation of public's right by CoCI /HoF.

1.5.2. Specific Objective

In order to address the general objective the study aims:

- Going around the related work in the design of Constitutional Interpretation Expert System
- Identify the methodology and tools to design Constitutional Interpretation Expert System.
- Gather a specific data in the CIES case, which will be input data, for the demonstration model of decision support CI expert system.
- Design the decision support CI expert system.
- Test the decision support CI expert system
- To test and validate the system
- To provide recommendation for further research in the area of CIES

1.6. Research Design

(Polit and Hungler, 1999:155) [36] describe the research design as a blueprint, or outline, for conducting the study in such a way, that maximum control will be exercised over factors that could interfere with the validity of the research results. The research design is the researcher's

overall plan for obtaining answers to the research questions guiding the study. (Burns and Grove, 2001:223) [65] state that designing a study helps researchers to plan and implement the study in a way that will help them obtain the intended results, thus increasing the chances of obtaining information that could be associated with the real situation.

1.6.1 Data Collection and Analysis

Interview was conducted with legal experts and members of management in charge of Constitutional Interpretation and Identity Affairs Standing Committee and its corresponding Directorate at the EHof. Ten (10) respondents were purposely selected from both the legal experts and the management. In addition, observation and document analysis was applied to understand the service process and identify the existing challenges. Content analysis consisting thematic coding and thematic analysis scheme was deployed for analyzing the qualitative data.

1.6.2 Application Development

Java-script Software Engineering with the integration of HTML, CSS, Not pad++. Methodology was used for the overall system development. Results from qualitative study will be used as an input for designing and developing the system. Various activities including requirement elicitation and analysis, system design, implementation and testing were employed the system development process.

1.7 Contribution of the Study

The key contribution of the study include:

- Enhancing the decision making process of CI experts at House of Federation with easy to use system based Information
- Enable legal experts to respond to clients' concerns and provide them advisory suggestions easily and efficiently using the CI expert system.
- Enabling clients to get justice on time
- Reduce the cost of customer that would have been paid for transportation to and from regional state and A.A frequently

- Experiences were not lost, when expert leaving an organization.

1.7 Scope and Limitation of CI Expert System

This study tries to come up or modernize cultural, manual or poorly managed (hard copy based) knowledge management in the CI Expert System of the HoF. Therefore, for the need to manage Knowledge resources of HoF's. Thus, Knowledge retention guidelines framework was recommended. To enhance and support the creation, storage, and sheering of knowledge in the Organization over time in order to ensure an effective knowledge management of OM.

1.7.1 Scope of this study on CI Expert System

The CI Expert System **scope** is as follows:

- It is cost effective.
- This CI Expert System does not forget the way human expert does.
- A system capable of providing questions with two choices (*Yes/No*) to be reply by the user
The user get the next question or decision comment, according his choice.
- CI Expert System **is** capable of delivering solutions after users respace.
- It provides expertise needed at a number of locations at the same time.
- Cuts the expense of consulting experts for problem solving
- It provides fast and efficient solutions to problems in a narrow area of specialization.
- Offers consistent answer for the repetitive problem
- Helps you to get fast and accurate decision suggestion
- A proper explanation of decision-making comment.
- Ability to solve complex and challenging issues

1.7.2 Limitations of this study on CI Expert System

However, this study did not provide an implementation plan for the knowledge retention Program within HoF, but for the demonstration purpose. This was due to the fact that the implementation of knowledge management program requires aligning the contributions of key Organizational actors, time, information communication technology (ICT), that need detailed information and understanding of the total environment of HoF. (Management and financial

support). So this study gives the sample demonstration of the knowledge based expert system, but not the actual implementation of the CI Expert System.

- Unable to make a creative response in an extraordinary situation
- Errors in the knowledge base can lead to wrong decision
- The maintenance cost of an expert system is too expensive
- Each problem is different therefore; the solution from a human expert can also be different and more creative

1.8 Organization of the Thesis

This thesis is organized into six chapters.

CHAPTER TWO: This chapter presets a literature review of the related works introduction, background study, statement of the problem, research objectives in detail; it is a detailed presentation of organizational memory and expert system, research design, methodology, scope and limitation of the study. It presenting about, and non -knowledge incentive organizations, and their differences are presented.

CHAPTER THREE: this chapter presents an overview of the Research Methodology, research approach, design and Explains, Data Collection Method, the Data Analysis Method, Qualitative Research Approach, Requirement, Elicitation of Functional and Modeling, Expert System Designing, ES Development Environments are presented in detail at the end of this chapter the last closing section “Ethical consideration” is explained.

CHAPTER FOUR: this chapter presents by starting by the chapter’s introduction followed by the data analysis, primary and secondary data analysis and findings from and the survey, and also challenges in current service process, requirement of the system are presented in detail, in addition to these, system analysis model, with use case model and descriptions are presented in detail, and others.

CHAPTER FIVE: This chapter presents the system design, implementation and the system testing types of the system are presented, these main topics of the chapter presented in detail in

their sub- topics. There are various system testing method, but for this system testing, I selected only three testing methods: they are Unit testing, Integrity testing, and User acceptance tastings are used.

CHAPTER SIX: This last Chapter presents contribution of the research, conclusions, discussion and Suggestions, future research directions were presented in detail.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter presents literature in the domain of the research, which is mainly concerned, with application of technology, i.e., Expert System in building organization memory.

The purpose is to create familiarity with current thinking and research on a particular topic of interest, and may justify research into an overlooked or understudied area and summarizes published research under consideration for it referring to all the previous research and scholars (Huett, A., MacMillan, D., Crum, K., and Koch, R. T., 2011) [27].

It will focus on the empirical studies related to the study as well as its conceptual framework and current trends related to the problem with the purpose of gaining a sense of direction and clear understanding.

2.2. Knowledge Intensive Organizations

Knowledge intensive organizations (KIO) employ highly skilled staff, knowledge workers, whose role is essentially problem solving. Knowledge in KIO is a product of the expertise, experience and skills of the individuals and workgroups that make up the organization; it is stored in individual's minds, explicitly encoded and documented in corporate information systems and implicitly embedded in organizational culture, rituals, policy and procedures. In such organizations, besides labor, capital, and land, knowledge has been recognized as an important Service or productivity factor for organizations [Abecker and Decker 1999] [18]. Solving problems in such organizations involve complex, knowledge-intensive tasks such as dealing with abstraction and uncertainty or recognizing patterns of organizational behavior.

Knowledge-intensive organization constitute knowledge workers who are defined as qualified labour (Alvesson, 2004) [39]. The term 'knowledge worker' is used to encompass both professionals and groups with other forms of discipline-based knowledge or more esoteric expertise and skills. Distinguishes between two major types of knowledge-

intensive Organization; Research and Development (R&D) companies and professional service Organizations Professional service Organizations deal largely with intangibles and those employed often deal directly with clients while R&D companies typically produce tangible products and contact between employees and the customer are less direct. They are client-based and their focus is client relations. The Law organizations have existed as organized profession. The majority of professional service Organizations are structured and organized along similar lines – often referred to as the professional bureaucracy. Professional bureaucracies are organized along traditional hierarchical lines. Legal professionals will occupy the senior positions within the Organization and a range of non-legal professionals will manage discrete functions within the Organization such as human resources, finance and so on.

To be effective, work-groups in KIOs must seek to exploit examples of best practice, improve their efficiency and contribute to overall organizational learning. Workgroups in KIOs need to manage their existing skills effectively, create mechanisms to elicit new ideas and innovations, and identify sources of information. Mechanisms should be developed for keeping this intangible knowledge asset and transforming it into outcomes valued by the customer. Continuous learning and renewal of individual and organizational practices and processes is necessary in a constantly evolving environment. A proactive attitude in questioning the existing ways of doing things is valuable.

2.3. Knowledge Representation

Knowledge representation it is a infrastructure of an expert system which introduced many method for this. On the other part, we live In advance and complex information technology world, then we need a new method to use of complex knowledge representation. At first, XML Language introduces as extended of HTML Language for using, showing ad transmitting data of internet webpage. After shortly, this language cae use in other information systems as dataset system and so. Nevertheless, the advantage has not been use on this language in expert system, until now. in this paper at the first section, we survey as background to XML language then discusses total properties of a knowledge representation. [63]

Although knowledge representation is one of the central and, in some ways, most familiar concepts in AI, the most fundamental question about it--What is it?--has rarely been answered

directly. Numerous papers have lobbied for one or another variety of representation, other papers have argued for various properties a representation should have, while still others have focused on properties that are important to the notion of representation in general. [65] the knowledge base systems consists of facts. Facts, in general, are elements that can be described by a finite amount of discrete values. The coherences between the elements are represented by rules. There are many knowledge representation techniques are:

- | | | |
|---------------------|------------------------|--------------------------|
| a. Logic | c. Frame | e. Conceptual Dependency |
| b. Semantic Network | d. Conceptual Graphsf. | f. Script |

Logic is particularly useful in the domain of automated theorem providing, which can trace its roots to the work of Newell and Simon in the early 1960s, the earliest legal knowledge based systems were developed in the 1970's; they were primarily rule-or logic based.

After knowledge has been gathered from domain experts and different sources, a model for representing the knowledge must be developed. Thus, knowledge representation is the preparation of a knowledge map and encoding of the knowledge in the knowledge base. Good knowledge representation methods have completeness, compactness, clearness and good performance characteristics [44]. Frames, semantic networks and rules are some common knowledge representation methods.

Even though, frame representation scheme is appropriate to highly well-defined structured knowledge, it is difficult to use it in unstructured knowledge due to the fact that instantiating new frames by matching to archetypes and implementing some logical relationships between concepts are difficult [46].

2.4 Organizational Memory (OM) and Definition

Many authors from different perspectives (Zeinab Toulabi, Mehdi Dehghani and Hamid Reza Al Taha, 2012) [40] define organizational Memory (OM) (also known as a Corporate Memory, Enterprise Memory). It is defined as:

- The means by which knowledge from the past is brought to bear on present activities resulting in higher or lower levels of organizational effectiveness
- A stored information from an organization's history that can be brought to bear on present

decisions (Walsh and Ungson, 1991) [42].

- Huber, Davenport, and King (1998) [43] summarize OM as the set of repositories of information and knowledge that the organization has acquired and retains.

OM is seen to have two principle goals: to integrate information across organizational boundaries and to control current activities and thus avoid past mistakes. Organizational memory improves and enhances organizational knowledge by merging dispersed knowledge in the organization through acquiring, organizing, disseminating and re-using it (Jacobsen, 2004) [44].

The loss of Corporate Memory often results from a lack of appropriate technologies for the organization and exchange of documents. Another contributing factor to the loss of corporate memory is the departure of employees because of either turnover or retirement. KM is concerned with developing applications that will prevent the loss of Organizational memory. Five “retention bins/facilities” of organizational memory were identified: individuals, culture, transformations, structures, ecology. Ungson and Walsh (1991) [45], for instance, argue that the content of the organizational memory is composed of information about previously made decisions and solved problems. Unland (1994) [46] considers that OM represents only one part of the process of organizational intelligence, which is the intellectual ability of an organization to solve organizational problems and is a collective of five components:

- a) Organizational memory;
- b) Organizational knowledge;
- c) Organizational learning;
- d) Organizational communication;
- e) Organizational conclusion

The organizational memory represents one of the central components of organizational learning, being a critical element for learning and communication in organizations (Walsh and Ungson, 1991) [56] as well as organizational knowledge.

2.4.1 Organizational Learning

Organizational learning (OL) is defined as the process of detection and correction of errors. In this view, organizations learn through individuals acting as agents for them. Individual

learning activities are seen as being facilitated or inhibited by an ecological system of factors that may be called an organizational learning system. Learning in this perspective is based on model of experiential learning where individuals learn by doing. A collective social practice is developed to link individuals together across official organizational boundaries, departments, and makes up Communities of Practice (CoP) that can engage in social construction of knowledge. The community of practice consists of members who interact with each other for their pursuit of a common practice. A community of practice can be defined as "a group of professionals informally bound to one another through exposure to a common class of problems, common pursuit of solutions, and thereby themselves embodying a store of knowledge" (Stewart, 2001; in Botha et al, 2008) [47] . Organizational Learning is therefore, the process by which an organization assimilates experiences of its members and uses that experience to modify the organization's potential actions. Whether the actual organization learns or only its members learn and then share, in both cases an Organizational Memory is necessary to facilitate the processing and retention of information and knowledge needed for the learning to take place.

2.4.2 Organizational Knowledge

(Davenport and Prusak, 1998) [48] View knowledge as an evolving mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information. They found that in organizations, knowledge often becomes embedded in documents or repositories and in organizational routines, processes, practices, and norms. (Nonaka, 1994) [49] expands this view by stating that knowledge is about meaning in the sense that it is context-specific. This implies that users of knowledge must understand the context in which it is generated and used for it to have meaning to them. This also implies that for an Organizational Memory (OM) to be useful, it must also store the context in which that knowledge was generated. That knowledge is context specific argues against the idea that knowledge can be applied universally, however it does not argue against the concept of organizational knowledge. On these considerations, organizational knowledge is to be a subset of OM. This implies that the processes of knowledge management are also a subset of OM. 3Organizational knowledge is considered, nowadays, as an asset that, although intangible, generates competitive advantage to the organization. Competitive advantage is reached through continuous improvement and process innovation, and knowledge is the

organizational resource that allows the organization to develop activities of improvement & innovation (Rodrigo Valio Dominguez Gonzalez and Manoel Fernando Martins, 26/2017) [50].

Organizational memory (OM) is not representing all knowledge in the organization. It is remembering only pertinent knowledge to be reused in organizational activity. This concept is replicating human memory model which is not remembering all, but only necessary memory (past activity) for supporting current activity. (Suzana Basaruddin, Haryani Haron and Sit Arpah Noordin, 2011) [24]. Relevant pieces of knowledge that are assumed to contribute to the performance of an organization could, and should, be stored in the OM. Some knowledge-based features are summarized below:

- The ability to store dispersed and unstructured corporate knowledge, such as corporate competencies characteristics, project experiences, and documents contextual knowledge.
- The ability to semi-automatically assist user queries and support related decision making tasks by providing a guidance structure based on proposing hints and alternatives, showing the reasons ‘why’ and ‘why not’, or presenting future perspectives on existing information;
- The ability to perform context-based information retrieval, presenting contextual (or situational) knowledge about information sources, and assisting the execution of services, problem solving services, and business tasks;
- The ability to perform reasoning upon the conceptual structure (e.g., based on ontological descriptions) and its particular instantiation in order to categorize (create) and classify new corporate knowledge assets. [13]

2.4.3 Organizational Knowledge Management

Knowledge management includes the processes of seeking, acquiring, aggregating, organizing, and disseminating knowledge as well as developing new knowledge and creating new relationships from existing knowledge (Gold, Malhotra, & Segars, 2001; Grant, 1996) [12].

There are two main perspectives of study on the knowledge management (KM) process. The first, referred to as flow based on organizational development, focusing on increasing the knowledge storage and reuse of the knowledge repository (Alavi, and Leidner, Argote 2001) [21]. In this perspective, KM refers to the development of methods, tools, techniques and

organizational values that promote the flow of knowledge between individuals and the retrieval, processing, and use of this knowledge in improving and innovating activities (Yang, 2010) [51]. In this way, organizations need to prepare themselves internally so that knowledge can circulate among individuals and, in addition, be used in actions that result in some kind of improvement. The second important area, called process-based flow, has as its main interest the study of the contribution of Information Technology (IT) as a mechanism to stimulate the creativity of individuals to develop new values (Teece, 2007) [52].

Although many of its central points are not new to the academic world, the study of Knowledge Management (KM) is a recent concept, discussed more fully in the 1990s [32], treated as a process that promotes the flow of knowledge between individuals and groups within the organization, consisting of four main steps: acquisition, storage, distribution and use of knowledge (Durst & Edvardsson, 2012; Liao et al., 2011; Argote et al., 2003; Cormican & O’Sullivan, 2003) [31].

2.4.4 Why Organizational Memory?

The notion of organizational (corporate) memory (OM) focuses on the persistence and maintenance of knowledge in an organization (Heijst et al., 1997). [53] The metaphorical view of an OM claims an infinite storage, retrieval, and distribution of organizational knowledge (Ackerman, 1994) [54]. OM is seen as a mechanism that enables the continuous storage and manipulation of organizational knowledge.

Why Does It Matter? Organization theorists, economists, and strategists have long sought to determine when organizations will be able to draw relevant information from their history. Although Organizations can sometimes learn from their experiences, we know that organizations and individuals frequently suffer from memory loss. Moreover, Organizations invest deeply in attempts to capture organizational memory in knowledge-management systems, but employees commonly underutilize these systems. Yet, our understandings on the performance benefits of organizational memory are still limited. These limited understandings likely stem from incomplete conceptualizations of information storage and retrieval and, in turn, from incomplete empirical tests.

2.4.5 Functions of Organizational Memory

Functions of OM is to *store* the captured data, information and knowledge applicable to the organization in accessible repositories. OM is created as a result of individual and organizational activities and learning. Capturing the experience involves capturing the structured explicit knowledge and the unstructured tacit knowledge. Capturing the structured explicit knowledge is relatively easy. It can be captured from documents, reports, publications, work procedures, data processing systems, Information Management Systems etc.

Capturing the unstructured, abstract, tacit knowledge though difficult, it is important for the OM. It requires actions such as changing procedures and work processes. The context and reasoning of such changes can be captured and stored in OM. In addition to this limited capture of tacit knowledge, individuals themselves are the main source of tacit knowledge. Information and knowledge stored in OM are applied over time, the organizational culture changes to reflect its use.

Researchers have argued that retiring workers are predestined for sharing knowledge with others because they have accumulated relevant organizational knowledge over several years (Voelpel, Sauer, and Biemann, 2012) [57]. More indicated that employees are more likely to approach older employees with requests for knowledge sharing, regardless of their tenure. In this case, knowledge retention is the result of successful knowledge transfer between older and retiring workers and those employees who remain within the organization (Ropes, 2013) [29]. Successful knowledge transfer is defined by the acquisition and application of the shared knowledge in new contexts by knowledge recipients (Beazley et al., 2002; Ropes, 2013). [14]

Knowledge retention processes, as essential components of knowledge management, relate to actions taken to develop and maintain the organization's knowledge base, i.e., organizational memory (De Long, 2004) [28]. **The** objective of knowledge retention is to ensure that organizational members can reuse knowledge. Basic functions of OM are *acquisition, abstraction, recording, storage, retrieval, interpretation, and transmission* of organizational knowledge (Stein and Zwass 1995). [22]

1. **Acquisition:** Organizational memory consists of the accumulated information regarding past

decisions. This information is not centrally stored, but rather it is split across different retention facilities. Each time a decision is made and the consequences are evaluated, some information is added to the organizational memory. Knowledge acquisition focuses on modifying knowledge to make it more potentially reusable. For instance, implicit procedures can be formalized and entered into a repository.

