Building a Knowledge Model: The Case of Ethiopian Revenue and Customs Authority

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This is to certify that the thesis prepared by Minwiyelet Fiseha, entitled: Building a Knowledge Model: The Case of Ethiopian Revenue and Customs Authority and submitted in partial fulfillment of the requirements for the Degree of Master of Science of Information Science complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

Knowledge is one of the essential resources for organizations to run their business and gain competitive advantage. Thus, many organizations have been forced to rethink the way they manage their knowledge resource and therefore the need for knowledge management. Knowledge management provides processes and technologies to identify, create, represent, and distribute knowledge for reuse, awareness, and learning across the organizations

Ethiopian Revenue and Customs Authority (ERCA) is entitled for collecting revenue from customs duties and domestic taxes, protecting the security and safety of citizens. It is responsible to increasing competitiveness of the country through efficient, targeted controls and legitimate trade facilitation. However, ERCA loses its knowledge through high employee turnover. To address this challenge in ERCA, this research built a knowledge model for the implementation of knowledge management system for import customs clearance directorate. The model reduces the knowledge losses due to high employee turnover and enhances the knowledge managements and uses of the import customs clearance procedure.

The research used design science research methodology to build the knowledge model and develop the prototype knowledge management system. Data were collected using interview and document analysis methods and decision-making method was applied for data analysis. Unified Modeling Language (UML) was used as a modeling language. Evaluation was conducted using human expert (interview with customs clearance experts) evaluation methods to evaluate the effectiveness of the knowledge model.

The findings of this research offers knowledge model, knowledge content and the relationship of different knowledge, of the import customs clearance. The research provides a better understanding of how the knowledge model supports the knowledge management process and implementation in import customs clearance business processes of customs administration organization. The research also offered a solid foundation for future research studies with development and implementation of successful knowledge management systems in customs administration organizations.

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Declaration

I, the undersigned, declare that this thesis is my own work. It is submitted in partial fulfillment of the requirements for the degree of Masters of Science in Information Science at the School of Graduate Studies of Addis Ababa University. It has not been submitted for a degree or examination in any other university and that all source of materials used for the thesis have been duly acknowledged.

Minwiyelet Fiseha	Signature

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Acronyms

Abbreviation	Description
AAA	Addis Ababa Air Port Branch
AAK	Addis Ababa Kality Branch
ASYCUDA	Automated System for Customs Data
CPC	Customs Procedure Code
ECVS	Ethiopian Customs Valuation System
ERCA	Ethiopian Revenue and Customs Authority
ESLSE	Ethiopian Shipping Logistic Service Enterprise
IDE	Integrated Development Environment
IT	Information Technology
MODBRK	Broker's Module
SAD	Single Administrative Document
TIN	Tax Payers Identification Number
TRDP	Trader Profile
UML	Unified Modeling Language
VDD	Valuation Detail Declaration

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

The development and universality of information technology changes the structure and operation of global economy, industries, organizations, work and business practices (Avgerou, 1998). This change makes organizations to operate in a new and different environment. To survive and ensure lasting competitive advantage in such environment numerous business and academic experts suggest that organizations have to be knowledge driven. The use and management of organizational knowledge has become a commercial obligation to gain competitive advantage.

Knowledge is one of the major strategic resources in addition to the traditional factor of production such as labor and capital (Gold et al., 2001; Chu et al, 2011). Thus, traditional production factors are currently no longer enough to sustain an organization's competitive advantage (Romer, 1986). According to Davenport & Prusak (1998), knowledge is seen as flexible event that can be altered to a combined experience, values, meaningful information and expertise to evaluate and integrate new information and experience. Therefore Knowledge is being used for the better management of the organization.

Knowledge management established as new paradigm to managing knowledge as an asset for an organization (Smith, 2001). It is the effort that increases usefulness of knowledge within the organization by creating, storing, accessing, sharing and use of knowledge (Elizabeth, 2001). Managing knowledge is considered as a way to control and steer the direct and overt knowledge assets, particularly the intangible and covert knowledge, as a way to apply knowledge inside and outside the organization to create knowledge, value, innovation and improvement in the organization (Wunram, 2000). Furthermore, knowledge management provides technologies and processes to create, share and distribute knowledge. Therefore, it is a very important mechanism of strategies and practices through which organizations can address their need for innovation, improved their business performance and their growth (Rusli Abdullah et al, 2005).

According to Smith (2001) knowledge management create new working environment that establish more efficient and more effective performance by facilitating knowledge management processes. Waltz (2003) explained that knowledge management is a combination of knowledge creation, storage, dissemination and application activities. Moreover, knowledge management

derives its importance from the support it provides to organizations to gain competitive advantage and effective working through sharing and re-using knowledge (Rusli Abdullah et al, 2005). Therefore, organizations need to give attention for the proper implementation of knowledge management, to fulfill the mission, strategies and businesses objectives.

Customs industries have assumed only ensuring high levels of compliance by applying policies and regulations and policing the frontiers. In recent years customs industries shifted towards a more customer-centric approach that focuses on service provision (Gebauer & Christian, 2012). They also explained that customer-centric administration drives higher levels of compliance by better understanding customers' needs. Knowledge management allows automation of customer service and support processes, as well as advancement of customer-centric front office delivery model in public sector institutions (Arora, 2011). ERCA as a customs administration agency realized the critical role of knowledge management to achieve high performance.

In an effort to harness knowledge within an entire organization and retain and distribute it throughout, customs administration organization have implement knowledge management systems (Leech & Sutton 2002). Knowledge management system is a class of computer-based information system applied to managing organizational knowledge, which support and improve the processes of knowledge creation, storage, retrieval, transfer and application (Abdullah et al. 2005). Therefore, the implementation of good knowledge management systems requires good understanding of knowledge management development related activities, such as modeling business processes, knowledge management processes, technologies, organizational design, operational principles and factors that affect its implementation.

As knowledge management is considered to be a significant function of the successful business operation, and many organizations are implementing knowledge management. Therefore organizations that have a plan to implement knowledge management need a knowledge model that provides a way to represent knowledge contents. Speel et al. (2001) revels that knowledge modeling concepts helps to formulate and build knowledge management system supported by adequate tools instead of articulating the knowledge management system using data processing and knowledge base algorithms as in the usual knowledge engineering concepts.

A knowledge model is representation or an abstraction of knowledge management system (Booch et al., 1999). Knowledge model helps to structure and create the knowledge contents and relationships among the knowledge components of the knowledge management system (Eriksson

& Penker, 2000). In implementation effort of knowledge management system, the knowledge modeling approach has very important feature because it organize the design phases to conceptual specification phases which is usually subject to errors than the possible error in the knowledge model which is closer to the conceptual models (Schreiber, 1999).

ERCA is the body responsible for collecting revenue from customs duties and domestic taxes and to protect the society from adverse effects of smuggling. It seizes and takes legal action on the people and vehicles involved in the act of smuggling while it facilitates the legitimate movement of goods and people across the border. The objective of ERCA is to establish modern revenue assessment and collection system; and provide customers with equitable, efficient and quality service; to cause taxpayers voluntarily discharge their tax obligations; to enforce tax and customs laws by preventing and controlling contraband as well as tax fraud and evasion; to collect timely and effectively tax revenues generated by the economy.

According to Halawi et al. (2005) the presence of an explicit knowledge management strategy and knowledge management system enhances organizational capability to use its knowledge resources. However, the director of the human resource directorate explains that ERCA has no knowledge management systems currently.

Although customs administration organizations play great role in revenue collection and protecting the society, there is little research on knowledge management in customs administration organization worldwide. The researcher also observed that lack of explicit knowledge management systems in ERCA makes it very difficult to manage its relevant knowledge resources. Thus, implementation of knowledge management system helps ERCA to enhance the finding of information, retain critical knowledge to maintain service delivery requirements and regulatory obligations, use knowledge effectively to reduce levels of mis-declarations, reduce fraud and generate additional revenue.

However, implementing knowledge management system that fits to customs administration is a challenging task for organizations like ERCA which does not have experience in implementing and using knowledge management system. Developing knowledge modeling before implementing knowledge management system is very important to reduce the cost of knowledge management system development.

Therefore, the purpose of this research is to build knowledge modeling for a knowledge management system implementation in ERCA specifically the import customs clearance

processes. This research helps to promote knowledge use in customs administration and reduce the knowledge management system implementation effort of ERCA and other customs administration organization. Promoting the knowledge use helps to reduce the knowledge losses in customs administration organization and improves increase their performance.

1.2. Statement of the Problem

Within this knowledge era, knowledge is one of the most important organizational asset to create competitive advantage and to grow at an accelerated pace than the physical properties (Itami, 1987, Sveiby, 1996). Managing knowledge is considered as a way to create value, innovation and improvement in the organization (Wunram, 2000). Knowledge management which is taken as means to manage knowledge (Adhikari, 2010). Moreover, there is a need to implement knowledge management in organizations to establish more efficient and effective environment by facilitating knowledge management processes (Smith, 2001).

Although, knowledge management helps organizations to identify, create, represent, store and distribute their knowledge, its implementation faces different barriers, such as alignment of knowledge management and business strategy, allocation of resources, use of technology, top management support, organizational structure & culture (Davenport and Prusak 1998; McDermott and O"Dell, 2001; Szulanski, 1996; Sveiby, 1997; Cook, 1996).

Cook (1996) pointed out most knowledge management implementation focuses on knowledge management system development process rather than the knowledge content. However the implementation of successful knowledge management in organizations needs representation of the knowledge content (Kim et al., 2003). Therefore, organizations should thoroughly analyze the knowledge content to effectively model their knowledge requirements. Therefore, building an effective knowledge model that simplifies knowledge representation becomes the major issue in knowledge management implementation effort of organization (Eriksson & Penker, 2000).