2. **Abstraction:** The process of generalization is based on compiling facts, deriving concepts and rules, building higher-level models, and accumulating knowledge that is abstract/conceptual in nature. Abstract knowledge is knowledge of high abstractness that leads to high applicability that makes up the core of human intelligence
3. **Recording:** Recording is a powerful instructional strategy of physical representation of knowledge and culture. It is essential for an Acquisition, organizations, and retention of Content knowledge.
4. **Storage:** The knowledge storage stage refers to the organizational memory formation process, in which knowledge is formally stored in physical memory systems and informally retained as values, rules and beliefs that are associated to culture and organizational structure. Knowledge storage involves the processes and practices used to hold knowledge until it is needed.
5. **Retrieval:** This can be either controlled or automatic. The latter refers to the intuitive and essentially effortless process of accessing organizational memory, usually as part of an established sequence of action. Controlled refers to the deliberate attempt to access stored knowledge (Sandoe and Olfman, 1992 and Morrison, 1997) [32]. Knowledge retrieval activities aim at accessing knowledge for reuse, for instance, by searching through a document repository.
6. **Interpretation:** is defined as the process of translating the events, developing models for comprehending, giving meaning and assembling conceptual schemes. States that individuals and groups have prior belief structures that shape their interpretation of information and thus the formation of meaning. A decision support system can support not only the storage and retrieval of information going into the decision-making process but also can be regarded as a

tool to promote learning and awareness among individuals and groups.

7. *Transmission:* Knowledge transfer means to convey and to diffuse knowledge among different organizations or within one organization. Regular meetings, training, and personal contact are ways to convey knowledge.

The knowledge acquisition strategies should yield positive effects in terms of service, productivity and overall organizational performance. Similarly, repositories should be designed to facilitate storage and retrieval, for instance, through proper knowledge categorization and links to other related knowledge resources.

Knowledge retention is a critical Knowledge Management process, but it is also closely linked to *knowledge loss*. As outlined earlier, knowledge loss refers to knowledge *attrition* when part of the created knowledge base is not retained by the organization. While knowledge may be created by individuals or groups within the organization, this knowledge may be lost if it is not acquired by a knowledge retention entity (e.g., a work process or knowledge management system; De Long, 2004) [28]. Some new or existing knowledge may be *intentionally forgotten*, for instance, to change bad habits, with the objective of increasing overall service and productivity. Knowledge can also be lost *unintentionally*. Two types of accidental knowledge loss have been discussed below:

- Failure to consolidate new knowledge and
- Failure to maintain established knowledge

Failure to consolidate new knowledge occurs when the organization neglects to go through the knowledge acquisition phase. In this case, knowledge is lost before it can be captured. Second, failure to maintain established knowledge occurs when stored knowledge is forgotten over time and stops being retrieved. Often, individuals forget the type of available knowledge that could help them with their tasks. Knowledge loss can also occur

expert contributors themselves, or when knowledge is not refined or reshaped over time. Following accidental knowledge loss, the organization has to recreate the knowledge before it can be reused, which has negative impacts on organizational performance.

Past research often implicitly assumes that improving knowledge retention means *reducing knowledge loss* (Levy, 2011) [23]. However, accidental knowledge loss does not represent the other end of the knowledge retention spectrum, since actions taken to increase knowledge retention do not necessarily translate into less knowledge loss. A document may be captured by a Knowledge Management System (KMS), but never retrieved and reused. This example shows that paradoxically knowledge can be both retained knowledge and lost over time.



Figure 2.1 Knowledge retention process (Source p.4,) [9]

An important step in knowledge retention is to make sure that knowledge is at greatest risk of being lost is documented. For example, if there is only one employee who knows why the CI Expert System utilizes a certain safety protocol, it is important to make sure that their how-to understanding of the way certain work processes work together is retained to support future performance of those same processes. To help ensure that knowledge retention efforts are successful, transit agencies should create protocols that dictate how knowledge should be retained, making sure that these processes are institutionalized and become part of the employee knowledge preserving system that prepares CI Expert System for future success. [16]

2.5 Organizational Memory System and definition

An Organizational Memory System (OMS) is a system, which realizes parts of the organizational knowledge base with the help of information and communications technologies. In addition, a system realizes and supports tasks, functions and procedures that are connected to the use of the organizational knowledge base. (Franz Lehner, Ronald Maier, Oliver Klosa, Oct 1998) OMS offer the possibility that computer system can better serve the information storage

and retrieval needs of an organization's memory.

OM Information System (OMIS) is defined as "a system that functions to provide a means by which knowledge from the past is brought to bear on present activities, thus resulting in increased levels of effectiveness for the organization" (Stein and Zwass, 1995) [38]. OMIS can be also defined as any IS used in the organization that allows to enhance the process of acquisition, retention, storage, and distribution of knowledge over time, even involving those individuals who are not part of the organization, promoting an effective knowledge management process and Organizational memory; and (ii) optimizing the processes of decision-making, problem-solving, quality assurance and development of services and products in the Organization (Kwan and Balasubramanian, 2003; Stein & Zwass, 1995) [55]. This definition clearly aims at the contribution of such systems to the increase in organizational efficiency. OMIS consists of processes for identifying OM, OM Repositories, processes for storing, searching, retrieving, and displaying OM, and users. In OMIS, information systems (IS) should make possible the acquisition and retention of knowledge, whether explicit or tacit, the storage and dissemination of this knowledge when needed. It is not required that the OMS be computer-based. Therefore, OMIS or OMS is considered as a component of organizational memory. There are three forms of OMIS: *paper documents*, *computer documents*, and *self-memory* (Jennex, 1997) [37].

- ***Paper documents***: are organization-wide references that reside in central repositories such as a corporate library. Examples of paper documents include reports, procedures, and technical standards. An important part of this memory is in the chronological histories of changes and revisions to these paper documents as they reflect the evolution of the organization's culture and decision-making processes.
- ***Computer documents***: include all computer-based information that is maintained at the work group level or beyond. These may be made available through downloads to individual workstations, may reside in central databases or file systems. Additionally, there are the processes and protocols built into the information systems that are reflected in the interface between the system and the user, by who has access to the data, and by the formats structured system inputs and outputs.
- ***Self-memory***: includes all paper and computer documents that are maintained by an

individual. Typical components include files, notebooks, written recollections, and other archives. These typically do not have an official basis or format. Each person's self-memory is determined by what is important to that person and reflects that person's experience with the organization.

Expert System (ES) knowledge-based systems (KBS), document management systems, semantic networks, object-oriented and relational databases, decision support systems (DSS), collaborative systems, social networks, intranets, simulation tools, distributed systems; document management; geographic information systems (GIS); contextual indexes; metadata; navigator; e-mail; search/retrieval of tools; information repositories; web server; agents/filters; external services server; video-conferencing; data mining; information and communication technologies (ICTs); artificial intelligence (AI); database technology; modeling; among others are examples of systems and tools that support organizational memory.

2.6 Expert System and Organization Memory

Expert system: Expert system is a branch of an artificial intelligence (AI) computer program that emulates, or act in all respects, that provides assistance in solving difficult problems normally handled by human experts. That would otherwise require extensive human expertise, to do so; it simulates the human reasoning process by applying specific knowledge and interfaces. Expert systems is said interchangeably, knowledge-based systems, and knowledge-based Expert systems. (Sanjay Kumar and Rajkishore Prasad, 2015) [33]

Expert systems differ from conventional Computer software programs in many important aspects. In expert systems, there is a clear demarcation between the knowledge about the problem domain and the knowledge for applying the same in solving a problem. The former is encoded in the knowledge base, while the latter is implemented as an inference procedure of the expert system. Ideally, it should be possible to change the system, by simple additions and deletions to the knowledge base. Conventional programs are designed to solve problems for which all the factors used in the decision-making process can be completely analyzed.

The operation of an expert system can be viewed in terms of the interaction of distinct

components. The knowledge base stores knowledge about how to solve problems. Inference procedures are executed by a software module called the inference engine. If the user of the expert system is a person, communications with the end user are handled via an end user interface. Figure 2.2 provides a graphical illustration that summarizes the architecture of a typical expert system.

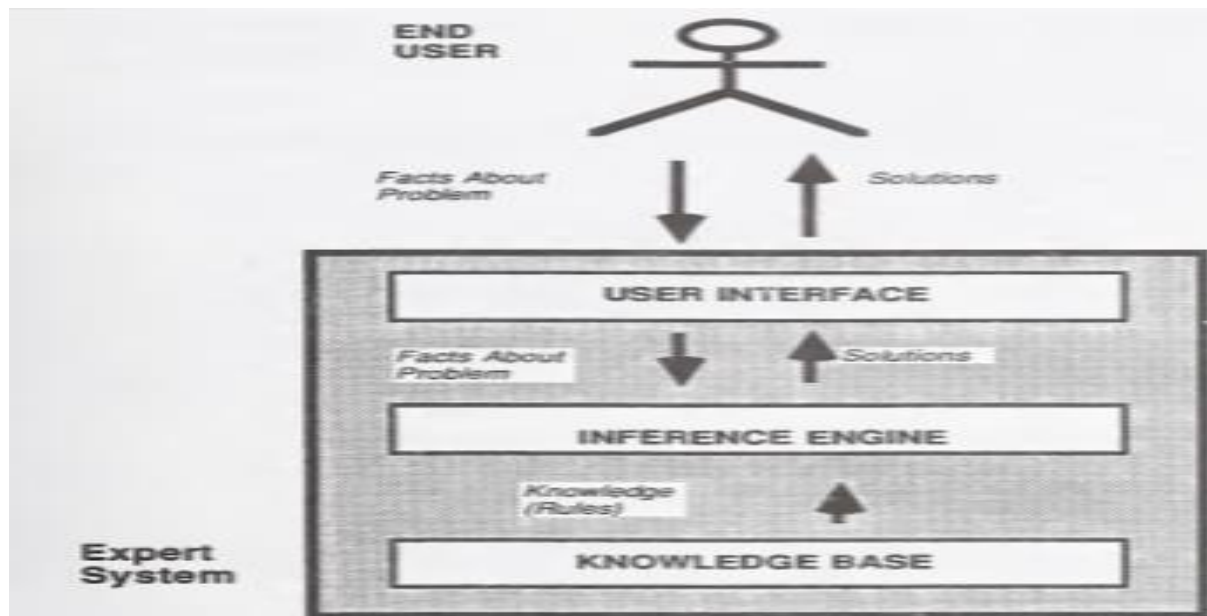


Figure 2.2 The Architecture of an Expert System

Organizational Memory: Organizational Memory (OM) can be viewed as abstract or concrete. It is comprised of unstructured concepts and information that exist in the organization's culture and the minds of its members, and that can be partially represented by concrete/physical memory aids such as databases. It is also comprised of structured concepts and information that can be exactly represented by computerized records and files. (Sandoe and Olfman, 1992); and Morrison (1997) [96] describe these two forms of OM as having two functions, representation and interpretation. Representation presents just the facts (or knowledge or expertise) for a given context or situation. Interpretation promotes adaptation and learning by providing frames of reference, procedures, guidelines, or a means to synthesize past information for application to new situations.

No single accepted definition of OM exists. OM is seen to have two principle goals: to

integrate information across organizational boundaries and to control current activities and thus avoid past mistakes. Huber, Davenport, and King (1998) [11] summarize OM as being the set of repositories of information and knowledge that the organization has acquired and retains. Stein and Zwass (1995) [15] define OM as the means by which knowledge from the past is brought to bear on present activities resulting in higher or lower levels of organizational effectiveness. (Stein and Zwass, 1995) [38] define OM as stored information from an organization's history that can be brought to bear on present decisions. Basic functions of OM are perception, acquisition, abstraction, recording, storage, retrieval, interpretation, and transmission of organizational knowledge (Stein and Zwass 1995) [15]. Walsh and Ungson (1991) [19] propose that organizational memory consists of five retention facilities: individuals, culture, transformations, structures, and ecology.

These definitions suggest that learning and knowledge are associated with OM. They also provide insight into the content and repository perspectives of OM. The content perspective focuses on the information and knowledge that is captured and the context in which it is used.

The repository perspective focuses on where and how information and knowledge is stored and retrieved. Both perspectives are relevant to this chapter.

2.7 Review of Related Studies and Gap Analysis

Table 2.1 Review of the related studies and gap analysis

1. Author, Year published, Title	2. Problem addressed	3. Method followed	4. Solution proposed	5. Research Gap
1 (Yasser A. Nada ^{1st} (Hossam Meshref ² ; Nov. 2014) Analysis, Design, & Implementation of Intelligent ES for Lady Clothes Style Selection	Ladies Clothes Style Selection problem?	Fashion Ontology	ES for Lady Clothes Style Selection	Methodology followed is not presented.
2 (Azian Azamimi Abdullah ¹ , Zulkarnay Zakaria ² & Nur Farahiyah Mohammad ³ ; 2011); Design and Development of Fuzzy ES for Diagnosis of Hypertension	Hypertension risk for patients problem	Blood pressure and heart rate. Diagnostic	diagnostic ES to threat the hypertension patient.	The research procedure followed is not presented
3. (Suheir H. Almurshidi; April, 2018) ES for diagnosing breast cancer	Breast Cancer problem	Follow custom Agile methodology	Breast Cancer diagnosis ES	Interview data should not be analyzed on thematic analysis method
4 (Adsavakulchai, S, 2014); Developing KBSs: Car Failure Detection using ES	Car failure problem	Shells, ESBTs programming environments	Car failure detection ES	Tastings, like System testing , integrity testing & user acceptance testing are not presented
5 Esin Ozar K iris, B.s., “Human factors for expert sstems”, May, 1993	No information (control condition),	(digital, categorical, analog & rank)	To reduce ES decision making time	The development models are not presented
6 Befrdu Seifu Gebreamlack, “Web-based legal decision support ES: the case of Ethiopia”, February, 2014	No legal consultation & decision support System.	JESS & E2gRuleEngi ne	legal decision Support ES.	No, research question

Finally, some of the articles or Thesis papers reviewed were written in the organized properly and formally written, from them I got Thesis writing skills. while, some were not properly/ formally written; misplacement of the organization of their paper, Methodology followed is not presented, The research procedure followed is not presented Interview data should not be analyzed on thematic analysis method, Tastings, like System testing , integrity testing & user acceptance testing are not presented The development models are not presented and etc.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

Research is a scientific inquiry aimed at learning new facts, testing ideas, a way to systematically solve the research problem. A research methodology describe a research design as a strategy or structure for an investigation or it is a list of conditions and processes for leading and controlling a research project. In other words, it is the strategy for conducting a research. It is the systematic collection, analysis and interpretation of data to generate new knowledge and answer a certain question or solve a problem. This chapter presents the research design, research instruments, data collection and analysis procedures, and system development methodologies with the aim of addressing the research questions and meet the objectives of the study.

3.2 Research Design

A research design serves as a master plan of the approaches, procedures and conditions that should be used to collect and analyse the data needed by the researcher for conducting a research. It is a list of specifications and procedures for conducting and controlling a research project. It indicates the full research process from conceptualization of the research problem, generation of data, analysis and interpretation of findings. This study not only need to know how to develop certain indices or tests, and how to apply particular research techniques, but they also need to know which of these methods or techniques, are relevant and which are not, and what would they mean and indicate and why.

This study follows qualitative (*Phenomenological*) research Approach Qualitative research approaches is inquiry in the natural setting, an exploratory study of experience-as-lived and everyday life in the world. The qualitative approach aims to investigate how the respondent interprets his/her reality (Bryman & Allen, 2011) [20]. Qualitative research is usually used for examining the meaning of social phenomena, rather than seeking a causative relationship between established variables (Feilzer, 2010). According to (Mayers, 2007) [41], the qualitative researcher's task often consists of describing and understanding people and groups' particular

situations, experiences, and meanings before developing and/or testing more general theories and explanations. The goal of a qualitative study is “to produce a rich description and in-depth understanding of the phenomenon of interest, the cultural or lived experience of people in natural settings” (Magilvy, 2003, p.123) [8]. **Qualitative (Phenomenological) research** Approach is preferred because of the following reasons:

- ✓ Qualitative research design is often emergent and flexible.
- ✓ qualitative research is also quite dynamic
- ✓ The qualitative research process is often non-linear and non-sequential.
- ✓ Qualitative research may seem relatively “*easy*” because it builds on skills used in our *daily lives* (e.g. asking, watching, and listening).
- ✓ Qualitative research most often uses “*purposive*,” rather than random, sampling strategies.
- ✓ Qualitative research is inductive rather than deductive

Therefore, in this study the House of Federation and legal decisions by lawyers in exceptional cases as well as the existing challenges used qualitative research approach to collect and analyse qualitative data to understand the existing process of CI Expert System. The results of the qualitative research was used as an input for developing a CI Expert System . Design science method was applied to develop the Expert System that support CI Expert System in exceptional legal cases.

3.3 Data Collection Method

Qualitative data was collected through semi-structured interview and document analysis. Therefore, the major sources of data are legal experts involved in the CI Expert System and identity affairs at the Ethiopian House of Federation (EHoF) and Council of Constitutional Inquiry (CCI) and documents consisting legal decisions made through CI Expert System In **Qualitative (Phenomenological) research** Approach *Purposive* sampling was used rather than “*random*” sampling to select experts who have knowledge and experience in the field of CI Expert System. The total number of respondents involved in the study were ten (10) Why they are 10? To include demographic variety including senior, junior, and leadership respondents, if the number is less than 10, the information will be less, if the number of respondents were more than 10 the data will be redundant. These expertise were selected based on their experiences and

their exposure to CI Expert System so that the richness of the data can be ensured and a different dimension can be derived with regard to the data collected. The interview was guided by an interview protocol consisting eleven (11) questions derived from prior studies conducted in the area of Expert System. The questions revolve around whether new information/knowledge is added each time a legal decision is made and whether there is a practice of recording, generalizing/abstracting, retention, accessing, and sharing of the newly generated knowledge. Lastly, respondents were asked about the type of information or knowledge to be stored, where it can be located, and whom the users will be if EHoF intend to build Organizational Memory. The specific questions asked are annexed at the end of the thesis. In collecting the interviews data, the researcher took notes and used a recorder to the interview sessions. The recording of the interview sessions in note form and on a record was undertaken to ensure complete capture of decisions. The sources of secondary data gathered include CI Expert System decision documents/magazine as well as Rules, and regulation published by the HoF and Council of Constitutional Enquiry (CoCI). CI Expert System Decision files of individuals were also consulted.

Valid and reliable requirements were also derived for the Expert system from both primary and secondary data. For the purpose of requirement gathering and determination of the current manual/cultural systems, both primary and secondary sources of data were used.

3.4 Data Analysis Method

Data analysis refers to the process of generating value from the raw data. There are a number of data analysis techniques that can be employed to analyze qualitative data. In qualitative research, the process by which data analysis is undertaken is fundamental to determining the credibility of the findings. Essentially, it involves the transformation of raw data into a final description, narrative was categorized.

After the recorded interview session, transcribed and merged with the hand written notes during the interview sessions the study used Microsoft Word in the transcription of the interview session. The process of content analysis involves continually revisiting the data and reviewing the categorization of data until the researcher is sure that the categories used to summarize and describe the findings are a truthful and accurate reflection of the data. The extracted data

description was used as an input for designing the CI Expert System...

3.5 Requirement Engineering

“The primary measure of success of a software system is the degree to which it meets the purpose for which it was intended. Broadly speaking, software systems requirements engineering (RE) is the process of discovering that purpose, by identifying stakeholders and their needs, and documenting these in a form that is amenable to analysis, communication, and subsequent implementation”. RE is the first and most important phase of Software Engineering. In this phase, we prove with evidence, maintain and formulate Software Requirements. Various research papers introduce different techniques in Expert System (ES) development using RE. Helps to collect and improve software quality and information.

Unlike other conventional programming software, ES works as an expert based on large amount of knowledge that is derived from human experts. ES development requires the knowledge of human experts to be converted into computer understandable rules and conditions.

ES are developed to meet requirements of users of some specific field. Therefore, the most critical phase of ES development is to get all but specific requirements of the users of that field. Previous works in this field of law has some limitations. The goal of this paper is to enhance the RE technique in ES software development by evaluating non-existing system of EHof and to demonstrate some Constitution interpretational Issue user-interface techniques for both *functional* and *non-functional requirements*, hence providing a complete framework for RE process in ES development.

This study applies set of techniques and activities completely and efficiently Elicit, Analyze, Formulate and validate the requirements according to the needs of user or stakeholders at HoF. The three main activities followed for requirement engineering process model include [27]:

- **Elicitation:** Eliciting requirements from users, customers and stakeholders.
- **Analysis:** Analyzing and modeling the requirements.
- **Documentation:** Documenting the Requirements in Software Requirements Specification (SRS).

3.5.1 Knowledge Elicitation

Knowledge Elicitation methods have been used to obtain the knowledge required to solve problems. The elicitation of knowledge from the experts can be done manually or with the help of computers. The type of method chosen and applied in this research is the manual methods, because of domain knowledge used is available on domain experts and manuals. Interview was used as a method to collect the requirements of users in the process of CI Expert System by the HoF. Various legal experts and responsible offices that deal with legal decision were involved in the interview to get different options. Relevant documents related that constitute legal decisions were also reviewed for understanding the processes and eliciting requirements.

The techniques used within manual methods are formless face-to-face interviews and observations. In eliciting knowledge about the Constitutional Interpretation Expert System identification, key informer interviews are conducted with ten (10) respondents, in addition to the interviews, six (6) hardcopy based Constitutional Interpretation decisions and one Constitutional Interpretation decisions magazine were referred from HoF, hence, these relevant manuals with key informers, to acquire the relevant knowledge or information. the magazine of the Constitutional Interpretation decision was shown below at Figure 3.1



Figure 3.1 Constitutional Interpretation decisions Magazine

Prior to the in-depth key informant interview, informal communication and observations has been held with the Individuals and Experts to be aware with Constitutional Interpretation identification Expert system.

3.5.2 Requirement Analysis and Modeling

Requirements were analyzed by identifying views of legal experts regarding knowledge retention or organizational memory, prioritizing the requirements of the legal experts and resolving any conflict in the specified requirements. Both functional and non-functional requirements were modeled using UML, ER diagrams and Use Case diagrams. After analyzing and modeling, the agreed requirements were formally documented.

3.6 Knowledge based Expert system representation method

A variety of knowledge representation schemes has been developed. Most of them are presented in chapter 2, Section 2.3. From the most usually used methods of knowledge representations *production rule*, *frame* and **Network**. Knowledge taken from experts and other bases must be organized in such a fashion that a computer inferencing program allows to access this knowledge whenever needed and draw conclusions. In this prototype KBS, production rules are used, since it permits the relationships that make up the knowledge base to be broken down into manageable units. In addition, new rules may be added and old ones deleted usually independently of other rules (Aronson and Turban, 2004).

The knowledge taken from the experts, is signified by *production rules (IF - THEN)*. Knowledge from the decision ladder in the previous chapter was hence, converted into **IF THEN** forms as follows for the Constitutional Interpretation Expert system (CIES) / KBS:

1. Divorce case

Rule 1 IF the divorce was made by the court's decision
AND the divorce was made based on the three reasons on the new family law Art. 75
AND the Court's decision doesn't violates Art. 34 & 9(1) of the constitution
AND the court's decision doesn't violates Art. 50(5), 55 of the constitution
AND the court's decision doesn't violates Art. 75 (1, 3) & 79 (3) of the constitution
THEN This divorce case doesn't require a Constitutional Interpretation

IF the divorce was not made by the court's decision
THEN This divorce case requires a Constitutional Interpretation

IF the divorce was made by the court's decision
AND the divorce was not made based on the 3 reasons on the new family law Art. 75

THEN This divorce case requires a Constitutional Interpretation
 IF the divorce was made by the court's decision
 AND the divorce was made based on the three reasons on the new family law Art. 75
 AND the Court's decision violates Art. 34 & 9(1) of the constitution
 THEN This divorce case requires a Constitutional Interpretation
 IF the divorce was made by the court's decision
 AND the divorce was made based on the three reasons on the new family law Art. 75
 AND the Court's decision doesn't violates Art. 34 & 9(1) of the constitution
 AND the court's decision violates Art. 50(5), 55 of the constitution
 THEN This divorce case requires a Constitutional Interpretation
 IF the divorce was made by the court's decision
 AND the divorce was made based on the three reasons on the new family law Art. 75
 AND the Court's decision doesn't violate Art. 34 & 9(1) of the constitution
 AND the court's decision doesn't violate Art. 50(5), 55 of the constitution
 AND the court's decision violates Art. 75 (1, 3) & 79 (3) of the constitution
 THEN This divorce case requires a Constitutional Interpretation

-
-
-

6. Family Urban land inheritance case

Rule 6 IF the land was sold to the respondent legally
 AND the appellant started appealing more than ten years ago
 THEN this case doesn't require CI since it is on period of limitation
 IF the land was not sold to the respondent legally
 THEN this case requires constitutional interpretation
 IF the land was sold to the respondent legally
 AND the appellant didn't start appealing more than ten years ago
 THEN this case require constitutional interpretation

The *antecedent* is the *condition that must be satisfied*. When the antecedent is satisfied, the rule is triggered and is said to "fire". The consequent is the action that is performed when the rule fires.

3.7 Expert System Designing

Expert system to be designed for the supporting CI Expert System aimed at “*decision comment*” providing CI Expert System in identifying, acquiring and encoding the knowledge of legal experts in exceptional cases. In this part designing a CI Expert System to help EHoF. JavaScript (JS) was used as designing software. The design of the CI Expert System consists three components (Grosan and Hoplin, 90) [37]:

1. Knowledge-Based Management System: The knowledge base similar to the database management system in an information system and a collection of rules or other information structures derived from the human expert. Rules are typically structured as IF/THEN statements of the form is presented I the previous 3.5 section.

There is a component called Agenda: When the program satisfies rules, they are added to a queue called the agenda. The agenda is an unordered list of all the rules whose antecedents are currently satisfied. Knowledge bases are typically not ordered, because order tends to play very little role in an expert system. Rules may be placed on the agenda in any order, and they may be fired in any order once they are on the agenda. (Grosan and Hoplin, 90) [37]

2 Inference Engine: The Inference engine is the Intensive engine model and the main processing element of the expert system. Inference engine works in the disassembly support system and chooses rules from the agenda to fire. If there are no rules on the agenda, the inference engine must obtain information from the user in order to add more rules to the agenda. It makes use of knowledge base, in order to draw conclusions for situations. It is responsible for gathering the information from the user, by asking various questions and applying it wherever necessary.

3 User Interface: A user interface is the method by which the CI Expert System interacts with a user. These can be through dialog boxes, command prompts, forms, or other input methods. Some expert systems interact with other computer applications, and do not interact directly

with a human. In these cases, the expert system will have an interaction mechanism for transactions with the other application, and will not have a user interface.

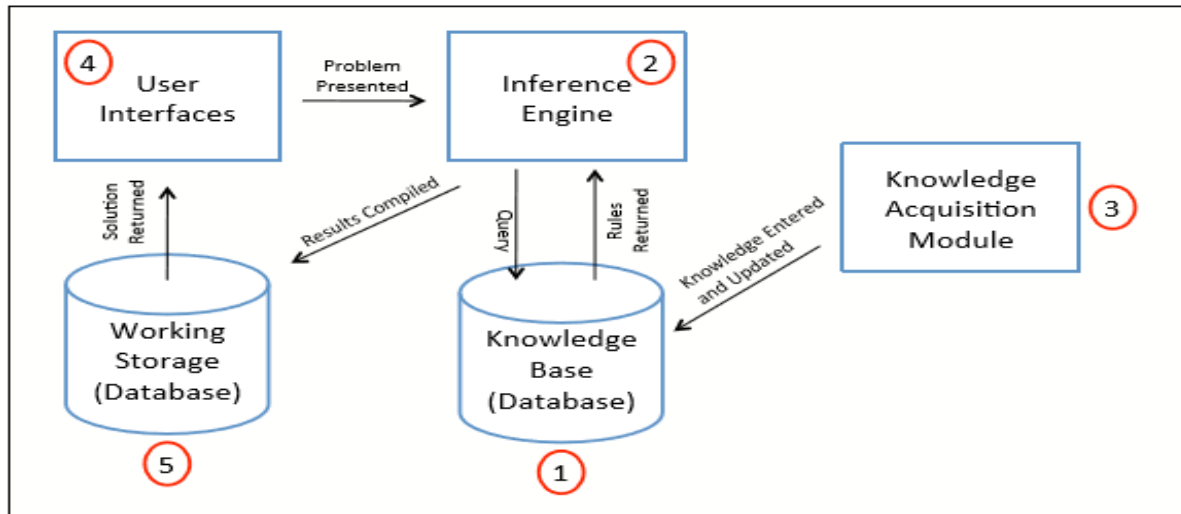


Figure 3.2 KBS Components/ Structure (Grosan and Hoplin, 90) [10]

3.7.1 Expert System Development Environment

There are a large number of programming environments, or expert system building tools, now available to assist the knowledge engineer in the construction of an expert system. [36] Expert systems can be developed in almost any computer programming language available; several major categories of software for developing expert systems exist. Like AI languages, ESBTs provide a development environment. ESBTs are often referred to as "*shells*." However, unlike Prolog, OPS5, and AI languages, ESBTs are more focused on supporting expert systems development and include features specifically for this purpose. For this study, JavaScript software is the most popular scripting language on the internet, and works in all major browsers, such as Internet Explorer, Firefox, Chrome, Opera, and Safari. Therefore JavaScript application was preferred, which was the most stable version at the time of this system's development. The latest JavaScript Development Tools (JSDT) is used. This JSDT has its own Software Development Kit (SDK) was chosen, since it *incorporates different functionalities/tools* for the development of the application, to use with the preferred application, HTML, Notepad++ and CSS were combined to make the development dynamic and suitable.

The CI Expert System is a desktop demonstration application designed to work on Desktop *computer*. This choice was made because of these devices are readily available and affordable in the Governmental Organizational offices that anybody knows it. For this research, the *Desktop /Laptop computers are preferred to install the* application. For the following important features, I preferred and used them:

1. **JavaScript:** was designed to add interactivity to HTML pages

JavaScript is a scripting language

A scripting language is a lightweight programming language

JavaScript is usually embedded directly into HTML pages

JavaScript is an interpreted language (means that scripts execute without preliminary compilation)

1. Everyone can use JavaScript without purchasing a license.
2. **HTML:** stands for Hypertext Markup Language. It allows the user to **create** and structure sections, paragraphs, headings, links, and block quotes for web pages and applications and
3. **CSS** is the acronym of “**Cascading Style Sheets**”. **CSS** is the language for describing the presentation of Web pages, including colours, layout, and fonts. It allows one to adapt the presentation to different types of devices, such as large screens, small screens, or printers. **CSS** is independent of HTML and can be used with any XML-based mark-up language.

4 **Microsoft Office Word 2016:** Microsoft Office Word is a word processor developed by Microsoft, it offers enhanced features to create professional-quality documents, **Shapes to draw Diagrams Tables Graphics with text bullets to the documents, and apply styles colors and** easier ways to work together with people, and almost-anywhere access to your files.

5 **Internet Explorer (IE):** World Wide Web (WWW) browser. Internet Explorer became one of the most popular tools for accessing the Internet is the main browser to open the Constitutional Interpretation Expert System.

6 *Notepad++* is an open-source Notepad replacement, distributed as free software is (As a lightweight text editor and source-code) editor for use with Microsoft Windows. It supports tabbed editing; another nice feature of Notepad++ that is lacking elsewhere is a tabbed interface. It adds functionality missing in Windows Notepad, such as tabs, a split-screen interface, spell checking and plugins. A handy macro recorder is included on the toolbar, for creating keystroke shortcuts for use in multiple windows. Notepad++ also has a robust plugin system, with many plugins available for installation when you download it, and the ability to pull community-developed.

3.8 Research procedure

The research carried out is known as Qualitative research. This study intended to collect information regarding the Constitutional Interpretation Expert System.

The following Sub-Topics will relate in detail how this information was collected. First, the *research strategy* will be outlined. Second, the *procedures for implementing* the strategy will be defined. **Third**, the *selection of the participants* of the study will be stated. Fourth, the *instrumentation for the survey will be discussed*. Finally, the analysis procedure to be applied to the data will be presented.

3.8.1 Research Strategy

The research presented in this thesis has been carried out according to the following steps:

Through standard research and the Constitutional Interpretation Expert System, **key issues and concepts related to leadership and Organizational growth were identified and incorporated into the structure of the research with a sensitivity to maintaining** the Constitutional Interpretation Expert system.

1. With the input of the survey instrument drafts were constructed and tested on the issue based selected expertise of the organization.
2. Interviews were conducted with HoF Expert to determine the degree of priority of these issues in the lives of the HoF and to maintain the study's reliability to HoF culture.
3. Preliminary data were collected using an initial pilot survey. This pilot survey was distributed to ten (10) expertise serving in HoF at the Constitutional Interpretation and

identity issue Directorate.

4. After the pilot survey was returned, from the information that was gathered, a second pilot survey was constructed.
5. Upon the return of the survey instruments thematic data analysis and textual data were carried out, as reported in Chapter IV.
6. Before, thematic data analysis, interviews were carried out with ten (10) selected expertise. The results of these interviews were included in Chapter IV.

From the beginning HoF agreed to this study and gave its permission to use its logo in the survey instrument. This helped to give credibility to the study and assurance to the Expert that the information gathered would be kept confidential. Contact was also made with CoCI and HoF Expert in helping and carrying out this study.

3.8.2 Procedures of Implementation

As indicated above, the investigation presented in this paper is known as Qualitative Research. Qualitative research is defined as research that investigates human experience through surveys, case studies, and with the desire to order experience.

This study used a survey instrument and interviews to gather information about the Constitutional interpretation of HoF Expertise. All research questions were addressed through the use of eleven questions survey instrument. The development and use of the survey instrument has already been described at chapter IV section 4.3

The survey instrument was used to collect data from ten HoF Experienced and recognised expertise.

Based on the data collected through the survey, interviews were conducted with Ten (10) of the respondents. The expertise selected for this interview were not randomly selected, but with their past experience and present exposure in the Constitutional Interpretation and Identity issue Directorate used to prepare the first one drafts of the survey instrument. The purpose of these interviews was to gather more information on research questions 1, 2, &3. These are as follows:

RQ.1 how do we extract the required knowledge for developing CIES that can be used for

Constitutional Interpretation?

RQ.2 can be enhance features used for creating appropriate model that bring better Performance than the existing way of identification?

RQ.3 what are the appropriate modelling and inference techniques to implement the CIES for CI identification?

From a hard copy record of Six (6) individuals' CI decision Secondary Data Analysis was presented in chapter IV section 4.5 in table 4.5 Interview Analysis and Results presented were found in chapter IV section 4.3. By including interviews with expertise as a part of the study, the data gathered from the survey instrument was validated and refined to provide a better idea of the Organizational context of the expertise lives and work.

3.8.3 Participant Selection

Expertise from the HoF there are Employees of the HoF were targeted for this study. In the early stages, the methodology to carry out the study focused on disseminating and gathering the survey instruments during interviewee, individual respondents were involved. This change met with great success and in a matter of an hour of survey instruments were returned.

To help the Expertise, as well as maintain the integrity of the information gathered, assistant was involved, who guided the Expertise in completing the survey instruments.

3.8.4 Instrumentation of the Survey and documentation data

The survey instrument used to form this study included a total of eleven open-ended questions were included. In Chapter IV the data from these items will be presented as response frequencies. These were strategically placed to allow expertise to elaborate responses.

It was anticipated that this study would gather and analyse two kinds of data.

1. **Survey Data** - Consists of one type of questions that were analysed as follows: **Open-response data** - Open responses were context analyzed and tallied. When appropriate, individuals are constructed to facilitate information assimilation. Data and information gathered through these methods are presented in text and tables, in Chapter IV of this thesis.
2. **Document Research (Secondary) Data** - thus, interview data alone cannot be enough to

gain/ acquire/ all the required knowledge management Information, and data derived from the background research were subjected to analysis concurrent with its background, hence, relevant manuals such as “six (6) manual hard-copy based Amharic language Constitutional Interpretation decisions “were translated into English language. Thematic analysis Presentation and Analysis of Interview and secondary Data were presented in chapter IV sub-section 4.3.1

In chapter 3. Figure 3.1 Constitutional Interpretation decisions Magazine №. 3. Up to February, 2020 published was also part of secondary data collection in this study presented in chapter III section 3.5.1.

In the interpretation of data for comparison between primary and secondary data, it was necessary to present the findings in a proportional format. To do this, the general database was divided into two categories.

Finally, those survey instruments that came from the HoF were considered “Primary and secondary data” while those outside the HoF were Considered “secondary data.” Once data were classified, the frequencies of responses were divided by the number of Experts in each category. This gave a percentage figure that represented each individual equally served as the basis for making comparisons.