This research is focused on building a knowledge model for import clearance process of ERCA to support its knowledge management implementation efforts. According to human resource directorate of ERCA annual report, the total revenue collection was 35,708,000.47 Birr in 2009/2010; 50,816,000.45 Birr in 2010/2011; 70,745,000.94 Birr in 2011/2012; 84,414,000.41Birr in 2012/2013 and 106,798,000.27 Birr in 2013/2014. So, these figures show that ERCA's financial capacity, in terms of annual revenue collection has constantly increased within the last five years to achieve its mission.

However, customs administration of the authority has many challenges to successfully conduct its responsibilities such as collecting revenue from customs duties and domestic taxes to protect the society from adverse effects of smuggling and getting qualified employees and retaining its own experienced employees to offer its services. The human resource directorate report also reveals that the authority loses its knowledge through high employee turnover and retirements (Teshome, 2012). ERCA's employees turnover rate during 2010/2011, 2011/2012, 2012/2013 and 2013/2014 budget year was 4.1%, 7%, 11.1% and 21.1% respectively. ERCA's human resource directorate director also indicates that the employee turnover rate might increase in the future.

This implies that the authority loses its relevant operational knowledge due to the high employee turnover. In addition ERCA cannot address its need for innovation, improved business performance and growth due to lack knowledge management. Furthermore, there is no research undertaken on knowledge modeling for customs administration sector in Ethiopia.

All these circumstances bring to mind the need for a knowledge model to successfully implement knowledge management at ERCA which in turn is very important to reduce the knowledge loss through high employee turnover; to increase the capability of clearance process of customs administration; to use knowledge resources effectively, which helps to enhance accuracy in decision making and improved risk management, to reduce levels of mis-declaration and fraud; and to generate additional revenue.

Therefore, this research aims to build knowledge model for import customs clearance process that helps ERCA to capture and represent customs clearance process knowledge content from its employees and different documents. The knowledge model is the major building block to implement successful knowledge management in ERCA.

To build knowledge model for import customs clearance process, this research is intended to address the following research questions:

- What knowledge is required to perform the activities of import customs clearance business processes?
- How can a knowledge model be built for import customs clearance procedures of ERCA to promote knowledge use and reduce organizational knowledge loss at ERCA?

1.3. Objectives of the Study

1.3.1. General objective

The general objective of this research is to build a knowledge model for the implementation of knowledge management to enhance the knowledge uses of the import customs clearance procedure of ERCA, to reduce operational knowledge loss and improve the performance of customs administration.

1.3.2. Specific objectives

In a similar manner, the study intends to achieve the following specific objectives:

- To identify the business processes and their activities of the import customs clearance procedure of ERCA;
- To identify and capture the knowledge need for each activity of the import customs clearance business processes;
- To build a knowledge model for the import customs clearance procedure that supports ERCA to manage its valuable knowledge;
- To evaluate the knowledge model to ensure that the model is a true representation of business processed knowledge;
- To develop a knowledge management system prototype for the implementation of the knowledge model and evaluate the knowledge model.

1.4. Significance of the Research

Knowledge is the main strategic resource of an organization; hence managing knowledge is essential to address organization need for innovation, improvement, performance and their growth. Successful implementation of knowledge management needs to develop knowledge model that helps to capture the knowledge content in the implementation efforts. If ERCA wants to take the opportunity that knowledge management contributes, it will develop the knowledge modeling and implement knowledge management system.

The study is intended to build knowledge modeling to assist the implementation of knowledge management system in import customs clearance procedure of ERCA. The study has identified the import customs clearance business process and its activities and developed system implementation based on the knowledge model.

Therefore, the study provide an explicit representation of the knowledge content with their relationships and specific approach of knowledge modeling in the implementation of knowledge management for import customs clearance procedure of ERCA and other customs administration organizations. It helps ERCA and other customs administration organizations in knowledge management implementation effort.

1.5. Scope of the Research

Literature reviews of knowledge management practices reveal that knowledge management systems has enormous application in many industries and it is also at the heart of problems solving relating both to organizational performance and the technical dimension of customs. This research is concentrated on exploration of the applicability of knowledge modeling, builds a knowledge model and develops a prototype for knowledge model for knowledge management implementation.

Due to the time and financial constraint the scope of this study focuses on import custom clearance procedure of ERCA, as the import customs clearance procedure is the core business activity in customs administration and it can be undertaken independently with the other customs procedures such as transit and export. Among the custom office throughout the country this work also restricted to Airport and Kality branch of custom office since most of the import transactions are undertaken at the two branches. Custom offices that are outside Addis Ababa are not included since it requires enormous resource.

1.6. Organization of the Thesis

This thesis report is organized into six chapters. Chapter one discusses the background of the study and statement of the problem. It also presents general and specific objectives of the study, significance of the research, scope of the research and methodology of the study.

In chapter two, literature review on knowledge overview, knowledge management, knowledge management processes, technologies for knowledge management, factors affecting the implementation of knowledge management, knowledge modeling and knowledge management in customs administration are presented and different type of proposed global and local related works on knowledge modeling are discussed.

In chapter three research methods and techniques are discussed. Chapter four deals with the domain area selected for knowledge modeling, data gathering and analysis and describe the

knowledge modeling building processes. Chapter five discussed about evaluation of the proposed knowledge modeling to verify the effectiveness of the knowledge model. Chapter six discuss about the implementation of prototype knowledge management system. It explained different tools used in prototype development and user interface of the knowledge management system prototype. The last chapter presents findings of the study, conclusion, future research and recommendations of the research.

CHAPTER TWO

2. LITERATURE REVIEW

In today's economy, knowledge has become increasingly more crucial element in the effective operation of an organization, since it is considered as organizations' primary sources of production and value. Managing this valuable resource is not easy for organization due to the complex nature of knowledge and diverse strategy for managing the knowledge. The goal of this chapter is to reviews key research issues on knowledge management and review previous research on knowledge management phenomenon.

The literature review is organized into eight sub sections: Overview of knowledge, knowledge management, knowledge management processes, knowledge management systems, knowledge management enabling factors, knowledge modeling and knowledge management in customs administration.

2.1. Overview of Knowledge

2.1.1. Definition of Knowledge

Many definitions have been developed in the knowledge management literature in order to understand knowledge. Due to the interdisciplinary nature of knowledge, it is difficult to find a single definition of knowledge. Some of the definitions of knowledge are:

Nonaka & Takeuchi (1995) define knowledge as "a dynamic human process of justifying personal belief towards the truth".

Davenport and Prusak (1998) define knowledge as "information combined with experience, context, interpretation, and reflection. It is a high-value form of information that is ready to apply to decisions and actions". As an alternatives Davenport and Prusak (1998) also defines knowledge as "is a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information" and "it originates and is applied in the mind of the knower".

Leonard and Sensiper (1998) define knowledge as "information that is relevant, actionable and based at least partially on experience".

O'Dell and Grayson (1998) define knowledge as "what people in organization know about their customers, products, process, mistakes, and success".

2.1.2. Data, Information and Knowledge

The term knowledge has many definitions but it is not a clear concept as it extremely related with the terms data and information. Although data, information and knowledge are related they should not be used interchangeably (Blumentritt & Johnston, 1999). Therefore, it is helpful to differentiate data, information, and knowledge for clarification.

Data are raw facts that are recorded and stored. Data do not have much meaning. Data are specific numerical or symbolic representations of facts about the world. Klicon (1999) defines data as un-interpreted material on which a decision is to be based and depends on facts which may include anything known to be true or exist. Data must be sorted, grouped, analyzed, and summarized to have meaning. When data are organized and processed, they become information.

Information is a useful organization and selection of facts, not the number of facts available. It involves relationships among the represented facts. Information has meaning and value to the receiver. According to Klicon (1999) information is results from the interpretation of data in a given context. Therefore, single content of data may produce different information contents if the context is different (Klicon, 1999). Information becomes knowledge when it is combined with context and experience.

Knowledge consists of data or information that has been organized and processed to give understanding, experience, and expertise in a specific context. Information comprises facts that are organized in a structured way, whereas knowledge incorporates values, beliefs, perspectives, judgments, and know-how (Blumentritt & Johnston, 1999). Compared to data and information, it is hard to manage knowledge due to the context- dependent aspect of knowledge. Many studies reveal that to distinguish data, information and knowledge is useful to represent them in a hierarchy. In the hierarchy knowledge is represented at the top with the most value and meaning and data at the bottom with the least value and meaning (Awad & Ghaziri, 2004; Bierly et al., 2000). The hierarchy representation can be depicted as shown in the following Figure.