This section has dealt with how the research strategy was carried out for this study how the data was interpreted. Chapter IV will present the findings of the data that was gathered from the survey instrument, interviews and secondary data from the document.

3.9 Ethical consideration

Data was collected after the permission from my advisor and support letter was provided to all EHoF from St. Mary`s University. Each interview and all interviewees have been asked prior for their willingness to participate in the data gathering; and informal verbal approval was also being obtained from all study participants and each respondent is informed about the purpose and objective of the study. Besides, the convenience, confidentiality, privacy and comfort of the participants were considered.

CHAPTER FOUR

DATA PRESENTATION, DATA ANALYSIS, AND DESIGN

4.1 Introduction

The purpose of this chapter is to present data analysis and key findings which are important inputs for the design and development of the Expert System. . Experts were selected from the HoF and Council of Constitutional Inquiry (CoCI) who are familiar with the principles and the procedures of responding the questionnaires and interview

Data analysis is the process of bringing order, structure and meaning to the mass of collected data. It is a messy, ambiguous; time consuming, creative, and fascinating Process. It does not proceed in a linear fashion; it is not neat. Data analysis is a search for answers about relationships among categories of data. The ways in which the researcher moves from a description of what is the case to an explanation of why what is the case is the case.

The sections below present the data and its analysis. Although the study was qualitative which is mainly based on interviewing 10 experts in the area and document analysis some quantitative results are also presented on some demographic aspects and other variables.

4.2 Data Presentation and Analysis

4.2.1 Respondents' profile

Each questionnaire and interview session opened with biographical information of the respondent. This was done to establish the competency of the respondent in providing information that would be valid for this study. The data presented below demonstrate that the respondents have varied set of experience, expertise, talent, skills and educational levels that an organization can exploit to its advantage.

Age: As shown in table 4.1 the age range of the respondents was from 25 to 60 years. From the 10 respondents four (4) of them are aged between 36 and 46 and three (3) of them are aged between 36 and 46. The rest of the respondents are between the age group of 47 and 57 (2) and between 25 and 35 (1). Overall the 9 out of 10 of respondents were within an age range of 36 – 65.

Table 4.1 Respondents' age

Age	Number of respondents
25-35	1
36-46	3
47-57	2
58-65	4

Gender Distribution: From the table 4.2. it is clear that female respondents were dominant in the study

Table 4.2 Gender distribution of respondent

Gender	Number of respondents
Female	7 (70%)
Male	3 (30%)

Education level of the respondents: Level of education and work experience in House of Federation (HOF) and Council of Constitutional Inquiry (CoCI) was also investigated since research has reported them to be related to organizational knowledge acquisition and retention (Giovanni, 2009; Sveiby, 1997). The highest level of education attained by each respondent is presented in Table 4.3 below. As it is indicated in the table the majority of respondents have Bachelor's Degree and Master's Degree.

Table 4.3 Level of formal education

Level of Formal Education	Frequency
Bachelor's Degree	5 (50%)
Master's Degree	3 (30%)
PHD	2 (20%)
Total	10

4.2.2 Ease of Finding & Utilizing Information in the HoF & CoCI:

Respondents were asked how easy it is to access and utilize information needed for their decision making in their respective organizations. Below are the findings represented in the following table 4.4.

Table 4.4 Accessibility and usage of information in the organization

Responses	Number of respondents
Easy	2
Difficult	5
Neither easy Nor difficult	2
Don't know	1

The results indicate that 5 of them (50%) confirmed that it is difficult to find information, and 2 of them said easy, 2 of them said neither easy nor difficult and 1 don't know.

The respondents who replied "difficult" were further asked to explain in the space provided why it is difficult to find and utilize information in the organizations studied. They mentioned bureaucracy, lack of transparency, lack of sharing and co-operation, considering information as classified, poor archiving system and old manual systems as major factors. Cases of file misplacement was also mentioned as common challenge making access and utilization of information difficult for management and employees.

4.2.3 Major Beneficiaries of the Proposed Knowledge based ES

Respondents were also asked to give their suggestion on which organization will benefit most if an expert system is developed for knowledge retention and management. As the result is indicated below in Table 4.6. the majority of respondents confirmed that CoCI will benefit most from the expert system. As respondents further explained CoCI is the first one to provide decision idea in all the cases of Constitution Interpretation and the next step is forwarding the case to the HoF to make the last decisions based on the council's decision idea.

4.3 Presentation and Analysis of Interview Results

4.3.1 Introduction

One of the primary expectations of the study is that its contributions will highlight the need for developing appropriate knowledge management and knowledge retention system using Expert System, which is to support Constitutional Interpretation at the levels of the HoF and Council of Constitutional Inquiry services. Ten (10) participants were selected based on their expertise and long years of experience in constitutional interpretation of HoF. In collecting the interview data, individual interview was done to get rich data for the research; Participants were asked whether there is any new information/knowledge added each time a legal/Constitutional interpretation decision is made. All of them responded that there were new information and knowledge gained every time they made a decision, especially at the time of examining cases that can't be resolved by referring to the article in the constitution since relevant articles may not found in the constitution for a particular case. The recent decision made by the HoF regarding *postponement of the sixth national election* is a case in point that required the generation of new information or knowledge that supported the decision.

There was nothing written in the constitution that specifies how to handle the case in an emergency problem like *COVID 19*. A number of experts within and outside of the country were involved to suggesting various solutions and decision ideas to the problem of postponing the national election, which is part of generating new information and knowledge. Evaluation of the consequence of each decision made may result in the generation of new knowledge at the time of

taking corrective measures. In this regard, participants were asked whether they evaluate the consequences of each decision made. Thus, interview alone cannot be enough to gain/ acquire all the required knowledge. Hence, relevant manuals such as “six (6) manual hard-copy based Amharic language Constitutional Interpretation decisions“were translated into English language.

4.4 Challenges in current service processes

This part discusses the challenges faced by the CI Expert System service providers of HoF and CoCI found in this study, because of the lack of automated system that can provide adequate information to the customers/clients are suffering from various economic, social and environmental challenges., poor and backward knowledge management made overall performance and reputation of the Organizations are at stake.

Customers/clients they could not get fast response and waste a lot of time and resource by coming from long distance to the CoCI ad HoF offices repetitively for extended time to get justice through proper constitutional interpretation right.

4.5 Secondary Data Presentation and Analysis

From a hard copy record of Six (6) individuals’ CI decision, which is written in Amharic, three of which needed the Constitutional interpretation and the rest three, **didn’t need a CI Expert System decision, these decisions files are important for references, if the same cases will occurred for the future.** These document reviews was conducted to gather the precise information and gain a closer look at the patterns of information flow in the existing manual/traditional system. In the table 4.6 below the general procedure and decision idea made by the council of constitutional inquiry is presented. In addition to the council’s decision idea HoF incudes its expert idea and briefly explained articles included and the last decision of the HoF CI Expert Systems decision procedure illustrated in figure 4.1.

Table 4.5 Individuals Constitutional Interpretation documents decision summery

Issues Directed to the Constitutional Interpretation			
N°	The issue	Decision made by the CoCI	Decision made by the HoF
1	<p>It was a divorce case and the lower courts made a decision saying the accuser does not need a legal divorce since they already had a conditional divorce, so the accuser appealed to the council of constitutional inquiry that she require a constitutional interpretation.</p>	<p>By evaluating the appeal made by the accuser and decision made by the lower courts</p> <p>In the new modified family law article 75 divorce made legally by three ways there are three main reasons for divorce and especially on article 82 the power of deciding on rights related to divorce is only given to courts. But based On the constitution article 34,50(5),(55/79) sub article (1,3),84 sub article 1 on proclamation 798/ 2005 article 3(1) the a decision made by the lower courts violate the right of women and children . Therefor the council of constitutional inquiry decided it require a constitutional interpretation & sent its decision to the HoF.</p>	<p>After the experts and permanent committee of the HoF evaluated the decision made by the council relating with other decrees</p> <p>In the new family law article 75 there are three main reasons for divorce and especially on article 82 the power of deciding on rights related to divorce is only given to courts. But based On the constitution article 34,50(5),(55/79) sub article (1,3),84 sub article 1 on proclamation 798/ 2005 article 3(1) the a decision made by the lower courts violate the right of women & children so based on the constitution article 9(1) the decisions made by the lower court are null or void.</p> <p>Therefor the HoF has fully voted on it's last decision & sent it to the federal supreme court for implementation.</p>

Issues Directed to the Constitutional Interpretation			
N°	The Issue	Decision made by the CoCI	Decision made by the HoF
2	<p>It was a land ownership case</p> <p>The defendants live in Addis yet were asking their share from the farm land the accuser own which is found in a rural kebelae farmer association the lower courts made inappropriate decision so the accuser ask for a constitutional interpretation .</p>	<p>By evaluating the decisions made by the lower court Based On proclamation number 89/89(2), number 789/2005 article 3(1) and from the constitution article 40(4)/84(1), the council found it inappropriate that the low courts decided that the farm land which accuser owned by registering at kebele farmer association and which is also an only livelihood for the accuser shall be shared by the defendant who live in Addis and different part of the country .Since the decisions made in the lower courts violate the decrees in the constitution, the council has fully voted on its decision to be sent to the HoF.</p>	<p>After the experts and permanent committee of the HoF evaluated the decision made by the council relating with other decrees the decisions made by the lower courts</p> <p>Since the decision in the lower courts violated the constitution article 40(4)/84(1), 9(1) & proclamation number 89/89(2) the decision will have no acceptance. Therefor the HoF has fully voted on it's last decision and sent it to the federal supreme court for implementation</p>

Issues Directed to the Constitutional Interpretation			
Nº	The issue	Decision made by the CoCI	Decision made by the H oF
3	The accuser has a national trade license he got from the Amhara national state government but he was arrested cause he bought goods for sale in Oromia national state so the accuser ask for a constitutional interpretation	<p>By evaluating the decisions made by the lower court</p> <p>Based on the constitution article 22(1) and article 22(32) proclamation number 686/2002 article 6 decree the decisions in the lower court violate the individual's right to work in different areas</p> <p>Since the decision made in the lower court violate the decrees in the constitution, the council has fully voted on its decision to be sent to the HoF.</p>	<p>After the experts and permanent committee of the HoF evaluated the decision made by the council relating with other decrees the decisions made by the lower courts</p> <p>Since the decision in the lower courts violated the constitution article 22(1) ,32,9</p> <p>9(1) proclamation number 686/2002 article 6 the decision will have no acceptance .</p> <p>Therefor the HoF has fully voted on it's last decision and sent it to the federal supreme court for implementation</p>

Issues did not need Constitutional Interpretation

N ^o	The issue	Decision made by the CoCI	Decision made by the HoF
1	<p>The accuser's families had land in Tigray and she wasn't home for more than thirty years and after all those years she claimed her inheritance but the land was in other person's possession and she was denied ownership of the land and she asked for a constitutional interpretation.</p>	<p>By evaluating the decisions made by the lower courts</p> <p>Based on the regions farm land proclamation article 12 the owner of the land can't stay out of the region for more than two years otherwise the land will be given to another farmer and in this case the accuser was out of the region For more than thirty years so the council fully voted that the decision made by the lower courts don't violate the constitution and the case doesn't require a constitutional interpretation.</p>	<p>The appeal made by the accuser was inappropriate since the defendant was legally given the right to own the land so according to the decision made by the council of constitutional inquiry the HoF has fully voted on the decision that the issue doesn't require a constitutional interpretation.</p>

Issues did not need Constitutional Interpretation			
Nº	The issue	Decision made by the CoCI	Decision made by the HoF
2	The accuser got Into conflict because of a car sale deal with Dr. Kebede Hailu and the accuser asked for a constitutional interpretation.	Decision made From lower court to supreme court were made based on examining evidence and hearing both sides according to the constitution so the council decided in full vote that the case doesn't require a constitutional interpretation .	Since the HoF found the decision made by the council of constitutional inquiry appropriate the HoF has fully voted on the decision that the issue doesn't require a constitutional interpretation.
3	The accuser believe the decision made by lower court on the conflict she had with a defendant is inappropriate so she asked for constitutional interpretation.	The council was able to understand that this case was held as untimely by the lower courts from records the council decided in full vote that the case doesn't require a constitutional interpretation.	The appeal made on the decision made by the council of the constitutional inquiry was inappropriate so the HoF has fully voted on the decision that the issue doesn't require a constitutional interpretation

4.6 Proposed system

The proposed system designed to clear the way, and to go to one step for whom interested, to enhance “Knowledge management system” Of HoF’s Since the proposed system used as an input data from the six different Constitutional right and legal right violated client’s Applications documents, this will help for the future similar case based references.

4.6.1 Feature of the system

The proposed system solves the problems of the current system and the difficulties faced by customers, this demonstration system prototype cleans the phase to the real functional system

makes the customers by helping their life easy, by reducing over a year time customers wasted from waiting for the CI Expert System response services, avoid being late, energy, financial cases.

4.6.2 Functional Requirements

Functional requirement refers to behavioral requirements or what fundamental functional features that the system should incorporate for the users while in use. The following functional requirement explains and describes the interaction between the system and the users or in general with the operation environment. Thus, the application consists of the following functional requirements:

An *inference engine*: is the part of Knowledge base system, component, it is the software program that refers the existing knowledge edge, manipulates the knowledge according to need and make decisions about action to be taken *inference engine*.

The following table 4.6 *Conventional programing system and knowledge-based system programing* tasks are seen in the following table.

Table 4.6 Conventional and knowledge based Expert System-programing tasks

CI Expert System Program	Conventional Program
1. Knowledge base	1. Program Code
2. Inference Engine	2. Interpreter /Compiler
3. Knowledge Engineers develop this	3. Software Engineers /Program analysis develop this
4. Knowledge Engineering Tool Languages for ex., Art, KES, M.I. OPS5, Hearsay III etc.	5. Relatively low level programing language <i>for example, C, PASCAL etc.</i>

The operations performed by each screen was described as follows:

1. Data was entered into the system by IT expertise at the HTML file and we will give *“liking name”* for the html file in the script.js to link/integrate other files with the system.
2. First home page user login interface screen provided by the system is “welcoming salutation sentence”, *case based menus* to choose from them, “*Click here*” button to display relevant question with “Yes/ No”, answers to choose from them to the user according to the

case selected from the menu users' to answer as lawyer expertise or other case based questions understandable user can only answer the questions after the "Yes/ No", the response may be the next question or decision comment according to the selection *Different articles related to the case and the constitutional articles were written for that case are included in a given question.*

3. The second user interface System asks relevant questions associated to the case and CI Expert System or decision comment.
4. The third user interface screen provide decision comment. These three user screens were depicted in Chapter five-udder Prototype section 5.2.3.

4.6.3 Non-functional Requirements

Non-functional Supplies are qualities of the system Obligatory for the overall usability of the system. They are requirements of the system that are user considerate or user-visible aspects but not directly related to the useful behavior of the system. Usually, these are constraints of the system to improve quality of service and the system is supposed to function. The following are the non-functional requirements of the system requirements.

4.6.3.1 User interface

The User interface is the way or address to communicate both the System and any user who familiar with the system or between one interface and another interface uses it.

- It can be used by any Expert of lawyer employee who is familiar with computer
- It is familiar and simple to use
- It can be used any employee who is familiar with computer and can read questions, select from the choices.

4.6.3.2 Security

Protecting/secured the system by Authenticated and authorized and installing, configuring the licensed antivirus software.

4.6.3.3 Performance

This standard deal with the rapidity and/or space necessities of the system. and large amount of disk space in order to make the system lowest response time and extreme throughput

4.6.3.4 Maintainability

The system is available to easy maintenance and, if there are further user requirements, application failures, and new features shifts, etc...

4.6.3.5 Efficiency

The application does not take too much time to load and search for CI Expert System services and display the information to users.

4.7 System Analysis Model

System examination modeling was the tool used to comprehend the system; this model was then used for examination of the system. Many models were developed to represent the system view under consideration and explain the behavior of various components of the system. The different components in the system were explain using UML tools.

4.7.1 Actors identification

An actor is a person, organization, or external system that plays a role in one or more interactions with the system. In this system, there are about five groups of actors. As shown in table 4.2, The first group of actor in this study is the *customer/the people who loss his/her right at the court are the group*, of the system and it is primarily set to get services from the system is the actors of the system. The second group of system actor is **CoCI/expertise/** is responsible to check and give CI Expert System decision comment to the HoF. The third group of system actor is *system Administrator*, Administrator organizes users. The fourth group of system actor is **Secretariat of the HoF**; to check CoCI's decision comment and its further checking and give the last decision to the customers and Supreme Court. The fifth and the last actor of the system is group of Supreme Court, responsible to act based on CI Expert System decisions that it receives decision from the HoF to implement the decision.

Table 4.7 List of Actors

No	Actors	Description
1	User	Receive CII decisions from CoCI or HoF
2	CoCI	CoCI is responsible to check and give CII decision comment to the HoF
3	System Admin.	Manage users
4	HoF Secretariat	Is responsible to manage; register, edit and delete a given data/information of the Organization; to check CoCI 's decision comment and its further checking and give the last decision to the customers and Supreme Court
5	Supreme Court	Responsible to execute CII decisions that it receives from the HoF.

4.7.2 Use case model

Use Case model represents the requirements in user-centric approach in order to describe all the tasks that the actors need to perform with the system [Habiba Sultan Reja, June 2018] [30] a system comprises of functions, features, etc. with specific outputs contributing to the system goal. Actors that can be inside or outside the system initiate these functions. Use Case diagrams describe these behavioral requirements of the system. Actors are the users of the system (who perform action using the system); Use Case are generally the starting point of object-oriented analysis with UML. The Use Case diagram is followed by a description of each Use Case given separately in a Use Case description.