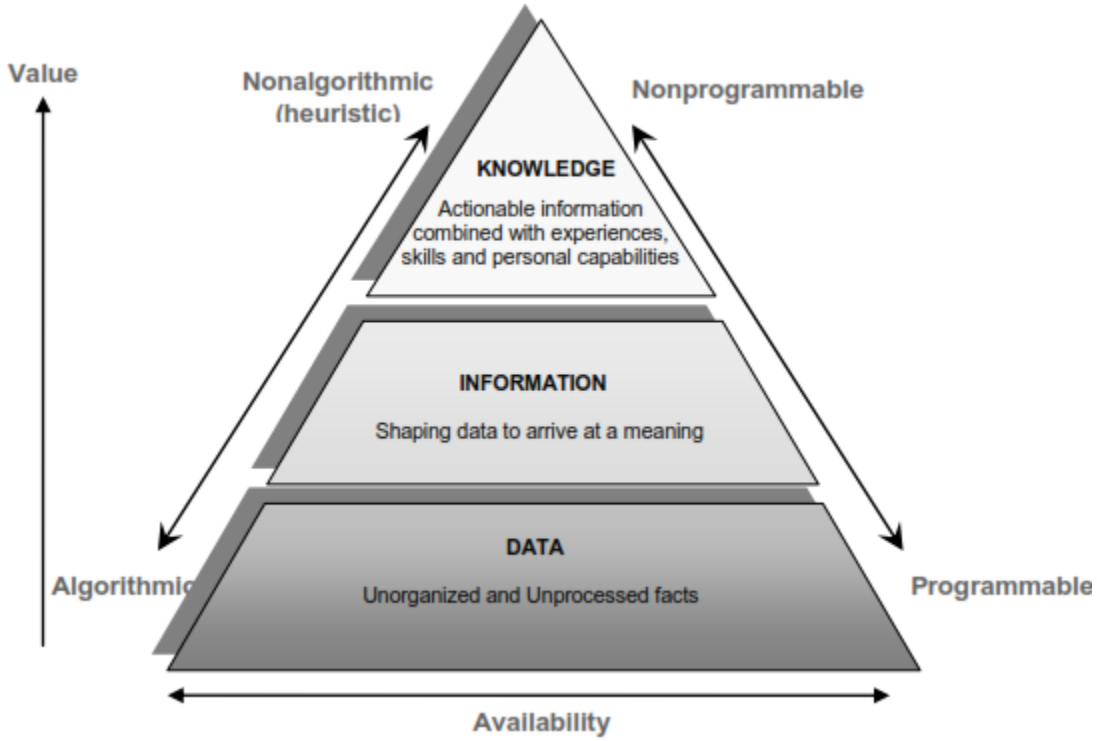

Figure 2. 1 : Data, Information and Knowledge
(Awad & Ghaziri, 2004; Bierly et al., 2000)

2.1.3. Type of knowledge

Many researches reveal the existence different knowledge classification methods (Tserng & Lin, 2004; Lin et al., 2006). These classifications have been emerged and used within the knowledge management literature as a response to the growing interests in managing knowledge and rising awareness of its usefulness and importance. Hence, identifying the type of knowledge is an important issue to help the organizations in managing their knowledge resources successfully by identifying the different types of knowledge with different nature need different procedures, tools and activities to process and manage (Tserng & Lin, 2004; Lin et al., 2006).

Tacit and explicit knowledge

One of the most well-known proposed frameworks for classifying knowledge is to distinguish between tacit knowledge and explicit knowledge. Polanyi (as cited in Nonaka, 1994) made a distinction between the tacit and explicit type of knowledge. Tacit knowledge refers to the knowledge that has a personal quality that makes it hard to articulate or communicate. It can be said to be the knowing or the deeply rooted know-how that emerges from action in a particular context.

The tacit knowledge is based on thinking, experience, and feelings in a specific context, and is comprised of both technical and cognitive components (Popadiuk and Choo, 2006). The cognitive component refers to an individual's mental models, maps, beliefs, paradigms, and viewpoints. The technical component refers to concrete know-how and skills that apply to a specific context (Popadiuk and Choo, 2006).

Therefore tacit knowledge is highly personal and hard to be managed, shared or formalized since it includes experiences, know-how and perceptions, which normally reside in individuals' mind and memories (Nonaka, 2007; Lin et al., 2006). Explicit Knowledge refers to the modifiable component that can be disembodied and transmitted (Alavi and Leidner, 2001). It is the "know-what" which can be extracted from the knowledge holder and shared with other individuals (Nonaka & Takeushi, 1995). It can be expressed in form of books, reports, data files, newsreels, audio cassettes, disk and other physical forms.

2.2. Knowledge Management

Knowledge is a primary asset of organizations. Managing this asset helps organizations to provide their people the ability to use a systematic methods and procedures that were created or used by others previously to solve similar problems, and to learn from past experiences, while maintaining the new created experiences to be used in the future (Tiwana, 1999; Davenport & Prusak, 1998; Baker et al., 1997). Knowledge management is evolving as a primary strategic resource in the 21st century and many organizations are beginning to initiate and implement it (Wonga & Aspinwall, 2006).

2.2.1. Knowledge management definition

Wiig (1997) defined knowledge management as "a set of distinct and well-defined approaches and processes. The overall purpose of knowledge management is to maximize the enterprise's knowledge related effectiveness and returns from its knowledge assets and to renew them constantly."

Knowledge management is the process of making an organization in the direction of the continuous renewal of the organizational knowledge including creation of supportive organizational structures, facilitate organizational members, putting information technology infrastructure to facilitate teamwork and diffusion of knowledge (e.g., groupware) into place (Bertel, 1996).

Skyrme (1999a) defines knowledge management as explicit and systematic management of vital knowledge and knowledge creation, collection, organization, diffusion, use and utilization process. He also stated that knowledge management requires turning tacit knowledge into explicit knowledge that can be widely shared throughout the organization and appropriately applied.

The numerous definitions knowledge management advocates the objective of knowledge management. Many studies reveal that the objective of knowledge management is to use knowledge to provide a competitive advantage for the business and transform knowledge to add value to the processes and operations of the business leverage knowledge strategic to business that accelerate growth and innovation.

Davenport (1998) also explained that most knowledge management objective is either to make knowledge visible and show the role of knowledge in an organization; to develop a knowledge-intensive culture by encouraging knowledge management behaviors and proactively seeking and offering knowledge; or to build a knowledge infrastructure-not only a technical system.

Knowledge management provides the tools, techniques and facilities for end users to managing knowledge (Ahmad et al., 2007). They reveals that these tools, techniques and facilities help end users to capture, share, reuse, update, and create new experiences, best practices to aid employees in processes without having to spend extra time, effort and resources on reinventing solutions that have already been invented elsewhere in the organizations.

The extensiveness of these definitions reveals that, knowledge management is a set of things involving various activities like theories, models, processes and technologies for exploitation, creation, retaining, sharing and using of knowledge. These activities have always been managed historically for organization that has no explicit knowledge management strategies; effective knowledge management needs explicit knowledge management system.

Successful knowledge management system enhances an organization's ability to incorporate knowledge into business processes and enables organizations to perform intelligently to sustain their competitive advantage by using their knowledge assets (Wiig, 1999).

2.3. Knowledge Management Processes and Systems

Although there are inconsistencies about the knowledge management processes, various definitions of knowledge management show that all the process of knowledge management in organizations is much related. Knowledge management process help to share perspectives, ideas,

experience and information; To make sure that knowledge management related experience, ideas and perspectives are available in the right place at the right time and improve efficiency knowledge management processes help to enable informed decisions and reducing the need to rediscover knowledge.

According to Gold (2001), knowledge management process are classified into four broad dimensions of process capability – acquiring knowledge, converting it into useful form, knowledge application and protecting knowledge. Five basic activities of knowledge management processes are noted by Serrat (2008): capture, create, store, share and use knowledge. Lei et al. (2000) divide the knowledge management process into four high level processes and the processes are knowledge acquisition, knowledge coordination and induction, knowledge transmission and diffusion and knowledge creation.

Most of definitions of knowledge management explain that knowledge management processes outline all aspects involved in the actual management of knowledge. Most literatures reveal that in order to achieve the organizations' goals there are five key processes associated with knowledge management: knowledge creation, knowledge capturing, knowledge storage, knowledge sharing, and knowledge application.

Knowledge creation refers to the creation of new knowledge that does not exist before from both the organization and from outside (Alavi & Leidner, 2001). This process includes the transformation of tacit knowledge to explicit knowledge and vice versa. Within the organization the knowledge creation process is a dynamic interaction between knowing and knowledge at the individual and social level (Cook and Brown, 1999), in which new knowledge is generated within the process of learning. According to Nonaka and Takeuchi (1995) knowledge creation process is composed of four distinctive processes as socialization, externalization, combination, and internalization that take place inside communities of practices.

Knowledge capturing is the process of regaining tacit or explicit knowledge that exist inside people, artifacts or organizational bodies (Becerr-Fernandez et al, 2006). Also, Rezende and Souza (2007) noted that knowledge capture symbolizes the gaining of knowledge with an essential competences and experiences for the creation and updating of the selected knowledge areas. Moreover, knowledge capture or acquisition confines knowledge using matching technologies and symbolize or formalize knowledge in format used by computers (Deng, and Yu, 2006).

Knowledge can be captured or acquired from either internal or external sources of the organization. It is acquired internally through induction program for new employees and externally through educational institutions and previous employers. External knowledge sources are important and one should therefore take a holistic view of the value chain (Gamble & Blackwell 2001). Sources include suppliers, competitors, partners/alliances, customers, and external experts. Communities of practice can extend well outside the firm.

Knowledge storage is the process of storing organizational knowledge for future retrieval and to provide a better understanding of knowledge for workers. Knowledge storage provides coding and indexing of knowledge for later retrieval. Knowledge is reside or stored in different place in the organization: in the minds of people, in organizational processes, in organizational culture, in written documents, or digital storage devices (Davenport & Prusak, 1998).

Davenport & Prusak (1998) reveals that storing the knowledge without losing its distinctive features makes the stored knowledge valuable for the organization. Halawi et al (2005) expalian that storage of knowledge reduces the knowledge recreation processes and it also speed up the job learning.

Knowledge sharing is a process intended to exploit existing knowledge. It can be defined as a social interaction culture, involving the exchange of employee knowledge, experiences, and skills through the whole department or organization (Hogel et al., 2003). Knowledge sharing is the most important aspect in knowledge management process, since knowledge management is fundamentally about making the right knowledge or he right knowledge sources including people available to the right people at the right time and the vast majority of knowledge management initiatives depend upon it.