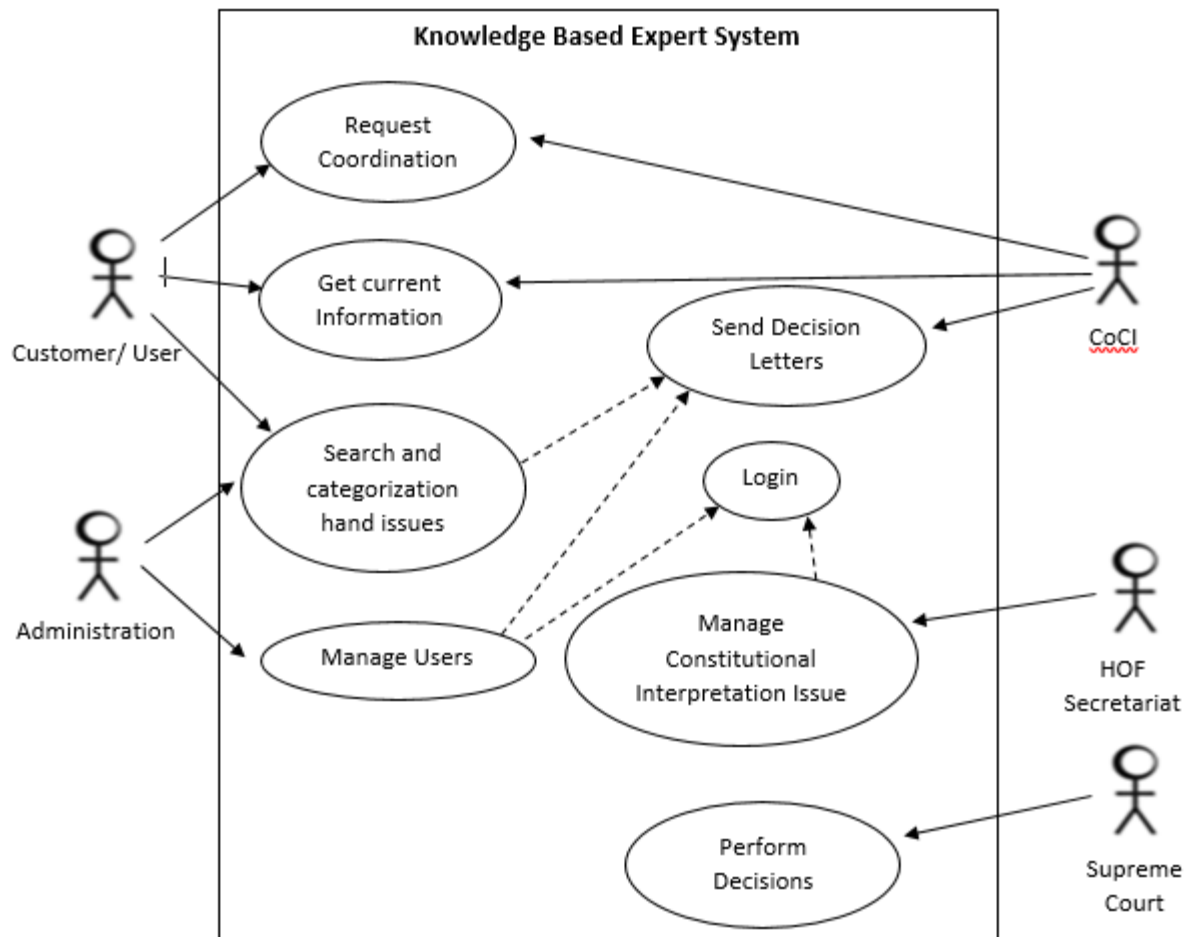


Figure 4.1 Use Case Diagram

4.7.3 Use case description

Description is required for each Use Case so that how it is accomplished, what is required to complete it is easily understood.

4.7.3.1 Manage Use Case

Table 4.8 Manage users Use Case

Use Case Issue No :	UC-01	
Use Case Name:	Manage CII	
Actor(s):	Administrator	
Description:	This Use Case describes the process when the administrator register, edit and delete, when rules, regulations, and Articles are changed on conclusion the information are managed.	
Requirement:	1 The administrator must have an administrator role.	
	Actor Act(s)	System Reply(s)
Flow of Event:	<p>Step 1: This Use Case is started when the administrator started this application.</p> <p>Step 2: The administrator clicks the click here menu.</p> <p>Step 4: The administrator enters registration, edition or deletion information regarding.</p> <p>Step 6: This use case is concluded when the administrator register, edit or delete information,</p>	<p>Step 3: The system displays information page.</p> <p>Step 5: The system stores information in Hard drive and External Hard drive</p>
Results:	Information will be registered, edited or deleted from Hard disk...	

4.7.3.2 Manage CI Expert System Use Case

Table 4.9 Manage CI Expert System Use Case

Use Case Issue No :	UC-02	
Use Case Name:	CI Expert System	
Actor(s):	Secretariat	
Description:	This Use Case describes the process when the Secretariat register, edit and delete CI Expert System on this application. On completion of the CI Expert System information are managed.	
	Actor Action(s)	System Response(s)
	<p>1st: This Use Case is initiated when the Secretariat started this application.</p> <p>2nd: The general manager clicks the menu CI Expert System that are managed.</p> <p>3rd: The general manager enters registration, edition or deletion information regarding Secretariat.</p> <p>6th: This use case is concluded when the Secretariat register, edit or delete Information,</p>	<p>Step 3: The system displays CI Expert System page.</p> <p>5th: The system stores CI Expert System information in Hard drive.</p>
Results:	CI Expert System information will be registered, edited or deleted from external hard drive and system	

4.7.3.3 Login Use Case

Table 4.10 Login Use Case

Use Case ID:	UC-03	
Use Case Name:	Manage HoF/ CII	
Actor(s):	Secretariat and Administrator	
Explanation:	This Use Case describes the process when the Secretariat and administrator login to the system. On conclusion, the Secretariat and administrator login to the system.	
Requirement:	The Secretariat and administrator must have an account to log in to the system. The Secretariat and administrator must have Own role.	
	Actor Action(s)	System Response(s)
Flow of Event:	<p>1st: This Use Case is initiated when the Secretariat and administrator started this application.</p> <p>2nd: The Secretariat and administrator Enters “click here” button.</p> <p>5th: This Use Case is concluded when the Secretariat and administrator logged in to the system.</p>	<p>3rd: System checks validity of the information.</p> <p>4th: System displays the appropriate page.</p>
Results:	Secretariat and Administrator logged in to the system.	

4.7.3.4 Display Real-time information Use Case

Table 4.11 Display time - information Use Case

Use Case ID:	UC-04	
Use Case Name:	display Real-time Information	
Actor(s):	User and Administrator	
Description:	This Use Case describes the process of real-time. On completion, the system displays Real-time information of the CII decision comment.	
Results	Actor Action(s)	System Response(s)
	<p>1st: This Use Case is initiated when the user started this application.</p> <p>2nd: The user and administrator select the menu which he/she wants information about it.</p> <p>6th: This Use Case is concluded when users and administrator get a real-time information of trains.</p>	3rd: The system displays the information user for update.
Flow of Event:		
Results:	Real-time information will be displayed.	

4.7.3.5 Display Information Use Case

Table 4.12 Display Information Use Case

Use Case ID:	UC07	
Use Case Name:	Display Information	
Actor(s):	Users	
Description:	This Use Case describes the process when the Users search Information. On conclusion, the system shows the information.	
Precondition:	1 The user must clearly the question accordingly the Yes/ No choices.	
	Actor Action(s)	System Response(s)
Flow of Event:	1st: This Use Case is initiated when the user started this application. 2nd : The users select the desired menu 6th : This Use Case ended	The system respond the appropriate response
Results:	Information will be displayed.	

4.7.4 Context diagram

Context diagrams delivers the non-concrete view of the info system. It is used for showing the scope and border of the info system. Context diagrams show the interactions among a system and other actors (data source, entities, and procedures) with which the system is intended to interface. System context diagrams can be useful in considerate the context, which the system will be part of. A context diagram displays the entire system as a single process.

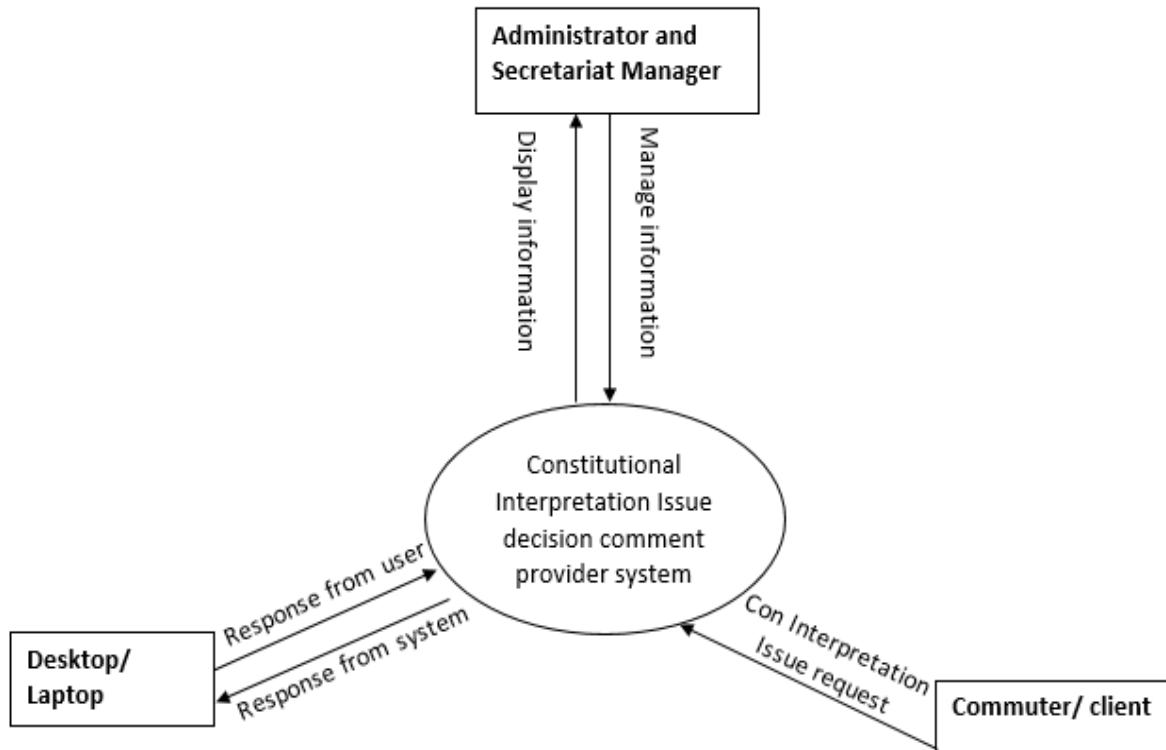


Figure 4.2 Context Diagram of CI Expert System

4.7.5 Sequence diagram

The dynamic behavior of the system is depicted by using sequence diagrams. The sequence diagrams facilitate the specification of formalization to accommodate behavioral modeling, which is responsible to interaction between participating objects in a given Use Case. They are also helpful to identify the missing objects that are not identified in the analysis object model. These diagrams are in the form of two-dimensional charts. The following diagrams describe the direct translation of identified Use Case in to the sequence diagram.

The CI Expert System question Sequence Diagram presents the interactions that happened in the users question; the user first answer the question in the user screen, then the result will change depending on the answer of the questions as showed in Figure 4.3

4.7.5.1 Login

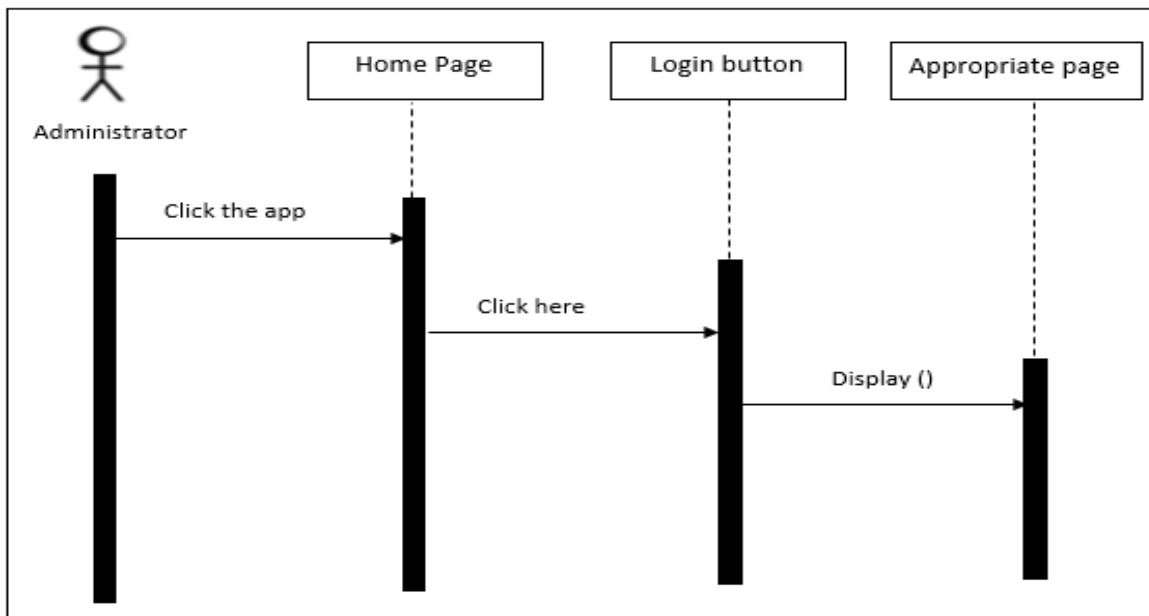


Figure 4.3 Login Sequence Diagram

4.7.5.2 Get question & Response from choices

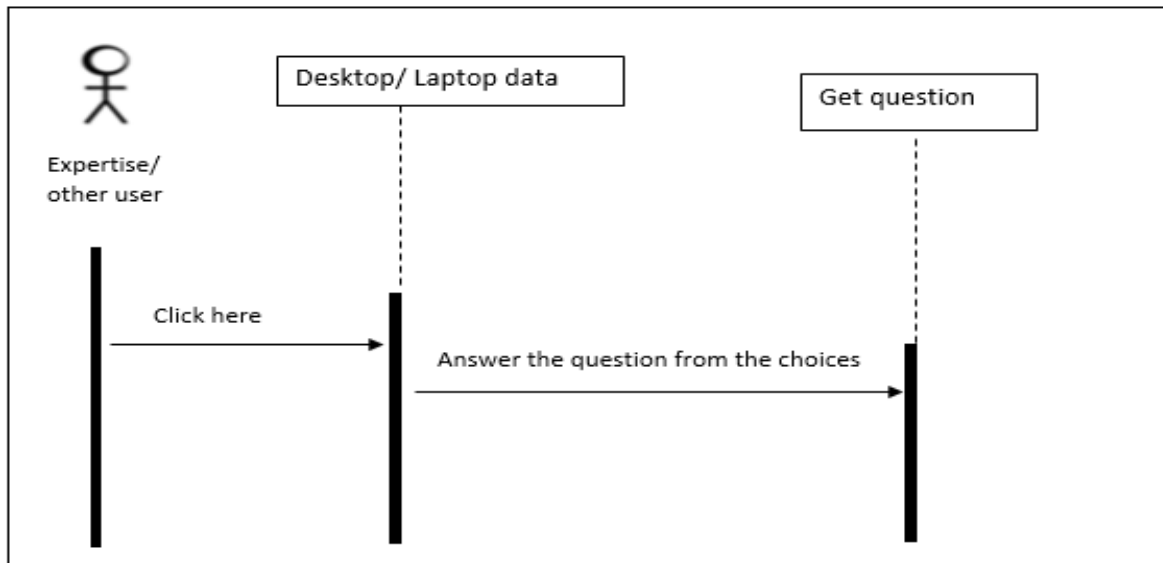


Figure 4.4 Getting started to get question & Response from choices Sequence Diagram

4.7.5.3 Get next question or Decision Comment

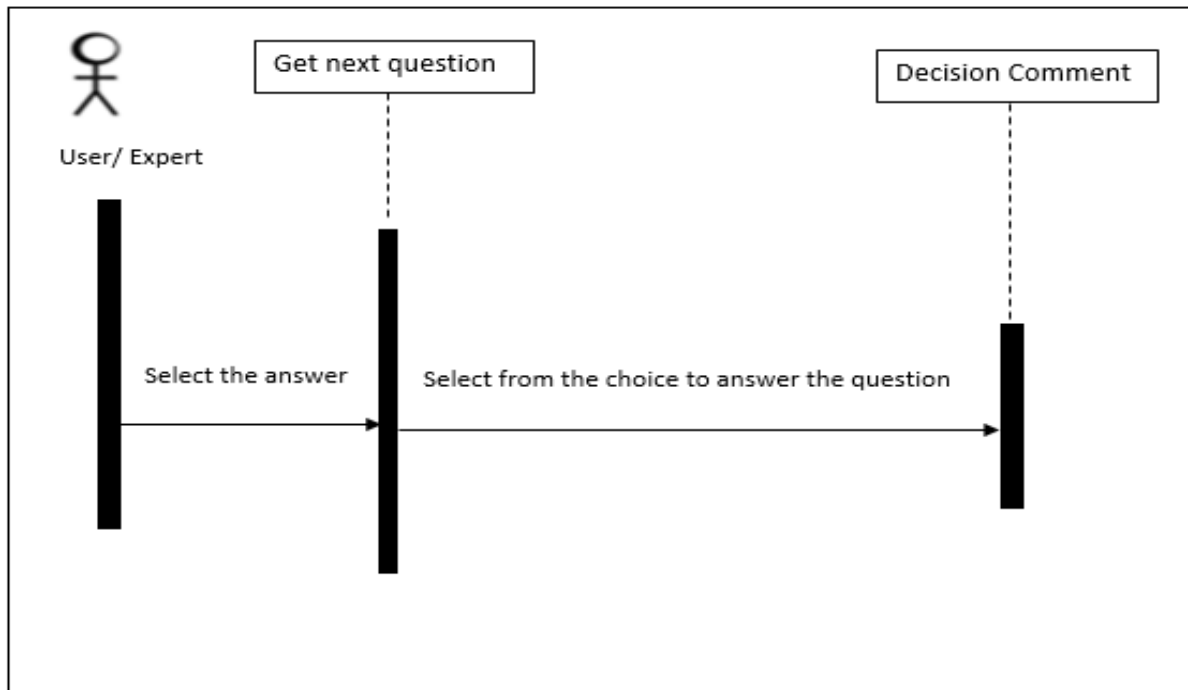


Figure 4.5 Get next question or Decision Comment Sequence Diagram

4.7.6 Activity diagram

Activity diagram is a technique that shows the workflow using stepwise activities and actions which has beginning and ending events. Activity diagrams show the interaction among services processes. It conveys what is happening inside the use case or inside a class through activity description. These are used to model the flow of the system and are depicted below.

Activity diagram is another important diagram in UML to describe the dynamic aspects of the system. Activity diagram is a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system.

The control flow is drawn from one operation to another. This flow can be sequential, branched, or concurrent. Activity diagrams deal with all type of flow control by using different elements such as fork, join, etc.

4.7.6.1 Manage Users

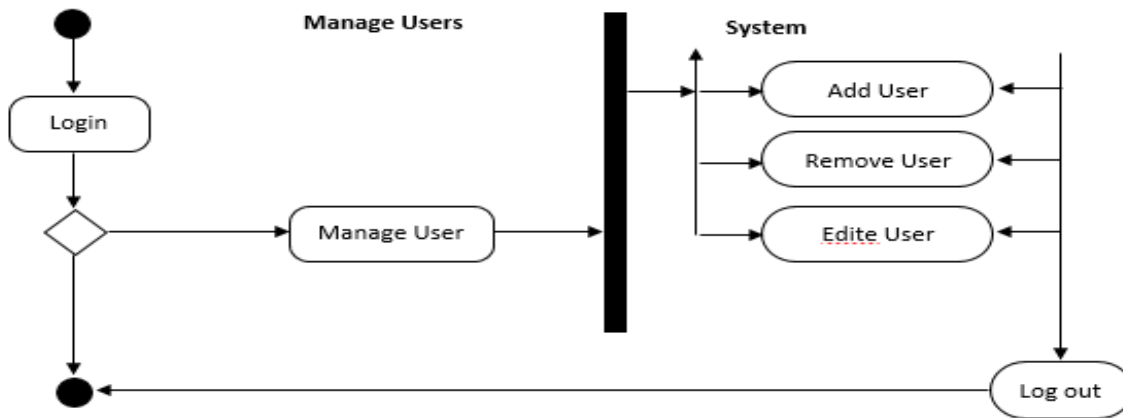


Figure 4.6 Manage Users Activity Diagram

4.7.6.2 Search Info

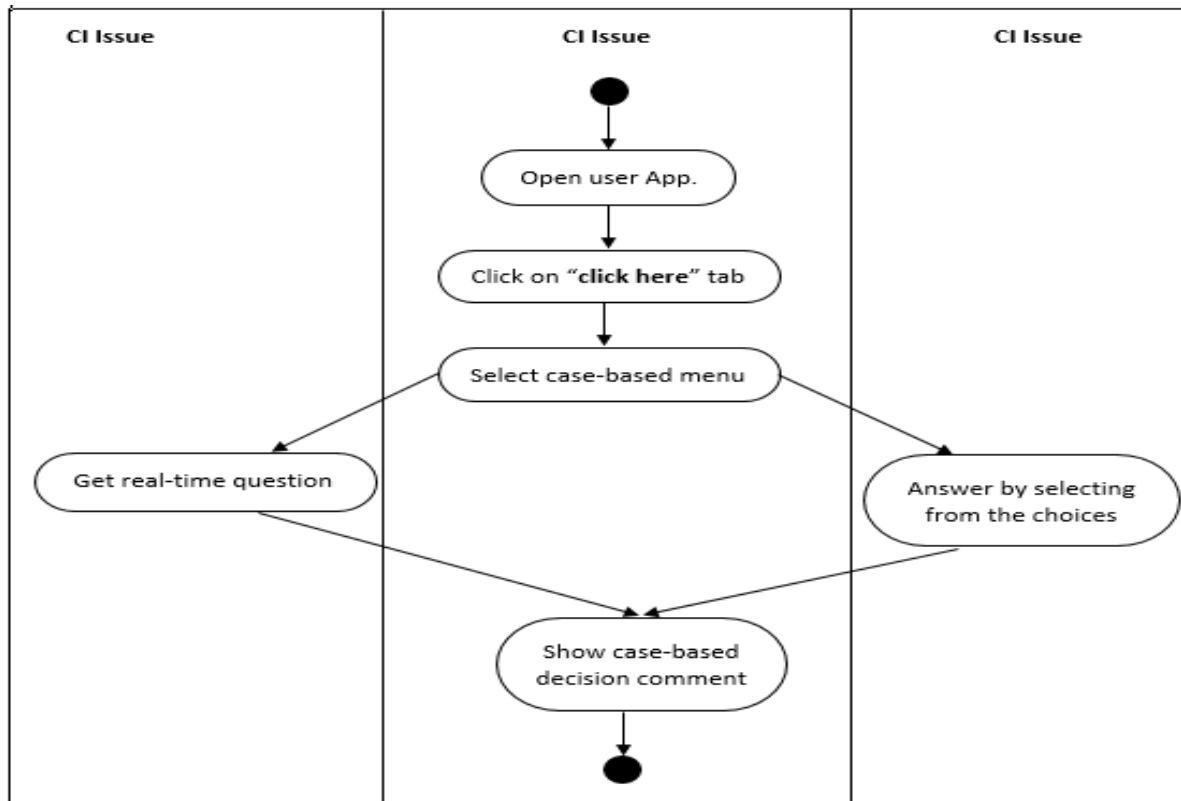


Figure 4.7 CI Issue CI Expert System activity diagram

4.7.7 Class diagram

Class diagram describes the attributes and operations of a class and the constraints imposed on the system. The class diagrams are widely used in the modeling of object-oriented systems because they are the only UML diagrams, which can be mapped directly with object-oriented languages.

Class diagram shows a collection of classes, interfaces, associations, collaborations, and constraints. It is also known as a structural diagram Figure 4.9 shows the class diagram for the set of classes that are identified in our system.

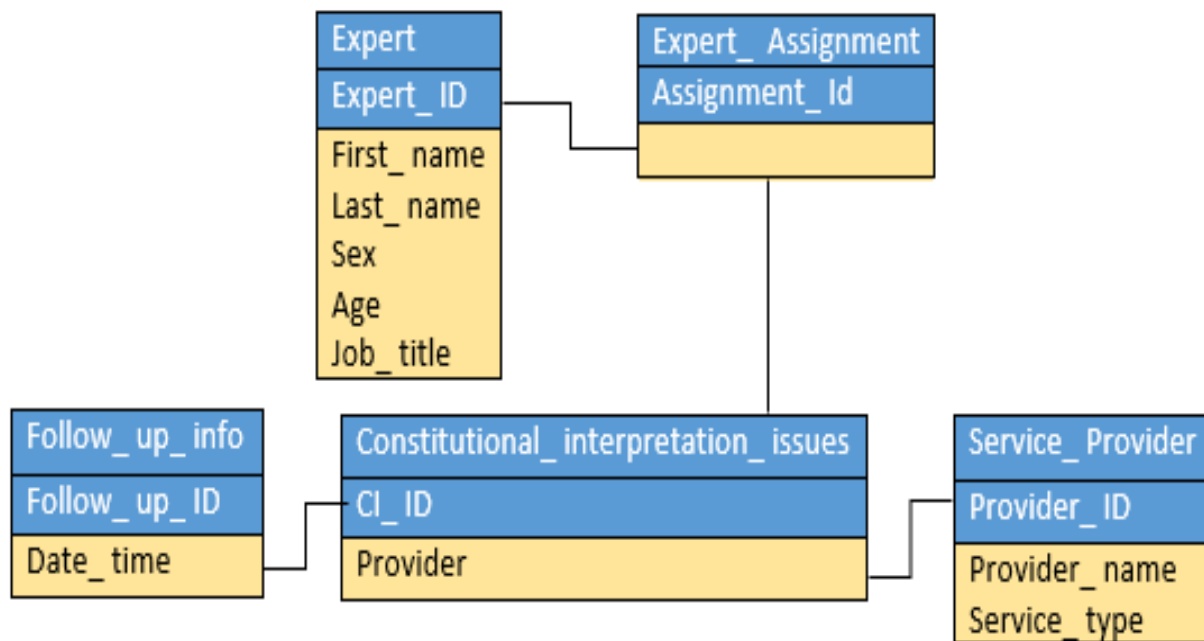


Figure 4.8 Class diagram

4.8 Thematic analysis Presentation & Analysis of Interview & secondary Data

1. **Familiarization:** It is the first step in the thematic analysis process of data analysis. Reading the text and taking initial notes, and generally looking through the data to get familiar with it. The researcher took notes and used a recorder to the interview sessions. The recording of the interview sessions in note form and on a record was undertaken to ensure complete capture of decisions. Transcription of recorded interview

sessions in a recorder was done but only for sections which were identified to be crucial for the study. This study used Microsoft Word in the transcription of the interview session. It involves going through all of the data in organizing the researcher. Recording notes was taken preliminary in hand Writing, Identifying the basic themes, which will then use for the analysis. Before analyzing the data, it is important to transcribe the data into a readable format, so that is easier to visualize the data. While going through the data, as it enables the nature of the information collected, adequate time spend in it and being familiarized with the data, develop an easier approach for the research. After, going over the interview data carefully, thus, interview alone cannot be enough to gain/ acquire all the required knowledge. Hence, relevant manuals researchers, moves on to the six (6) manual hard-copy based Amharic language Constitutional Interpretation decisions were translated into English language other Constitutional Interpretation decisions Magazine was considered presented at Figure 3.1 These steps are also crucial, as it helps to the study, steps of the familiarization process, to prioritize and to organize the data into a manageable form, so that it is more efficient for the research.

2. **Coding the Data:** After familiarizing with the data, the next step in the thematic analysis is coding (highlighting sections of text, phrases or sentences) and coming up with labels written or “codes” to describe their content was used for analysing the interview data. Coding the transcripts of the organized data. Since the data involved in thematic analysis is non–numeric in nature, therefore it is important for the research to mark and code the text, with the relevant points, which can then be used by the researcher to make an effective analysis. The codes used for the research vary from one research to another. Therefore, it is the skills and experience of the researcher, with which they code the text, to help them make the process of analysis easier. Coding the data has an additional benefit of saving time and making the process of analysis much more organized and efficient.
3. **Highlighting Key Themes:** Highlighting the themes is one of the most important steps of the thematic analysis. It involves, studying the codes, and keywords, identified in the previous step, and categorizing the data in different themes. The themes highlighted in this step serves as a map which guides the research. Therefore, it is important for the

researcher, to spend time in studying the data and highlighting the relevant themes were done carefully

4. ***Reviewing the Themes:*** Once it has identified the themes, it is important to review them and make sure that the themes identified are suitable for the main objective of the research. It is in this step, where the research, can refine the selected themes and make improvements as per their convenience.
5. ***Defining and Naming the Themes:*** After confirming the themes, which are suitable for the research, it is important to describe them and set definitive criteria, which can help you in categorizing the data, into each theme, more effectively. Since the nature of the data, involved in thematic analysis is non-numeric in nature, it is vital, to set criteria, to make sure that the data, is not miss-interpreted. It helps in reducing human error and saves time in the process.
6. ***Interview questions and generalized Report:*** The final step, in the process of thematic analysis, is to study the categorized data carefully and make relevant observations and inferences. It is where the skill and experience of the researcher come in. It takes great effort to study the transcribed data and identify the inferences adequately. It is why; the researcher must take great caution in this step. Once this is done, the data is then ready to be turned into the final report of the thematic analysis. Five of the respondents were said rarely, three of them said not regularly and two of them said there is no evaluation. Those who said rarely and not regularly stated that there is no clear procedure, structure and assigned person to do the evaluation which commonly result in further complain by customers on the decision made. They stated that there is limited possibility of adding new information and knowledge through evaluation.

To the question on whether there is any practice of recording newly generated information/knowledge and the media used, all participants confirmed that there is no automated system and media that can capture the newly generated knowledge in the process of making decision. Every decision made and the associated information and knowledge remain in the hard copy and they are not fully captured. Participants were asked how they retain the knowledge and experience of experts, which is accumulated over several years

before they retire or leave the organization. All the participants stated that they don't have any system to capture and retain the knowledge of experts. To the question on how they store the newly generated information/ knowledge, participants stated that the newly generated information/knowledge is stored electronically using Microsoft Word and in printed format. They stated that they don't have modern computerized system. Individuals' mental memory was also stated as one of the storage of newly generated information/knowledge and such kind of knowledge is shared through interaction and used when it is needed.

Participants were asked whether there is a practice of generalizing/abstracting the newly generated information/knowledge in the form of new rules. All the participants said that they don't generally have such practice adapting newly generated information/knowledge as a new law but the experts use them when needed. Participants were also asked whether the stored information or knowledge easily accessible. They explained that it's not easily accessible since the existing storage method doesn't differentiate newly generated knowledge/ information from the ordinary ones. The other factor contributing to limited sharing of knowledge is lack of willingness of employees/experts to share their knowledge to other experts. The personal knowledge and the knowledge stored in hard copy but controlled by an individual become inaccessible when the individual is leaving the institution. With respect to the question on whether there is a practice of sharing the newly generated information/knowledge, participants stated that there is sharing but not in a modern way. One way of sharing is publishing in a journal all the decisions made on customer cases through constitutional interpretation. This publication is distributed to relevant stakeholder institutions like Courts, Universities, etc. the journal is not published on regular basis and the newly generated information/knowledge is not mentioned separately.

Participants were asked to identify the existing mechanisms used for sharing the newly generated information/knowledge. All participants stated that newly generated information or knowledge is shared through personal contact and seldom shared by hard copy. They also stated that there is no modern way of sharing such information and knowledge. Regarding the kind of Organizational Memory System that HoF intends to build, participants reacted

that not every case can be solved using the knowledge base expert system. Rules in the constitution interpretation is sometimes will have to look in to different solutions from different sources according to the complexity of the cases, so any new measures or procedures taken to reach a decision should be stored in an Organizational Memory System. They also stated that the major users of the system are mainly experts from HoF and it can also be used by the CoCI.

CHAPTER FIVE

IMPLANTATION & TESTING

5.1 System Design

This section presents the implementation and testing of an Expert System that support Constitutional Interpretation based on the functional and non-functional requirements and the design specifications developed in the fourth chapter.

5.1.1 System Architecture

Architecture is one of the first considerations while developing any application. At a high level, the architecture of an application defines how different parts of the system are organized and logically separated yet ensuring that they work together. Furthermore, architectures can be split into different tiers and it is the idea of tiers that delivers a convenient way to group different classes of buildings. Software construction is the fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution. Designing architecture in tiers is useful because it supports layering, promotes scalability and allows easy maintenance of the application. (Ropes, 2013) [29].

When you click on The CI Expert System, support CI Expert System , the Application displays case based menu to select from them by the user's need, after selection, the selected menu copied itself and that copy place itself on another place on the screen to confirm to the user the selection is performed. The user by clicking "Clickhere" tab to get question with Yes/No choices to select from them according to the user's selection the response may display the next question or decision suggestion for the user. This application is flexible and user-friendly.

Expert Systemic that support CI Expert System application is to ask questions to the user and user replays answer by Yes/ No, then the system gives decision/ suggestions the application is intended to be flexible, user-friendly.

A CI Expert System tools, or shell, is a software development environment covering the basic components of expert systems. The core components of knowledge-based systems are the knowledge base, Inference Engine and the user interface.

Knowledge Base: The knowledge base contains the knowledge necessary for understanding, formulating and for solving problems. It is a warehouse of the domain specific knowledge captured from the human expert via the knowledge acquisition module. Knowledge representation can take many forms to signify the knowledge legal rules, frames, logic, semantic, symbols, data and net etc.... from these the most common form is the **Production Rule legal rules** IF-THEN, shown KR Method that is **production rule** in detail presented in section 3.6:

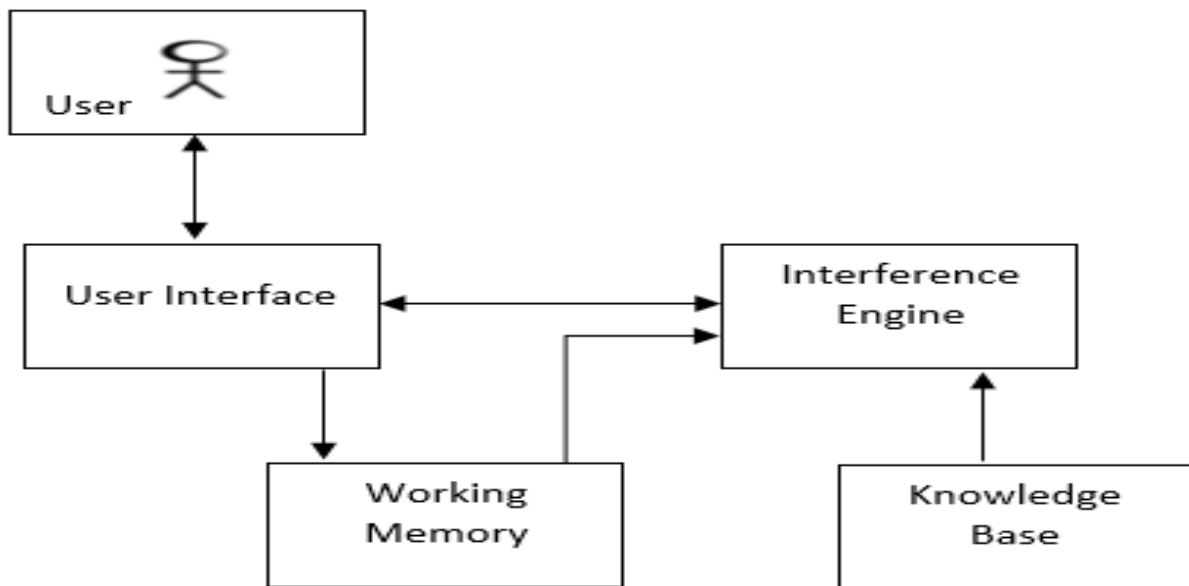


Figure 5.1 Archr of KBS (Shivani Gael Assit. Prof. & Mahak Agarwal student, 9/11/14)

Legal rules are mainly convenient way of expressing experiential knowledge. The overall scheme for organizing and representing knowledge is sometimes called a *knowledge representation system*. The knowledge base refers to the actual store of knowledge for a specific Constitutional Interpretation I Expert System.

Knowledge base systems communicate with human users via an end user interface. The purpose of the end user interface is to obtain information about the problem from the end user

and to display solutions. To obtain information, the interface may display questions at a terminal and prompt the end user for (Yes/No) answers. Solutions may consist of text statements. More elaborate end user interfaces may use graphics and hypertext.

A valuable function of a CI Expert System is the ability to explain its actions. While using CI Expert System, the end user may wish to know why questions are being asked or why certain facts were concluded. When the solution is displayed to the end user, the user may request an explanation of how the solution was reached. The end user interface contains procedures that generate explanations that can be shown to the end user.

5.1.2 Modules of the Application

JavaScript application, which are the core components of this application are categorized into three major modules. Description of each module and depicting the flow of tasks and data in diagrams are seen under the following sections.

5.1.2.1 Internal expert (module)

This module is a type of the client side JavaScript application that is installed by the user computer/Laptop who wants to get the information of the Constitution Interpretation Expert System. Internal Expert / Module is shown as follows.