Chua (2004) considered knowledge sharing is as the core process of knowledge management as the major goal of knowledge management research and practice is to provide the movement or flow of knowledge among individual. Moreover, an effective knowledge management system is a shared system where individual can access and contribute to the knowledge pool as well. Knowledge sharing is accomplished by distributing and employing of knowledge chosen from within or outside the organization (Sun and Gang, 2006).

Sun and Gang (2006) reveals that knowledge sharing process has the knowledge representation, knowledge distribution and knowledge utilization sub processes. Knowledge representation refers to the representation of knowledge in more clear and storable way. Knowledge distribution

refers to the spread of knowledge throughout the organization. Knowledge utilization refers to the application of knowledge.

Knowledge application Knowledge application refers to the real use of captured and created knowledge and put into the management of knowledge life cycle (Kim, 2004). It is the process of getting knowledge utilized for making decisions and performing task perfectly for the organizational success. Knowledge utilization results in knowledge increase, by gaining expertise and insights. Knowledge application also refers the process of using organizational knowledge for making decisions and performing task perfectly for the organizational success. Only knowledge application can ensure that the organization knowledge represents a viable source of competitive advantage. Without knowledge application, all the other knowledge management processes are useless.

Organization that needs to implement knowledge management system must begin by specifying the necessary knowledge management processes. Organization also needs to understand the knowledge management cycle which helps to successful adoption of knowledge management systems. The knowledge management processes need to be supported by technology to facilitate the knowledge management systems. To have an effective knowledge management in organization, the knowledge management processes must be included in the knowledge management framework.

Knowledge management system is a collection of computer-based information system applied to managing organizational knowledge (Rusli and Mohd et al. 2005). Knowledge management system helps to facilitate the capture, storage, and sharing of knowledge (Alavi & Leidner 1999). Alavi and Leidner (2001) outline the role information technology plays in simplifying various knowledge management processes such as knowledge creation, storage/retrieval, transfer, and application.

2.4. Knowledge Management Enabling Factors

Implementation of knowledge management may face obstacles from different directions within the organization or from the outside. Knowledge management enabler (also called factors) refers to the factors that govern the effectiveness of knowledge management execution in the organization (Yeh et al, 2006). Many researchers identify factors the influence knowledge management activities. Chong (2006) reveals that in knowledge management program it is

extremely important to identify critical performance indicators of success factors to measure its performance.

Knowledge management enablers also refer to knowledge management barriers that are associated with structural and functional conditions of an organization which determines the success or failure of knowledge management initiative (Chauvel and Despres, 2002). Knowledge management enablers have the power to controller knowledge management in the organization and therefore organization should identify them in order to ensure successful implementation of knowledge management (Chong et al., 2009).

The three knowledge management enabling factors that support implicit explicit conversion process are organizational structure, culture and information technology (Laupase, 2003). According to Yu et al (2007) factors that have significant and positive influence on knowledge management performance are knowledge management activities, knowledge management system quality, knowledge management reward and learning orientation. Bishop et al (2008) also identified clear definition of knowledge management, business objectives, integration with organization, champions and a supporting team, top-level support, demonstrate the benefits, financial and non-financial rewards and balance between people and information technology as the main knowledge management enabler factors that need to be considered before, during and after implementation to ensure knowledge management effectiveness.

According to Kankanhalli (2003) many studies report reveals that technology is one of the critical factors for successful knowledge management projects. He also explained that when organizations develop knowledge management system they start with technology. Kim et al. (2004) reveals that most of the knowledge management projects focus on technologies. However, technology simplifies knowledge management processes such as knowledge creation, acquisition, sharing and application. The actual knowledge content managed by the technology is very important (Kim et al., 2004). Knowledge management technologies have little value without the knowledge content. The successful implementation of knowledge management projects depends on the knowledge content.

Organizations need a mechanism that helps them in managing their knowledge contents so that they can identify, organize and share the knowledge content in an effective and efficient manner (Kim et al., 2004). The knowledge model will help specify knowledge contents and show their

flows into the business processes. A knowledge model can provide tool for an organization that helps to manage knowledge contents (Kim et al., 2004).

2.5. Knowledge Modeling

2.5.1. Conceptual Modeling

Sen and Vinze (1997) defined model as a simplified representation of reality which is important to gain understandings of a complex problems. Models are a simplification and representation of reality (Booch et al., 1999). Real systems are any entities comprising many interrelated components and sub components working together in a complex manner. Models are used to represents the essential features of real systems by decomposing them into more manageable component and sub component that are easy to understand and to operate (Fowler 1999).

Models allow people to understand the complex system by means of enabling them to focus on specific area of the system (Abdullah et al. 2002). Modeling offers users and developers the ability to visualize the intended systems and communicate it effectively; therefore, they can better understand the reality by building a model. It also helps people to have unified view system instead of their diverse view of the system. According to Savolainen et al. (1995) models are highly related with the essential features or domain they represent. That domain will describe their modeling languages, working communities, and the supplementary tools used.

In system development processes models are used to view high level representation of the system and facilitate communication between people in the development team at different level of abstraction. According to Whitman et al. (2001) modeling is usually helps to analyze the problem domain before implementation, used to decrease complexity of reality and helps to communicate a common understanding of the system to different stakeholders. Models are used to capture the essential features of a real system by breaking them down into smaller components so that they can be better understood and used in system development to draw blueprints of the system and facilitate communication between different people.

Conceptual modeling is important in knowledge management system development process (Hakansson 2001), as it deals with the development of implementation independent knowledge models (Preece et al., 2001). Robinson (2008) defines conceptual model as a model made of the structure of concepts, which are used to help people understand the domain model.

The main objective of conceptual models is to deliver the fundamental principles and basic functionality of the system in which it represents. According to Kung and Solvberg (1986), properly implemented conceptual model should satisfy four fundamental objectives: Improve an individual's understanding of the representative system, facilitate efficient delivery of system details between different participants, offer a point of reference for experts to extract system specifications and document the system for future reference and provide a means for collaboration.

In conceptual model one of the most important elements is the modeling language (Kim et al., 2006). They also reveal that UML has proven to be effective for conceptual modeling it provides a very rich set of tools. UML as a language for object oriented models has further increased its acceptance (Evans and Clark, 1998; Fowler and Scott.1999). Object oriented modeling can be used to model knowledge because and much knowledge modeling techniques use object oriented modeling (Abdullah et al., 2002).

The UML covers conceptual things, such as business processes and system functions, as well as concrete things, such as programming-language classes, database schemas, and reusable software components and it can be considered as the standard of the entire object oriented community.

2.5.2. Business Process Modeling

The business Process modeling helps to identify knowledge intensive tasks that are inputs for conceptual modeling and it is considered as feasible for knowledge management system development. A business process is a set of logically related and structured business activities or tasks that combine to deliver something of value (e.g. products, goods, services or information) to a customer (Reijers et al., 2003). It is the arrangement of a set of activities in enterprise with a structure describing their logical order and dependence and their objective is to produce a predefined result (Reijers et al., 2003).

Hammer (1990) defines businesses process as "a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer". Operational business processes is a type of business process that establish the core business and create the primary value stream.

In business process modeling the enterprise process model is often referred to as the business process model. Business processes models are simplified, abstract representations of business processes and their structure represents the logical chronological sequence activities. A business

processes model enables a common understanding and analysis of a business process and it provides a comprehensive understanding of a process. An enterprise can be analyzed through its business processes.

Business process models may be utilized for different purposes. Different literatures reveal the following purposes for the use of business process models: Facilitate human understanding and communication and helps to accomplish a full understanding of processes for example, objectives and characteristics (Curtis et al., 1992).

2.5.3. Knowledge Modeling

In knowledge management, conceptual models are used to represent the knowledge or expert opinion in developing knowledge management systems and knowledge modeling is considered to be the key component for the construction of knowledge management systems (Hakansson 2001), According to Cook (1996) the content of the knowledge management system is very important. He also noted that most knowledge management system development give more attention to development process rather than its content. Organizations should systematically analyze knowledge requirements or knowledge contents before they begin any knowledge management system development (Kim et al., 2004).

The main objective of knowledge management system development is to manage the knowledge contents. Therefore it is important to analyze the knowledge contents. Kim et al. (2004) also reveal that the knowledge contents provide value for businesses and help corporations to succeed. Without knowledge contents it is difficult to understand the market, solve business problems, or support decision-making processes. Knowledge management technologies have little value without the knowledge contents.

Wielinga et al. (1997) reveals that knowledge models are very important to understand the tasks, methods, inferring knowledge, domain knowledge and its schemas in knowledge management system development. According to Davenport and Prusak (2000), modeling contributes to understand the source of knowledge, the inputs and outputs, the flow of knowledge. They also explained the importance of knowledge modeling in the identification of variables such as the impact that management action has on the organizational knowledge.

Organizations need a tool to analyze the knowledge contents needed in business processes and decision making so that they are identified, defined, organized and communicated an effective

and efficient manner. A knowledge model can offer such a tool to organizations that help to analyze knowledge contents (Kim et al., 2004).

Bubenko (1994) defines knowledge modeling as a collection of conceptual modeling techniques for defining different sides of the organizational domain including operational, business processes, actors, roles, flow of information and purposes.

A knowledge model is an abstraction of a knowledge management system (Kim et al., 2004). Knowledge model provides a simplified representation of a knowledge needs, structures, and relationships among components of the knowledge management system (Kim et al., 2006). Milton (2002) also reveals that knowledge modeling is used in acquiring, validating and storing knowledge for future use. He also explained knowledge models as structured representations of knowledge.

According to Eriksson and Penker (2000), knowledge modeling is served as a plan in managing knowledge of the enterprise to support their business process. It also fosters what is needed, what is not currently available and sets the situation in formulation of strategy to attain knowledge not currently available.