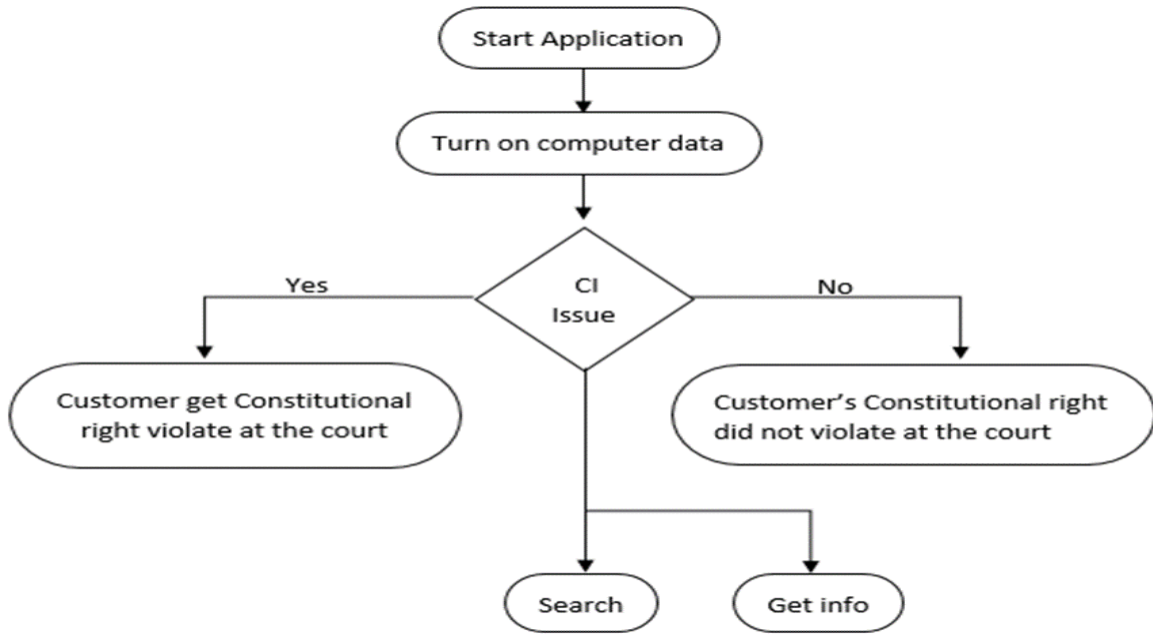


Figure 5.2 Internal expert (module)

5.1.2.2 Administrator Module

The Administrator and IT expert Module is for the CI Expert System decision comment system, Administrator and HoF IT expert has given privilege to add, update new information and remove/delete unnecessary information. Administrator and IT expert module Diagram is shown as follows.

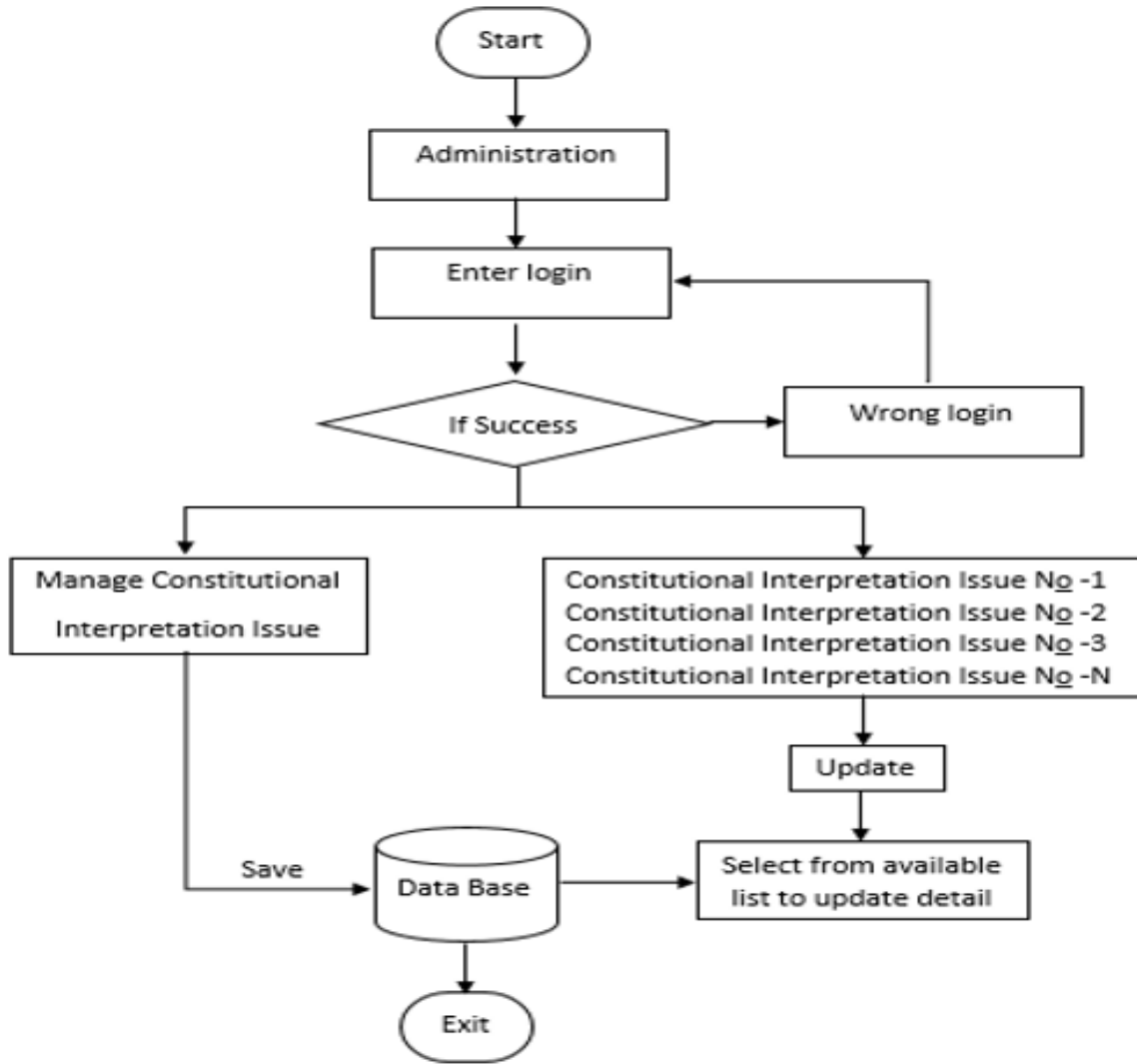


Figure 5.3 CI Expert System administrator Module diagram

5.1.3 Sub-system decomposition

The purpose of sub-system decomposition is to break-down a complex system into smaller units, which are loosely joined with each other while each broken-down CI Expert System in order to simplify and minimize the complexity of the solution domain, the sub-system decomposition we are working on is further decomposed into subsystems are show below

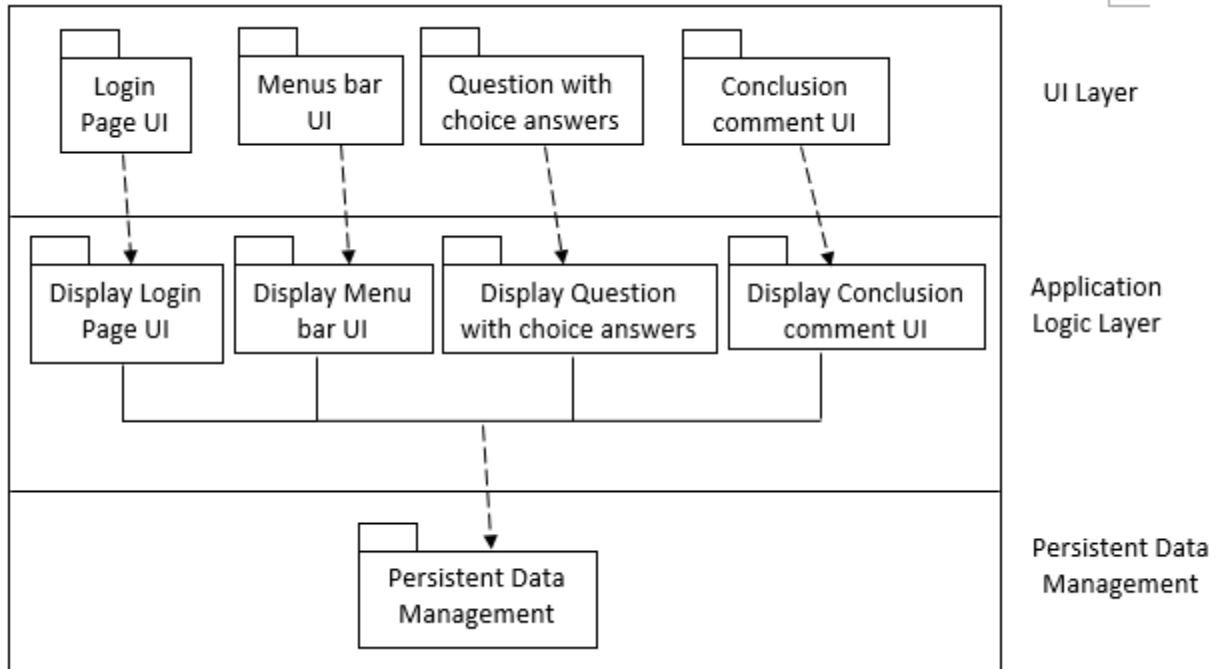


Figure 5.4 Sub-System Decomposition of Constitutional Interpretation Expert System

5.2 Implementation

The prototype for CI Expert System Expert System issue application prototype was developed using the requirements obtained from users the various chapters in order to increase the applicability and usability of the system by solving real world problems/challenges faced by customer and CI Expert System service provider Organizations. The functionalities described in chapter four i.e. the system requirements, functional requirements and non-functional requirements all are addressed while the system was developed. The system was also tested based on functionality and performance.

The system is was designed developed using various tools that were used to accomplish a different task and define a certain components of the system.

5.2.1 Implementation tools

It is a JavaScript application done using HTML, Notepad++ and CSS, which are the most stable version at the time of this system's development. For developing the system, the latest JavaScript Development Tools (JSDT) was used. This JSDT has its own Software Development Kit (SDK) and it was chosen since it incorporates different functionalities/tools for the

development of the application.

5.2.2 Hard ware

1. **Desktop Computer Dell: Processor Intel (R) Core (TM) i7-7370 CPU @ 3.40 GHz** 4.00 GB RAM 3.89 GB
2. **lap- top HP computer:** Processor Intel(R) Celeron (R) CPU N3060 @1.60GHz 1.60 GHzRAM: 4:00 GB

5.2.3 Software Development Tools Used

Software that was used for developing this application was:

1. **JavaScript** is a text-based software programming language used to allow you to make webpages interactive. I used this language for the following purpose
 - “**ngAnimate**” this directive provides support Java Script, CSS transition, and CSS keyframe animations.
 - “**ngRoute**” provides routing and deep linking services and directives for AngularJS apps. also **ngRoute** create a layout template and build an application that has multiple views by adding routing
 - “**\$route Provider**” Used for configuring routes.
 - “**ng-app**” directive tells that this is the root element of App.
 - “**ngView**” listens for the directive to instantiate the controller and render the view.
2. **CSS:** I used CSS language for describing the presentation of Web pages, including colors, layout, and Fonts.
3. **Notepad++:** is an open-source software (As a lightweight text editor and source-code) editor
4. **HTML:** stands for Hypertext Markup Language. It allows the user to create and structure sections, paragraphs, headings, links, and block quotes for web pages and applications
5. **Internet Explorer (IE):** World Wide Web (WWW) browser. Internet Explorer became one of the most popular tools for accessing the Internet is the main browser to open the

“Constitutional Interpretation Expert System” if Interest available or not.

6. **Microsoft Office Word 2016:** Microsoft Office Word is a word processor developed by Microsoft, it offers enhanced features to create professional-quality documents, **Shapes to draw Diagrams Tables Graphics with text bullets to the documents, and apply styles colors and** easier ways to work together with people, and almost-anywhere access to your files.

5.2.4 Login Page

The CI Expert System service system has opened y Double- *Clicking, the icon of the App. This action takes as to the “Eater User name” and the “Click here”* login page for the IT Expert, Administrator Secretariat HoF, CI Expert System service providers and other privileged employee who wants to update, add, remove and manage the system. The data/information is managed at the CI Expert System CI Expert System was managed by right-Clicking on **“Notepad++ screen” language** and selecting **“ Edit with Notepad ++**, then this environment provides different languages for example HTML to write data, JS used for routing and deep linking services and directives for AngularJS and configuration route.

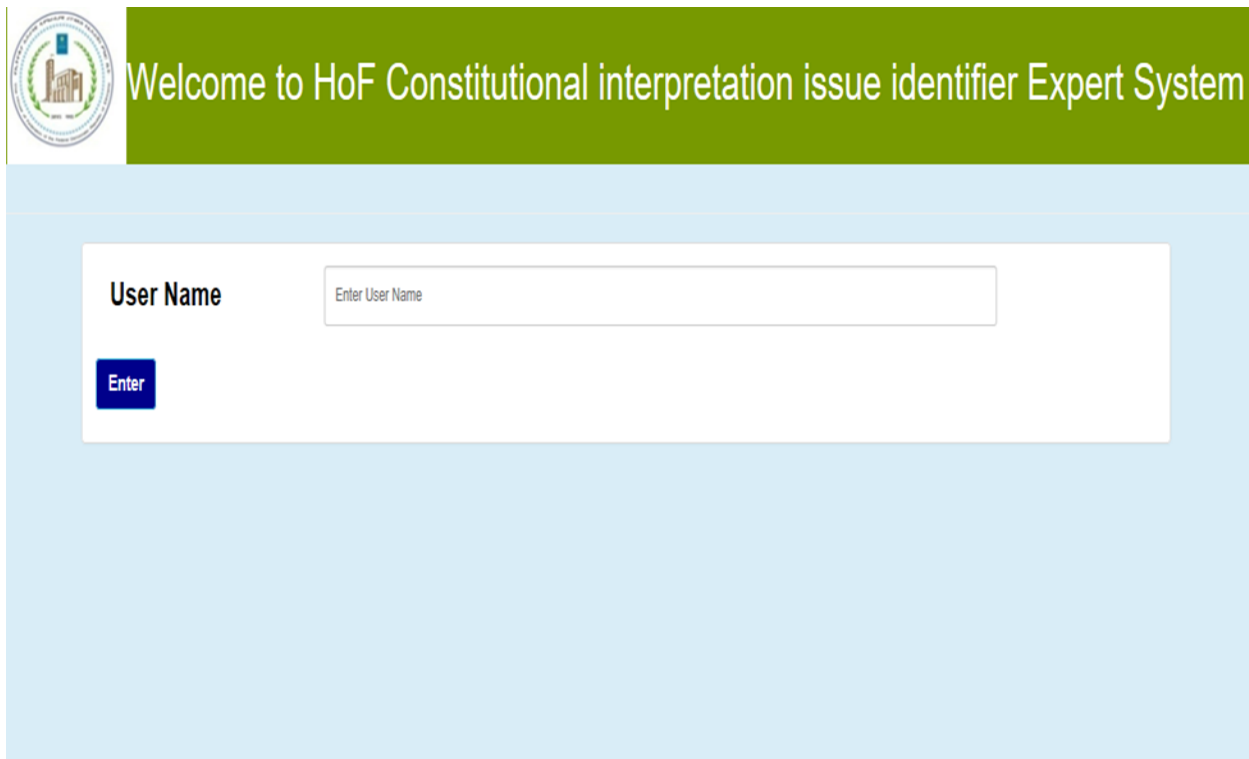


Figure 5.5 The first login screen for the CI Expert System

5.2.4.1 Prototype

This CI Expert System was designed after conducting qualitative study and analyzing the respondents input from the gathered data using the interview, observation and document analysis as well as analyzing comments and suggestions from the experts in field of legal experts. The contents were gathered from two political, governmental Organizations namely (HoF and CoCI) working on the CI Expert System consulting experts in the field.



Welcome to HoF Constitutional interpretation issue identifier Expert System

Divorce case Farm land right case Trade license case Family Rural Land Inheritance case Car Sales & 3rd party debit case Family Urban Land Inheritance case

DIVORCE CASE

To Identify Constitutional Interpretation Issue [Click here](#)

Figure 5.6 the second login system user interface screens

The second system user interface provides Case based Menus with default Menu selected by the system for the user, the user didn't want the default selected menu he/she can select his/her desired Menu, the he/she clicks the **“Clickhere” ta to get question with two choices /Yes, No, user can select any one from** the two choices and the system provide the next question or the decision suggestion.



Welcome to HoF Constitutional interpretation issue identifier Expert System

Divorce case

Farm land right case

Trade license case

Family Rural Land Inheritance case

Car Sales & 3rd party debit case

Family Urban Land Inheritance case

1. Was the divorce made by the court's decision?

- Yes
- No

Figure 5.7 The third user system interface provides Question with two choices Yes/No.

The third user system interface is see as show me the scree y waiting the user to answer from the choice.



Welcome to HoF Constitutional interpretation issue identifier Expert System

Divorce case

Farm land right case

Trade license case

Family Rural Land Inheritance case

Car Sales & 3rd party debit case

Family Urban Land Inheritance case

2. Was the divorce made based on the three reasons on the new family law Art. 75?

- Yes
- No

Figure 5.8 The fourth user system scree

This scree shows the after the previous question user response, queceqitive second question was displayed as shown.

5.3 System Evaluation

Evaluation is a process, which reveals errors in the program. It is the major quality measure employed during software development. In the way of Evaluating, the program is executed with a set of Evaluation cases and the output of the program for the Evaluation cases is evaluated to determine if the program is performing as it is expected to perform. There are various Evaluation types, but for this study I used only three testing types, they are:

- 1. Unit Evaluation**
- 2. Integration Evaluation**
- 3. User acceptance Evaluation**

5.3.1 Unit Evaluation

Unit Evaluation performed on each module or block of code during development. The programmer who writes the code normally does Evaluation.

Table 5.1 CI Expert System Identifier System - Unit Evaluation

No	Test objective	Test Steps	Expected Result	Result
1	To ensure if we can log into the system, Double Click on the Icon of the system, and. Clicking on the desired menu to select that chosen menu.	1. Click on " lickhere " tab to get system's question	The Previously mentioned Tab provides the question with "Yes" or "No" choices.	Yes
2	To ensure if the question is displayed under each Tab or Question followed question.	If the case is procedurally did not performed firstly that case did not need the next question, but it needs decision comment.	The question is displayed with a "yes" and "No" option	Yes
3	To insure if some particular answer leads to other question	1. Click on the click here tab 2. Click on either "Yes" or "No" brings another question or decision comment	After clicking either "Yes" or "No" another question will be displayed	Yes
4	To ensure if some particular answer or decision comment is displayed.	1. click on the " lickhere " tab 2. click on either "Yes" or "No"	After clicking either "Yes" or "No" is, the decision is textual decision displayed.	Yes

5.3.2 Integration Evaluation

Integration Evaluation done before, during and after integration of a new module into the main software package. This involves testing of each individual code module. One piece of software can contain several modules, which are often created by several different programmers. It is crucial to test each module's effect on the entire program model.