A knowledge model does not change frequently because it is modeled at the conceptual level and is built around business processes and the essential knowledge at the conceptual level (Kim et al., 2006). In knowledge modeling a conceptual level modeling is crucial (Schreiber et al. 1999). He also noted that, during the knowledge acquisition stage, most of the knowledge is unstructured and the modeling process constructs conceptual models of knowledge intensive activities.

2.5.4. Knowledge Modeling Techniques

Several knowledge modeling techniques have been proposed for modeling organizations knowledge. Some of these knowledge modeling techniques in term of how they are used for knowledge modeling during the development of a knowledge management system, how they complement each other and what their limitations are CommonKADS (Schreiber et al. 1999), Protégé 2000 (Grosso et al. 1999), the Unified Modeling Language (UML) (OMG 2001b; OMG 2003b) and Multi-perspective Modeling (Nuseibeh 1996; Chen-Burger 2001).

CommonKADS

Abdullah et al. (2002) explained CommonKADS as "has become the de facto standard for knowledge modeling and is used extensively in European research projects". They also noted that, CommonKADS includes techniques that supports structured knowledge engineering, methods that perform a detailed analysis of knowledge intensive tasks and processes and tools for corporate knowledge management.

CommonKADS is a set of models for knowledge engineering methodology (Schreiber et al. 1999). It supports organization modeling, task modeling, agents modeling, knowledge modeling and the design of the knowledge management system (Vollebregt et al. 1999, Schreiber et al. 1999).

The organization model deals about the feasibility study for the knowledge system (Schreiber et al. 1999). The problems and opportunities are the bases for study; it can focus on structure, process, people, culture and human power bases, resources, process breakdowns and knowledge assets. Hoog et al. (1997) reveals that the main purposes of organization model are: the identification of what impact the knowledge based application will have in the organization when it is implemented, the identification of the area in an organization where knowledge based applications can be implemented and provides the system developers with a "feeling" for where in the organization the applications will be deployed.

Schreiber et al. (1999) explained that the task model provides an insight in to the likely impact that introducing the knowledge system will have on the organization. The task model denotes to the characteristics of the business processes including the inputs and outputs, the preconditions, performance and quality, the actors or agents, the structural coupling of those agents, the flow of knowledge between the agents, their overall control, the knowledge and competences of the agents and the resources available to deliver the business process.

Agent model is the model used to understand the roles played by different agents when executing a task (Schreiber et al. 1999). Agents can be people, systems or any other entity that can perform a task. The agent authority to perform the task, characteristics and any associated constraint is specified in agent model.

According to Schreiber et al. (1999) knowledge model of CommonKADS is used to describe the application that are associated with knowledge used to perform tasks and the role of the knowledge in problem-solving activities (Schreiber et al. 1999, Vollebregt et al. 1999).

Knowledge in knowledge model of CommenKADS is categorized in to there (Motta 1999, Schreiber et al. 1999, Visser 1997): Task knowledge, domain knowledge and inference model. Task knowledge is a knowledge used to describe the order of execution for the reasoning steps. Domain knowledge is knowledge about concepts, properties, relationship etc. of the domain. Inference knowledge that describes the reasoning step performed using the domain knowledge.

The communication model is a model used to describe the communication between the agents needed when performing the task (Schreiber et al. 1999). Design model is used to describe a technical specification of the system in terms of its architecture, platform, modules, constructs and computational mechanisms (Schreiber et al. 1999).

CommonKADS also has its own graphical notations for task decomposition, inference structures and domain schema generation (Schreiber et al. 1999). According to Manjarres et al. (2002) and Schreiber et al. (1999) CommonKADS integrates an object-oriented development process and uses UML notations such as class diagrams, use-case diagrams, activity diagrams and state diagrams.

Protégé 2000

Abdullah et al. (2002) reveals that Protégé 2000 is a modeling technique developed by Musen and his colleagues. It is a frame-based ontology editing tool with knowledge acquisition tools that are widely used for domain modeling (Noy et al. 2001). They also explained that the frames are the main building blocks for knowledge base. The Protégé ontology contains classes, slots, facets and axioms (Abdullah et al., 2002).

Noy et al. (2001) explained classes in Protégé 2000 as "constitute a taxonomic hierarchy and are templates for individual instance frames". Properties or attributes of classes is known as slots in Protégé 2000 axioms (Abdullah et al., 2002). They also reveal that Slots are first class objects in Protégé 2000. There are two forms of slot. "Own slots define intrinsic properties of class or individual instance frames. Template slots are attached to class frames to define attributes of their instances, which in turn define specific values for slots" (Schreiber et al. 2001).

Facets are properties or attributes of a slot and they are used to specify constraints or cardinalities of slot values or data type (Abdullah et al., 2002). Abdullah et al., 2002 also explained axioms as it used to define additional constraints on frames.

Unified Modeling Language (UML)

The UML together with the Object Constraint Language is the de-facto standard for object modeling (Abdullah et al., 2002). UML is a modeling language that covers a wide range of different application domains (McCarthy et al. 2004).

According to Kim et al., (2006) UML is an industry standard tool for requirement gathering, visualizing, representing, designing, and documenting software systems. UML can be used outside of software modeling (Naiburg & Maksimchuk, 2001). UML can be used for modeling many different types of analysis and design (Kim et al., 2006). McCarthy et al. (2004) noted that domain specific concepts and techniques need a more specialized modification to the existing construct of the language.

UML can be used to model knowledge because other knowledge modeling techniques use object oriented (Abdullah et al., 2002). They also explained that CommonKADS use UML diagrams for knowledge modeling process and Protégé 2000 is developed using an object-oriented programming language. To model the knowledge UML provides a very flexible extension mechanism to be adapted and it fits well for knowledge modeling (Kim et al., 2006).

Things, relationships and diagrams are the three components of UML (Abdullah et al., 2002). Booch et al. (1999) defines things as "are the abstractions that are first-class citizens in a model". He also explained that relationship ties things together and diagrams group interesting collections of things.

The most common diagrams in UML are: Class diagram, describes the structure of a system. The structures are built from classes and relationships. Object diagram, expresses possible object combinations of a specific class diagram. Activity diagram, describes activities and actions taking place in a system. Deployment diagram, a special case of class diagram used to describe hardware within a software system.

Multi-Perspective Modeling

According to Abdullah et al., (2002) Multi-perspective modeling technique supports multiple techniques to be used together, each technique being the most suitable for modeling that specific feature of knowledge. Multi-perspective modeling technique is significant when organizational knowledge is very complex and heterogeneous and there is no single technique can model all these accurately and appropriately (Chen-Burger, 2001)

Kingston and Macintosh (2000) and Kingston (2002) reveal that multi-perspective modeling technique is used to produce different models of a single artifact which support different viewpoints. It is originated form software engineering where it is used to requirements gathering for software development projects (Nuseibeh 1996).

Multi-perspective modeling is supported by Zachman's Information System Architecture Framework. It has six categories (what, how, when, who, where and why) for viewing knowledge (Zachman 1987). "What" mentions to resources given in the form of declarative knowledge about things. "How" discusses to processes, that is, knowledge about actions or events. "When" refers to timing and constraints, that is knowledge about when actions or events happen, or should happen. "Who" refers to actors and describe knowledge about the actors performing each action, their capabilities and authority to carry out particular actions. "Where" refers to knowledge about communication, where the knowledge is needed and where it comes from, and how to input and output information. "Why" refers to knowledge about rationale, reasons, arguments, empirical studies and justifications for things that are done and the way they are done.

2.5.5. Knowledge Modeling Methods in Practice

Many authors propose different knowledge modeling methodologies. These methodologies can be used to develop practical knowledge management systems and each methodologies falls under one or more knowledge modeling methods that focuses on different knowledge management processes. In order to develop successful knowledge management system it is good to select the best knowledge modeling methods that is suitable for selected business processes. Some of the knowledge modeling methods and methodologies are reviewed as follow.

Methods Focus on Acquisition of Knowledge

According to Tallis et al. (1999) these methods have been commonly used for elicitation and validation knowledge from domain experts for knowledge based systems in the field of knowledge engineering. Popular methods include problem-solving methods (PSM) and knowledge acquisition and design structuring (KADS) are the most popular in this category. It is the most influential and first method to distinguish modeling aspects of knowledge acquisitions from implementation aspects (Schreiber et al., 1993)

Ontology Based Knowledge Modeling Methods

Allemang and Hendler (2008) define ontology "as a set of knowledge terms, including the vocabulary, the semantic interconnections which can be associated with inferences and smart queries for any particular domain". Inferences means that given some stated information one can determine other related information that one can consider as it had been stated (Allemang and Hendler, 2008). Ontology deals with the formal conceptual representation of reality (Gruber, 1992) and tries explicitly specify the concepts in existence. Ontology can be used for building a knowledge model. According to Maedche et al. (2003) framework for distributed organizational memories (FRODO) and corporate memory management through agents (CoMMA) are built on the ontology-based methods.

Knowledge Mapping Methods

Knowledge mapping is the process, methods and tools for analyzing knowledge areas to discover meaning and visualize these in comprehensive, transparent form therefore, and business relevant features are clearly highlighted (Carnot et al., 2001; Briggs et al., 2004, Cañas et al., 2004). Knowledge map is a navigation aid to explicit and tacit knowledge and depicts how knowledge flows throughout an organization (Grey, 1999). People, documents and databases are pointed using knowledge maps.

Methods Focus on Knowledge Transfer, Sharing or Capitalization

This modeling method involves the analysis and integration of knowledge processes and it gives emphasis to the investigation of knowledge flow dynamics to improve the flow of knowledge through the enterprise (Kim et al., 2006). The main objective of this method is to enable the transfer of knowledge from its source to where it is needed (Caussanel & Chouraqui, 1999; Nissen, Kamel, & Sengupta, 2000; Nissen, 2002; Gronau, Kopecny, & Kratzke, 2006). Kim et al. (2006) reveals that knowledge modeling and description language (KMDL) is one of the methods for building a process oriented knowledge model. Fröming et al. (2006) describe that KMDL is used to model knowledge intensive processes and it is possible to identify available knowledge existing in or necessary for processes effectively.

Corporate Memory Methods

Van et al. (1996) define corporate memory as "an explicit, disembodied persistent representation of knowledge and information in an organization". Corporate memory can be used to find,

access, diffuse and apply the corporate knowledge in an effective and efficient manner (Kim et al., 2006). Dieng et al. (1999) also reveals that method for knowledge system management (MKSM) is an example of corporate memory knowledge modeling methods.

Decision-Oriented Methods

This modeling method focuses on the analysis and identification of organizational knowledge and their structure (Kim et al., 2006). It emphasizes on the knowledge requirements by analyzing the input to the decision making processes. Kim et al. (2006) also reveal that the success of a knowledge management system is depending on the knowledge requirement of the business processes. It contents to answer users' questions, help solve their problems, or expedite their decision making processes.

Building knowledge management needs a clear definition of business processes (Gemino, 2003). He stated business model helps to analyze knowledge requirements. The knowledge model will helps to specify knowledge contents and show their flows into the business processes. Business processes facilitate knowledge gathering (Kawalek et al., 1997).

2.5.6. Business Process Oriented Knowledge Management

According to Giorgos et al. (2002) in knowledge modeling the business process oriented knowledge management provides a conceptual framework for modeling knowledge in business processes by focusing on business processes. They also explained that the business processes have to be analyzed from a knowledge management viewpoint and knowledge management activities should be seamlessly integrated with them. In analyzing the business processes from knowledge management perspective, the processes should be knowledge intensive and weakly structured (Giorgos et al., 2002). They also describe these two characteristics of business processes as follow:

Knowledge intensive business processes are defined as processes that are complex but conceptually simple and document centered activities. These processes have central decision making steps that require personal judgment based on experience, a comprehensive knowledge about the given as well as about older, similar cases, access to much specific information in files and forms, manifold legal regulations and standard operating procedures. Remus (2002) also reveals that knowledge intensive business process is the primary viewpoint within process oriented knowledge management.

Weakly structured business processes are processes that contain many steps performed by many people in different roles and involve several departments. Though regulations commend the individual roles or departments or roles to be involved, the specific sequence of processing steps may vary for specific instances due to particular eventualities, exceptions, or complications.

Heisig (2000) also explained that the importance of linking the business processes and knowledge management design. He also presents a business process analysis approach from the knowledge management perspective and he attempts to integrate knowledge management activities into daily business.

Several business process oriented knowledge modeling are proposed by different researchers, some of them are reviewed as follow.

Business Process Knowledge Modeling: Method and Tool (Giorgos et al., 2002)

Giorgos et al. (2002) proposes a business process knowledge modeling method that provides the methodological guidance for running a business process oriented knowledge management project. The proposed methodology contains six steps. The steps are discussed as follow.

Step1: Business Process Identification

This step involves the identification of the most important business process or processes to be supported in knowledge modeling. Business processes that are central to the company's value creation and processes with high process complexity and stronger knowledge intensity are candidate for modeling knowledge.

Step 2: Business Process Analysis

This step is used to describe the selected business process or processes in terms of source material, actors, task constituting the business process and roles involved business process.

Step 3: Task Analysis.

This involves detailed description of the each task. The description contains their input and output objects, control relations between tasks, etc. in addition to the description every task is assessed through its contribution to the knowledge management processes.

Step 4: Business Process Design

This step helps to prepare a proposed business process model using graphical tools. The proposed model shows enhanced knowledge management tasks for knowledge flow in the business process.

Step 5: Ontology Creation

This step involves the creation of complex model for structuring indices used to describe document content. Kinds, characteristics and relations are the three central concepts (Giorgos et al., 2002). According to Giorgos et al. (2002) kinds are an objective category of the objects sharing a set of properties, characteristics are the properties belonging to a kind and relations are the sorts of general features that kinds show as a group rather than individually.

Step 6: Ontology Refinement

This step involves the improvement and validation of the ontology that helps to obtain a validated ontology (Giorgos et al., 2002).

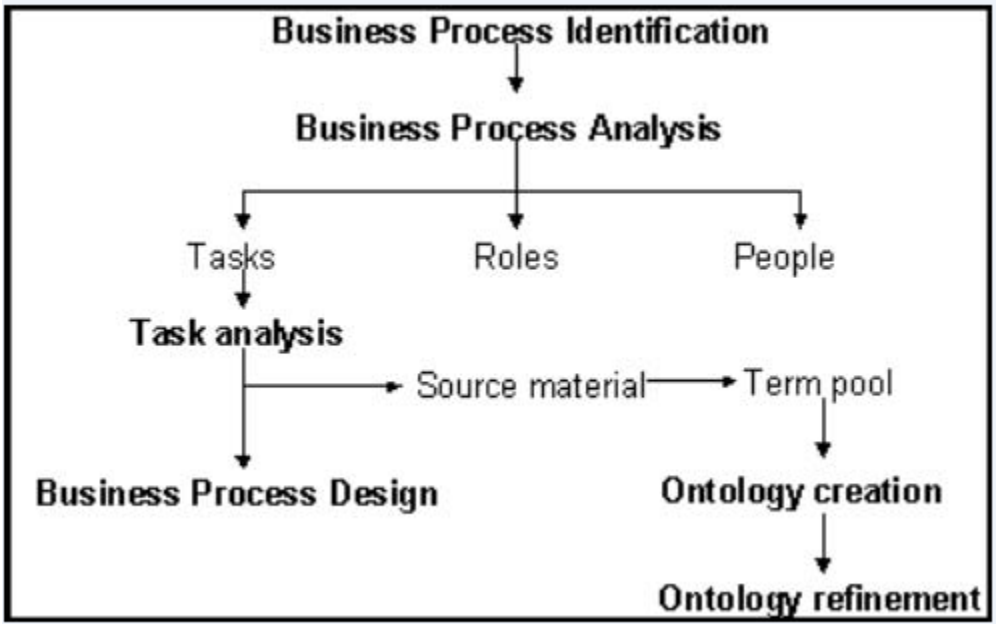

Figure 2. 2 : Business Process Knowledge Method (Giorgos et al., 2002)

Building the Knowledge Map: An Industrial Case Study (Kim et al., 2003)

Kim et al. (2003) proposes a practical methodology for capturing and representing organizational knowledge. The methodology contains six procedures. The proposed methodology extracts organizational knowledge based on the business processes. The methodology uses knowledge

mapping tools for representing the knowledge and provides guidelines and tips in each step. The proposed methodology steps are discussed as follow.

Step 1: Define Organizational Knowledge

This step used to define knowledge ontology that provides a uniform, text based intermediate representation of knowledge. The intermediate representation provides a means of describing knowledge. It defines knowledge and baseline taxonomy within an organization and the scope and level of detail of the knowledge map are also determined.

Step 2: Process Map Analysis

This step used to capture and managing knowledge involved in business process. The business process is analyzed using a process map technique. The process map is composed of process, flow and event and external objects (Kim et al., 2003).

Step 3: Knowledge Extraction

In this step knowledge is extracted using a process map. Three type of knowledge is extracted namely prerequisite, used and produced knowledge. Prerequisite knowledge is knowledge before process execution. Used knowledge is knowledge during execution and produced knowledge is knowledge after execution.

Step 4: Knowledge Profiling

In this step knowledge profile is produced from extracted knowledge. Knowledge is described using attribute and relationships. Knowledge Profiling helps to connect people with information and connecting people with people suing attributes such as keywords, descriptions, importance and people finder attributes such as an expert or author.

Step 5: Knowledge Linking

This step is used to identify new knowledge links and examine and confirm existing link. Knowledge link is represented as an arrow in knowledge map which depicts a navigation path of knowledge. Knowledge map is a type of directed graph contains nodes and links. In knowledge map each node represents knowledge item and the links representing pre and post relationship between knowledge.

Step 6: Knowledge Map Validation

In this step knowledge map is validation is performed using end users. A knowledge validation is conducted with domain experts, business managers and knowledge map producer. The checklists for conducting the validation are: Are all knowledge extracted, is any knowledge redundant over the organization and are profiles and links fully described for all knowledge?