Table 5.2 Modules Integration Evaluation

No	Test objective	Test Steps	Expected Result	Result
1	To ensure “ <i>lickhere</i> ” tab leads to the selected case question, and if the answer is “ decision comment ” from this section we want to go back “ <i>go to previous page</i> ” Tab is properly performed.	1. Both Tabs, “ <i>go to previous page</i> ” & “ <i>lickhere</i> ” tabs perform their tasks properly.	To Insert data into the system inserting section friendly available to the users.	Yes

5.3.3 User Acceptance Evaluation

Evaluation is a type of user acceptance Evaluation where the service /product team gives a nearly finished product to a group of target users to evaluate service /product performance in the real world.

The actual testing procedure should be relevant to your testing goals.

1. User acceptance evaluation is performed by Clients or End Users who are not employees of the organization
2. User acceptance evaluation is performed at a client location or end user of the product
3. Reliability, Security, Robustness are checked during the evaluation.

Table 5.3 “Industrial-strength” Quality assessment matrix (User acceptance test decision)

Miller’s extended criteria	Weitzel	Miller’s model	ANSI	MOKA	MK
1. Is the user interface of the system user friendly?	Yes	Yes	Yes	Yes	Yes
2. Is the system attractive (regarding the font size and color combinations) for use?	Yes	Yes	Yes	Yes	No 1
3. Does the search functionality work correctly by using destination name or number?	Yes	Yes	Yes	No	Yes
4. Is the system easy to understand and to be used?	Yes	Yes	Yes	Yes	Yes
5. Does the links of the system work correctly?	Yes	Yes	Yes	Yes	No

CHAPTER SIX

CONCLUSIONS AND FUTURE RESEARCH DIRECTION

6.1. Introduction

This last chapter of the research presents the chapter's Introduction, Key findings Contribution, conclusions, and future direction of the research.

Knowledge management is relatively new concept and practice has not yet been exercised, Organizational memory is an outcome of present and past performance of the organization, which can perform as part of knowledge management or by its own. Knowledge is regarded as the most important tool surpassing other resources; like land and capital. Knowledge flows a foregone conclusion out of Organizations through various factors such as key employees' resignations, retirement, death, turnover etc. In order to address this challenge in HoF, This study aimed to demonstrate *Knowledge based expert system*, to clean the way for enhancement of "*Knowledge based expert system*" in building Organizational memory and supporting decisions pertaining to Constitutional Interpretation tasks of the HoF. This task reduces the knowledge losses due to some key expertise turnover.

6.2. Key findings

This research used "qualitative research approach" was done for data collection, Intensive interviews conducted in the form of ten (10) unstructured interviews with participant selected based on their leadership positions from CI Expert System and Identity Issue directorate each were interviewed, in part, to determine from their past or present activity as defined Participants were no awareness and perception of knowledge management.

Knowledge management in service giving productive organizations and firms are the most important aspect today. One of the main aspects of KM is knowledge *retention*.

EHoF loses its time, resources, work force, knowledge and money spent on the same invention. Knowledge lies with the Expert in an organization. A crucial employee leaving an

organization will take the knowledge he/she has with him/her. Therefore, knowledge management (knowledge retention) is important aspect in the EHoF the employee's opinions were analyzed critically,

The study also discovered that the main shortcomings or downsizing problems related to knowledge creating obstacles for knowledge retention is occurred to the poor knowledge exchange and sharing among employees through managements within the organization, in the organization loss of essential knowledge due to a key employee *leaving for a better job is the most factor that frequently influence knowledge retention in EHoF*. Other factors for loss of crucial knowledge management is Key Employees leaving organization may be due to:

- Absence of recognition of knowledge in the present job,
- For career advancement,
- There is a general lack of recognition and awareness of the ***“knowledge management.***
- Stile cultural or poor Knowledge management practices were exist between CoCI and HoF Govrnmental political Organizations.
- Knowledge is did not updated (delated/added) as the situation of CI Expert System and Identity Directorate.
- Although, the study revealed that most of the respondents had not heard of the term knowledge management.
- Expert ***retirement (turnover)*** is the current issue for the HoF due to different factors.

6.3. Contribution of the study

The HoF Organization benefit from this Expert System to support CI:

- This initiation helps HoF, to construct its Knowledge management System (organizational memory) for the whole organization tasks.
- In this study, previous six (6) different hard copy based Constitutional Interpretation Issue manual work experiences were transformed to the computerized Knowledge-based CI Expert System will be refereed for the same /similar cases requested by the client for future.
- It avoids *wastage of time and energy, from finding hardcopy based information*
- *Particularly, when the recruitment made in the HoF (new employee joined to the*

organization) he/she can refer information from the system.

- Reduce the cost of customer that would have been paid for transportation to and from regional state frequently for the Constitutional Interpretation issue.
- Past Experiences were not lost, when expert leaving an organization.
- The services provided by this system is easy to use by experts and other employee is fast in fetching real-time decision-suggestion response, of customers in order to quickly get their respace by the improved knowledge-based expert system.

6.4. Recommendations / Future research direction

This paper focuses on CI Expert System decision Comment provider “CI Expert System”/ Expert System. The strategic decision-making lies in the fact that institutions are able to capture and acquire essential knowledge for informed decision making. *Knowledge capture, acquisition and retention mechanisms* are said to **build organizational memory**, therefore, it is important to carry out an additional research in this field. Usually considering all the arguments in the field of Expert System application on organizational memory and knowledge management, giving attention to this field it can be concluded that organizational memory is considered as one of the necessities of organizations.

Taking this premise a step further, the aim of this research was to answer the stated problem in chapter one. Through this research effort, the researcher identified the following issues as potential areas for further study.

Other stakeholders such as, researchers and software development companies who are interested in these demonstration system is as a departure point for their service providing and service endeavors should to add more functionality features that are not addressed by this CI Expert System demonstration CI Expert System .

- As shown in this research, from the directorate’s tasks only the single directorate of HoF which is, (CI Expert System and identity Issue) was tried to demonstrate. Future research will be consider in other service provider different Directorates under HoF.

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Appendix A: -Source code of App. program

1. *//This is Code for CI Expert System KBS*

2. *// File name Index Html*

3. *// Part 1 tasks performed at HTML*

4. `<html>`

5. `<head>`

6. `<title>CI Expert System identifier CI Expert System </title>`

7. *//HTML <script> element is used to embed executable code or data; this is typically used to embed or refer to JavaScript code.*

8. `<script src="Js/angular.min.js"></script>`

9. `<script src="Js/angular-animate.js"></script>` *// this directive provides support Java Script, CSS transition, and CSS keyframe animations.*

10. `<script src="Js/angular-route.js"></script>` *// provides routing and deep linking services and directives for AngularJS apps.*

11. `<script src="script.js"></script>`

12. `<link href="Js/bootstrap.css" rel="stylesheet" type="text/css">`

13. `</head>`

14. `<body class="alert-info" ng-app="FillsIntegration">` *//ng-app directive tells that this is the root element of App.*

15. `<div class="page-header text-center">` *//html class directs css elements*

16. `<h1 class="cls"> Welcome to HoF CI Expert System identifier Expert System</h1>` *//“cls” to provides heading color, and img to embed the log at*

the home page

17. </div>

18. <nav class="navbar-default"> // “*navbar-default*” to provides background and border color of the menu

19. <div class="container-fluid alert-info"> //“*container-fluid alert-info*” to provide set padding and margin of the menu

20. Part 2 tasks performed Divorce case to be default

21. Divorce case //I used “#!” Is mandatory to link the linking name in <a> and “/” is linking name given at script.js environment for the Divorce case to be default

22. \$routeProvider.when('/', {

23. templateUrl: 'Divorce case/index.html',});

} This code is written in JS to give linking name ‘/’ for 'Divorce case/index.html'

24. //“*btn btn-info navbar-btn*” to provide padding, font-size, text-align, border-radius of the menu

25. File name = *index.html*

26. <div class="container">

27. <div class="panel panel-default">

28. <h2>DIVORCE CASE</h2>

29. <p>To Identify CI Expert System Click here</p>

30. </div></div> // I used ‘att0’ linking name given at script.js environment for the Divorce case first question

31. `$routeProvider.when('/att0', {`
32. `templateUrl: 'Divorce case/att0.html',});` } This code is written in JS to
give linking name '/att0'
for 'Divorce case/ att0.html'
(1st question)

33. // ***“Click here” provides us the 1st question of the default or selected case***

34. ***The 1st question file name is “att0.html”***

35. `<div class="container">`

36. `<div class="panel panel-default">`

37. `<p>1. Was the divorce made by the court’s decision?</p>`

38. ``

39. `Yes` // ***when you select “Yes” the system provides you to the 2nd question***

40. `No` // ***when you select “No” the system provides us decision comment for the 1st question***

41. `</div></div>`

42. // ***Note “the above description is not for all case based menu questions it may be the reverse of the above question”***

43. ***The decision comment file name is “con0.html”***

44. `<div class="container">`

45. `<div class="panel panel-default">`

46. `<p>Based on the responses you have made:</p>`

47. `<p>This divorce case requires a Constitutional Interpretation</p>`

48. `Go back to the previous page </div></div>`

49. // “Go back to the previous page” button provides previous page

50. Part 3 cases selected by the user

51 Farm land right case // **I used “/0” linking name given at script.js environment for the Farm land right case menu**

52. \$routeProvider.when('/0', {

53. templateUrl: 'Farm land right case/index.html',});

This code is written in JS to give linking name ‘/0’ for “Farm land right case/index.html”

...

54 //The rest of user selected men us are stablished as the above example

55.</div> </nav> <hr/>

56. <div class="view-container">

57. <div ng-view class="view"></div> //“ng-View” listens for the directive to instantiate the controller and render the view.

58. </div>

59. </body>

60. </html>

61. “Script.js” is the name of the JS file the following codes are written on it:

62. (function(angular) { angular.module('FillsIntegration', ['ngAnimate', 'ngRoute']) //The ngAnimate service exposes a series of HTML fils utility methods that provide support for animation hooks.

63. // ngRoute is used for deep-linking URLs to controllers and views (HTML partials). It watches

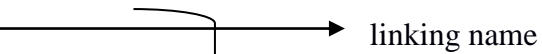
64. config(['\$routeProvider', function(\$routeProvider) { //\$routeProvider Used for configuring


routes

65. Part 4 Divorce case 5 questions and their decision comment linking name in the following way

66. \$routeProvider.when('/', {

67. templateUrl: 'Divorce case/index.html',});

68. \$routeProvider.when('/att0', {  linking name

69. templateUrl: 'Divorce case/att0.html',});  file name

70. \$routeProvider.when('/att1', {

71. templateUrl: 'Divorce case/att1.html',});

72. \$routeProvider.when('/att2', {

73. templateUrl: 'Divorce case/att2.html',});

74. \$routeProvider.when('/att3', {

75. templateUrl: 'Divorce case/att3.html',});

76. \$routeProvider.when('/att4', {

77. templateUrl: 'Divorce case/att4.html', });

These are Divorce case
questions file name
and their linking name

```
78. $routeProvider.when('/con0', {
79. templateUrl: 'Divorce case/con0.html',});
80. $routeProvider.when('/con1', {
81. templateUrl: 'Divorce case/con1.html',});
82. $routeProvider.when('/con2', {
83. . templateUrl: 'Divorce case/con2.html',});
84. . $routeProvider.when('/con3', {
85. templateUrl: 'Divorce case/con3.html',});
86. $routeProvider.when('/con4', {
87. templateUrl: 'Divorce case/con4.html',});
88. $routeProvider.when('/con5', {
87. templateUrl: 'Divorce case/con5.html',});
```

These are Divorce case decision comment file name and their linking name

```
...})(window.angular);
```

88. //All the rest case based menu are done by this way

Appendix B: -Information Sheet

Firstly, thank you for your time, consideration and readiness for helping me conduct this interview. My name is Tadesse Jatgao Gonche; I am an MSc student in Computer Science at St. Mary's University. The title of my Thesis is "Application of CI Expert System / expert system/ in building organizational memory: the case of hof".

Know, I am going to interviewee is to assess and understand all of the EHoF existing Knowledge management system, specially "CI Expert System service providing system" used by Federal governmental Organization of HoF. This Thesis cleans the way, to start one step ahead "long Journey" that give service providing for the "Constitutional and legal right violated people in the Country" . The current situation shows that the EHoF delays decisions for years causing people to lack justice; with this demonstration application helps customers to get services easily and quickly.

Your assistance in this interview is very much respected. The responses you give me will be used as an essential input for defining the functional and non-functional requirements which is important for designing the CI Expert System CI Expert System for service providing.

This interview takes approximately about 25-30 minutes to complete. As a participant of this interview, please note the following: if you seek any clarification on any of the questions you can ask me anything and you may withdraw from the interview at any time if you wish to and feel uncomfortable. Your responses will be kept confidential. The results collected from the interview will be used for the purposes of research only. Once again, thank you for your time and nice assistance.

Yours sincerely,

Tadesse Jatgano

Appendix C: - Information Sheet Amharic

ጤና ይስጥልኝ

በቅድሚያ ለዚህ ቃለ መጠይቅ ዉድ ጊዜዎትን ሰውተው እንዲሁም ፈቃደኝነዎትን ሰጥተው ስለ ተገኙ ታላቅ ምስጋናዬን ለማቅረብ እወዳለሁ። ስሜ ታደሰ ጃትጋኖ ይባላል ። የቅድስት ማሪያም ዩኒቨርሲቲ ድህረ ምረቃ ፕሮግራም ኮምፒውተር ሳይንስ ተማሪ ነኝ። በመስሪያ ቤታችን 'የዕዉቀት አስተዳደር ምን እንደሚመስል፣ በተለይም የህገ-መንግስት ትርጉም ጉዳዮች የስራ ሂደት አገልግሎቱ ምን እንደሚመስል ለማጥናት ነው የመጣሁት።

የቃለመጠይቁ ዋና አላማ በሙሉ ቤታችን የህገ-መንግስት ትርጉም ጉዳዮች የሚያስፈጽምና ፍትህ ባጡት ሕዝቦችና በከፍተኛ ፍ.ቤት ማእከላዊ በመሆን ፍትህ እንዲያገኙ የሚያደርግ መሆኑ ይታወቃል። ስለሆነም ይህም ጥናት የአገልግሎት አሰጣጡን ለማዘመን እና የሚሰጡትን አገልግሎቶች ጥራት ለመጨመር ነው። ይህ አፕሊኬሽን ለተጠቃሚዎች የተለያዩ ጥቅሞችን ይሰጣል

በዚህ ሲስተም ቀደም ስል ዉሳኔ የተሰጠባቸዉ ፋይሎች የክሱ ዓይነት፣ ለክሱ የዉሳኔ ሀሳብ የተሰጠበት መንገድ ተመዝግቦ ስለሚገኝ ለወደፍት ተመሳሳይ ጉዳዮች ሲመጡ አዲስ ተቀጣሪ ሰራተኛ ካለ ሳይቸገር ከሲስተሙ በየክስ አይነታቸዉ ስሚገኙ በቀላሉ ለማግኘት አይቸገርም።

በዚህ ቃለ መጠይቅ ወቅት ለሚደረግልኝ ትብብር ሁሉ በቅድሚያ በጣም አመሰግናለሁ። በቃለ መጠይቁ ላይ የሚሰጡኝ መልሶች ለሚሰራው የህገ-መንግስት ትርጉም ድጋፍ አፕሊኬሽን ዴቪሎፕመንት ወሳኝ ግብአቶች ናቸው።

ቃለመጠይቁ ከ20-25 ደቂቃ የሚፈጅ ጊዜያችሁን ብቻ የሚወስድ ይሆናል። ስለ ቃለ መጠይቁ ማወቅ የምትፈልጉትን ማንኛቸውንም ጥያቄዎች እንዲሁም ግልጽ እንዲሆንላችሁ የምትፈልጉትን ነገር መጠየቅ ትችላላችሁ። እንዲሁም መጠይቁ አሰልጦኛ ከሆነባችሁ ማቋረጥ ትችላላችሁ። የምትሰጡን ምላሽ ሚስጥራዊነቱ የተጠበቀ ሲሆን ከዚህ መጠይቅ የሚገኘው መረጃ ለዚህ የጥናት ጽሑፍ ብቻ የሚውል ይሆናል። በድጋሚ ስለ ጊዜያችሁ እና ትብብራችሁ በቅድሚያ አመሰግናለሁ።

ከሰላምታ ጋር

ታደሰ ጃትጋኖ

Appendix D: - Consent Form

I the undersigned have been informed that this interview is part of the study that explore Constitutional Interpretation Issue CI Expert System requirement analysis. I have been told that the study will help to develop an CI Expert System application, which makes information accessibility easy. And also I have been told about the time it will take to complete the interview is approximately 20-25 minutes. Therefore, I am willing to participate in the study by signing this form.

The Study Participant's Name _____

Mobile Number _____

Date _____

The Study Participant's Signature _____

Investigator Name _____

Appendix E: - Consent Form Amharic

ይህ ቃለ መጠይቅ የህገ-መንገስ ተርጉም አገልግሎት አሰጣጥን የተሻለ ለማድረግ አፕሊኬሽን ለመስራት የሚያስፈልጉ መረጃዎችን ለመሰብሰብ የሚረዳ መሆኑን ተረድቻለሁ። እንዲሁም ቃለ መጠይቁ የሚፈጀው ጊዜ ከ15-20 ደቂቃ ብቻ እንደሚሆን ተነግሮኛል። ስለዚህ በዚህ መጠይቅ ላይ ለመሳተፍ ተስማምቻለሁ።

የመረጃ ሰጪ ስም _____

የሞባይል ስልክ ቁጥር _____

ቀን _____

የመረጃ ሰጪ ፊርማ _____

ቃለ መጠይቅ ጠያቂ ስም _____

Appendix F: - Interview Guide

- 1) Tell me briefly about your company? When it was established, services, number of staff, capital, customers, stakeholders etc...
- 2) How does your Organization (HoF) current Knowledge Management handling?
- 3) For how many years HoF provides Constitutional Interpretation services?
- 4) In percentage estimate how much is People is coming to apply for the CI Expert System service In a year ?

4.8 What is the time interval between Application date and response getting date of the Applicant?

- 5) Is there any case that HoF provides service within a year from applicant's application date and response getting date? Y/N

5.1) If yes, why, did it performed quaky?

5.2) If no, why?

- 6) What do you expect from this system in terms of solving the current problems and challenges your company faces in CI Expert System sercice delivery quaky?

6.1) Additionally, what other functionalities should the system incorporate?

Appendix G: - Support letter