The proposed methodology deliverables after completing the procedures: Knowledge mapping deliverables: Standard terminology, new knowledge creation knowledge and knowledge gaps. Knowledge dissemination deliverables: final report an electronic system containing the captured knowledge. People oriented deliverables: network experts

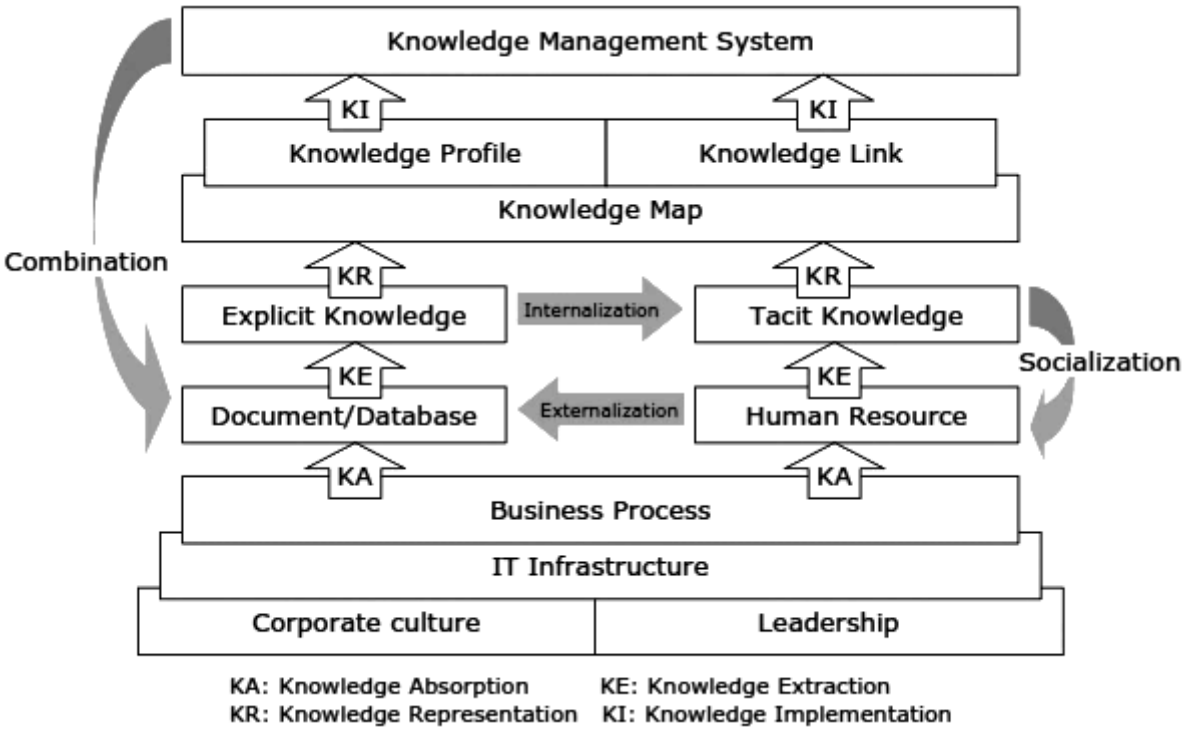

Figure 2. 3 : Knowledge Management Frameworks (Kim et al., 2003)

Building a Knowledge Model: A Decision-Making Approach

Kim et al. (2006) propose a method for building the knowledge requirements which is architecture for the effective knowledge management systems development. It is decision making oriented approach. They argued that any organization decision making processes are fundamental and decisions are made quickly and continuously. They also explained that the

decision making oriented method is a valid approach building knowledge model (Kim et al, 2004).

Kim et al. (2006) products, languages and procedures are the three elements in this knowledge modeling method. They reveal that products are the goals that a method is trying to achieve. According to Gemino & Wand (2003) language is used to document products and consists of notations and a set of rules directing how to use the language. Procedures are the rules and guidelines that define activities and how they are executed. It is a collection of steps with logical sequences.

The method produces two products: knowledge diagram and knowledge catalogue. UML language is used to document products in this analysis. The method contains procedures with six steps and discussed as follow.

Step 1: Select the Business Process

This step involves identification of business process which is needed to build a knowledge model is identified. The identified business process helps to define conceptual framework in building knowledge architecture. The scope is defined in this stage and the knowledge flows is formed around the process. A business process will consist of a series of decision point where the key decisions should be made.

Step 2: Identify Key Activities of the Business Processes

In this step the key activities of the selected business processes are identified. They are activities where knowledge requirements are analyzed. Each activity is filled with decision to be made. This step is also used to analyze key decision points for the business process. The UML activity diagram is used to analyze and document identify activities. Multiple iterations of interviews are conducted with the domain expert to understand the process.

Step 3: Analyze Each Activity to Identify the Knowledge Input to the Activity

In this step the activities represented in the activity diagram are analyzed to identify the knowledge input. The knowledge input is identified by analyze key decision point. A knowledge input is a collection of associated knowledge needed to make a decision and it is the knowledge requirements for the selected business process. Identification of knowledge input is conducted by one who has access to people that have knowledge about the process.

Step 4: Construct a Knowledge Diagram

This step is used to construct knowledge diagram from the activity diagram based on the knowledge input. A knowledge diagram is essentially a UML class diagram amended to incorporate knowledge. It also illustrates the association and whole and part relationship. The whole and part relationship indicates that any knowledge is a combination of information and expertise.

Information is the part of the knowledge you can easily identify and codify. Expertise is the part of the knowledge that represents the tacit dimension. Without expertise, the knowledge component is only data. Without the information part, the knowledge component may be mere intuition or guess. The output of the knowledge diagram is a broad and relatively high level overview of knowledge assets in an organization.

Step 5: Document the Knowledge Diagram

This step is used to constructed textual description of the knowledge diagram using knowledge catalog description template. A knowledge catalog is a detailed textual description of the internal structure of a knowledge component. It helps as a repository of knowledge components.

Step 6: Evaluate and Maintain the Knowledge Model

The last step of the method is evaluating the knowledge model and their sub components using key questions to be addressed. The step also involves continual update, regular audit and evaluation of evolving knowledge due to environmental change and technological update. Some of the questions to be addressed are: how and by who will an evaluation is carried out, what will be the criteria for evaluation and how will the evaluation results be taken into account.

2.6. Knowledge Management in Customs Administration

Government organizations usually have two major businesses: policy making and service delivery to the public (Cong et al, 2007). McNabb (2006) claims that government organization is increasingly implementing knowledge management strategies to maximize the benefit of what they know to improve the efficiency and effectiveness of their businesses. Customs is the government service which is responsible for the administration of laws and regulations relating to the importation, exportation and movement or storage of goods and the collection of duties and taxes. Customs administration is the most important factors in trade policies of every country. It has two roles in supporting the country: supporting domestic products and generating

income for the government. Good customs services would create a desirable satisfaction in the minds of customers, help others industries success through rapid and timely release of the imported goods and promote the cogitativeness of the country via support domestic product and market regulation and protects the public health, culture and economy.

Custom administration processes are the knowledge intensive government service. Knowledge management is a core discipline for customs administrations. Webb (1998) and Egbu et al. (1999) describe the importance of knowledge management in enhancing the performance of customs administration offices and it is increasingly acknowledged in customs administration industry and it can give improved business performance and innovation for that are needed for the industry. According to Kafchehi et al. (2013) knowledge management can enhancing customs offices continuous learning and creativity by directing their staff's and expertise which in turn maintain the sustainable growth and development of customs administration in dynamic environment. As a factor for competitiveness and organizations vitality, knowledge management has increased the quality of customs offices professional performance and created an opportunity for the customs offices to improve their effectiveness.

Knowledge management has been widely discussed by many researchers, but only few studies are found in customs administration industries and some of them are discussed below. Kafchehi et al. (2013) made attempt to examine the relationship between knowledge management with the improving professional activities in customs office. The main finding in their research is the implementations of knowledge management have a significant and positive relationship with improvement of customs professional activities. It all the activities including improves export, import, goods transit, passengers' goods and scrutiny on good smuggle dossiers. They also reveal that implementation of knowledge management in customs enhances the structure quality and labor relations in all dimensions and facilitate the achievement of missions and objectives.

Elham et al. (2013) has been tried to study the features of various process models presented in the knowledge management to provide a compatible model for the systematic use of knowledge in the Iranian customs administration. Based on institutional features of customs they propose knowledge management model. They identifies determining knowledge purposes, culturalizing, knowledge acquisition, knowledge sharing, knowledge creating, knowledge storage, usage of knowledge, measuring knowledge and getting feedback, empowering human resources are as knowledge management processes in customs.

There is only one work about knowledge management phenomenon in ERCA which is conducted by Teshome (2012). It is more focused on knowledge retention or storage. However, there is no research paper regarding knowledge model. Teshome (2012) recommended the organizational memory for knowledge retention in ERCA. He states, that ERCA lacked a number of knowledge management enablers which are necessary for enhancing organizational memory in order to retain operational relevant knowledge.

Teshome (2012) assesses the barriers towards building organizational memory at ERCA. According to his assessment the barriers are organizational support, cultural barriers, infrastructural barriers and personal barriers. Teshome (2012) also recommend a strategy for the development of an effective organizational memory in ERCA and his recommendation is summarized and presented as follows

Type of Knowledge	Knowledge Retention Facilities	Strategy	Recommended Tools
Knowledge shared among all members of the organization	• Lesson Learned Databases • Organizational Structures • Standard Operating Procedures, manuals, rules, regulations, etc	Codification strategy • In this scenarios the main task will be facilitating access and retrieval time • enriching the OM through combination	• Directories • Corporate intranet • wikis • E-learning • Story telling
Group Knowledge	• Individuals	• Codification for those knowledge through externalization	• Collaborative technologies (groupware, etc.) • Communities of practice • After action reviews • Best practice transfer • Cross-project learning

Individual Knowledge	• Individuals	• Personalization strategy through socialization.	• Personal web pages • Expert directories • Blogs • Master- apprentice relationship • Rewards • Exit Interview
Knowledge from the Organization's Environment	• External archives	• Codification strategy through combination	• Stake holder session • Interface with external organization • Links to stake holders official web sites

Table 2. 1 : OM Framework for ERCA
(Teshome, 2012)

Knowledge management enhances the performance of customs administration industries (Kafchehi et al. 2013). Moreover, it improves the customs offices continuous learning and creativity by directing their staff's and expertise. Researchers conduct different studies to increase the opportunity that the knowledge management offers in customs administration industries. However, the previous research focused on knowledge management system development processes. Faraj al. (1999) reveals that the success of a customs administration business in today depends critically on the quality of the knowledge content.

Knowing what one needs to know is the first and most important step in achieving success in knowledge management. It is the knowledge contents that provide businesses with value. It is the contents that help corporations succeed in a global market. Therefore, it is critical to analyze the knowledge content or requirements.

The knowledge modeling helps to represent knowledge contents and their flow in to the business processes. Therefore, this research focuses on building a knowledge model for import customs clearances business processes which is focused on knowledge content then the knowledge management processes.

2.7. Summary

A variety of literature sources were reviewed; those included professional journals, master theses, popular publications, on-line publications, and organizational websites. The literature review revealed that no single source of information or document precisely contained information on knowledge management and knowledge modeling. However, the literature reviewed did cover a broad range of knowledge management, knowledge modeling and related topics. The most prevalent themes are: type of knowledge, knowledge management, knowledge management systems and technologies, knowledge modeling methodologies and knowledge management practice in customs administration

The literature review exposed that knowledge application and management has become obligation for organizations to gain competitive advantage and knowledge modeling is considered to be the key component for the development of knowledge management systems. There are different knowledge modeling methods in practice, one of the method is decision-oriented modeling. It gives more attention to knowledge content rather than knowledge management system development process. Systematical analysis of knowledge contents is the most important issue in knowledge management system development.

Based on the reviewed literature, UML is one of the modeling languages which can be extended to model knowledge and it is reflected in knowledge engineering methodologies such as CommonKADS. This research adopted a decision-making knowledge modeling approach proposed by Kim et al. (2006). The selected knowledge modeling method uses UML for modeling language.

CHAPTER THREE

3. METHODOLOGY

3.1. Introduction

Research methodology is the procedures by which researchers go about their work of describing, explaining and predicting phenomena (Rajasekar et al. 2014). It is a science of studying how research is to be carried out. Research methodology contains the various research paradigms, research procedure, data collection, and data analysis techniques and modes of analyzing and interpreting data. The main purpose of this research is to propose knowledge management model for customs administration division of ERCA and to develop prototype knowledge management system for the proposed framework. In order to accomplish this research, design science research methodology was adopted. Design science has been chosen because it enables the researcher to understand and address the problems inherent in develop and implementing knowledge management system.

3.2. Research Paradigm

Paradigm is "a broad view or perspective of something" (Taylor, Kermode & Roberts, 2007). Weaver and Olson's (2006) define paradigm as "paradigms are patterns of beliefs and practices that regulate inquiry within a discipline by providing lenses, frames and processes through which investigation is accomplished". Paradigm reveals how research could be affected and guided by a certain paradigm according to Weaver and Olson's (2006) definition.

To clarify the research methodology choices, an exploration of the paradigm adopted for this research were discussed prior to any discussion about the specific methodologies utilized in this research. The design science paradigm is adopted for this research.

3.3. Design Science Research

Design science research is understood as a "problem solving paradigm" (Hevner et al. 2004; March & Smith 1995). Hevner et al. (2004) explain design science research "seeks to create innovations that define the ideas, practices, technical capabilities, and products to effectively and efficiently accomplished information systems application" (Denning, 1997).

Design science research creates and evaluates IT artifacts intended to solve identified organizational problems (Hevner et al., 2004). Thus, design science research uses the idea of an IT artifact both for the definition of the knowledge interest of the knowledge management system area as well as of the focal point for acquiring this knowledge. Benbasat and Zmud (2003) conceptualize the IT artifact as the application of IT to enable or support some tasks embedded within a structures that itself is embedded within a contexts. IT artifacts include constructs, models, methods that are applied in the development and use of information systems. (Hevner et al., 2004)

According to Hevner et al. (2004) some of the demands that design research should keep to: research problems should be relevant for business needs, design science should focus on an IT artifact and design artifacts must be rigorously evaluated, the research process must be rigorously performed, using scientific methods, the design process itself should be understood as a search process for new knowledge, the result must be communicated in both the practical and the scientific field and the research must contribute to knowledge in the area of artifact, foundation, and design methodology.

March and Smith (1995) propose four general output of design science research: constructs, models, methods and instantiations. Constructs are the conceptual vocabulary of a problem/ solution domain. Schon (1983) reveals that constructs provide the language in which problems and solutions are defined and communicated. Model is a set of statements or propositions stating relationships among constructs. Models are proposals for how things are or should be. Models use constructs to represent the design problem and its solution space (Simon 1996). A method is a set of steps or algorithm used to perform a task. Instantiations are an operationalization of construct, models and methods.

3.4. Design Science Research as Methodology

Although there are many design science research procedures, the following design science research process model which is developed by Vaishnavi and Kuechler (2008) was adopted for this research. Figure 3.1 shows the steps of the research procedure. Each step of the adopted procedures for this research is explained as follow:

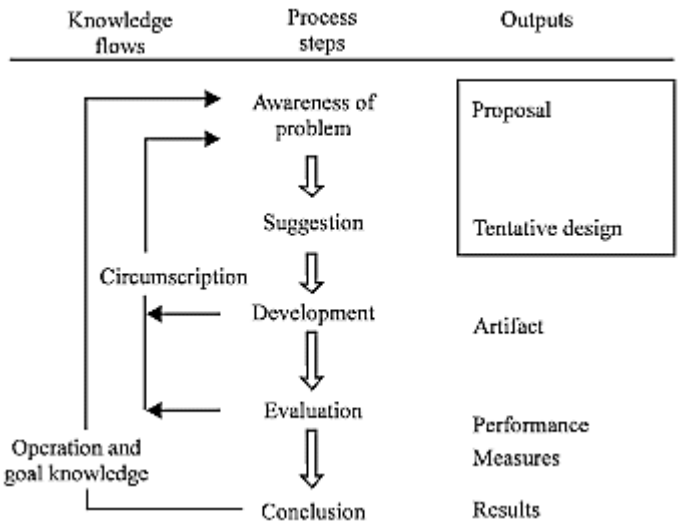

Figure 3. 1 : General Methodology of Design Science Research (Vaishnavi and Kuechler, 2008)

Awareness of a Problem

The first step of the adopted design science research methodology is awareness of a problem through problem identification and definition. In this step, the researcher identifies the problem, understands different researches and studies in the area of knowledge management specially the knowledge modeling and prepares the research proposal.

There is high employee turnover in ERCA and it has many difficulties to retain its experienced employees. According to ERCA human resource directorate annual reports the employees turnover rate during 2010/2011, 2011/2012, 2012/2013 and 2013/2014 budget year was 4.1%, 7%, 11.1% and 21.1% respectively. The directorate reports also expose that the employee turnover rate might also increase in the future. Due to the high employee turnover, the authority losses its relevant knowledge and faces many challenges to successfully conducting its operations. It is also very difficult for ERCA to get qualified employees in order to substitute the missing experienced employees.

In this research the lack of explicit knowledge management in import customs clearance procedure of ERCA which helps to retain the relevant knowledge from experienced employees and making available its explicit knowledge is identified as the problem. This research attempts to build a knowledge model of import customs clearance procedure of ERCA for knowledge management system implementation. The knowledge model enables to identify, represent and

show the relationship between the knowledge needed to perform the import customs clearance procedure of ERCA. The research proposal for this research was the output of this step.

Suggestion

The second step of the adopted design science research procedure is suggestion. This step is concerned with elaborated investigation of knowledge management literature and development of business process model for knowledge modeling. The researcher review more researches on knowledge management especially on knowledge modeling and knowledge management system development. After problem identification, the researcher derives suggestions to address the identified research problem. To examine the research question of how to build knowledge model for import customs clearance procedure of ERCA, it is important to select and gain good understanding of the business process in the import clearance procedure of ERCA to identify the knowledge required to undertake the selected business processes.

This research uses a decision making approach for the construction of the knowledge model. The selected approach is proposed by Kim et al. (2006). He revealed that the decision making approach utilizes the modeling of business processes to enable the derivation of knowledge content and the relationship between the knowledge. According to Kim et al. (2004) selection of the business process for which to build a knowledge model and identification of the key activities of the selected business process are the initial points for knowledge modeling.

After identifying a suitable domain area, the researcher gather detail information relevant to fully understand the import customs clearance procedure. This task delivers detail explanation to identify the business processes within the domain area. Next, the researcher analyzes the business processes and decomposes them in to activities. These activities help to identify the knowledge needed to perform each activity in the business processes. UML activity diagram is adopted to model the activities of the business processes. Multiple iteration of interview with subject matter experts and document analysis is used to identify, analyzes and model the business processes of the import customs clearance procedure.

Development:

Development is the third step of the adopted design science research procedure. In this step the knowledge model and working prototype knowledge management system was developed as an

output of this step. In this research knowledge management system is developed for the knowledge model.

After the analysis and development of the business processes model, the researcher identifies the knowledge needed for each activities identified in the business process model. Froming, Gronau, & Scmid, (2006) reveal that process oriented knowledge modeling methods can effectively define the knowledge available in or necessary for business processes. Kim et al. (2006) also suggests that knowledge can be extracted from the identified activities of the selected business processes. The researcher extracted both tacit and explicit knowledge. Tacit Knowledge is extracted using multiple interviews with subject matter expert. The explicit knowledge is extracted from import customs clearance procedure manuals, regulations, forms, reports and Automated System for Customs Data (ASYCUDA) system. After the extraction of knowledge for activities identified in the import customs business processes, the researcher establishes the link between the extracted knowledge. The knowledge link helps to identify the knowledge flow and association. Knowledge diagram is used to model the knowledge link. Kim et al. (2004) noted that, knowledge diagram is fundamentally a class diagram extended using stereotype methods to incorporate knowledge. The last task in suggestion step is documenting the knowledge diagram. The documentation helps to construct a textual description of the knowledge. For the documentation purpose the researcher uses knowledge catalog that helps as repository for knowledge diagram. The knowledge catalog is used to analyze and describe the knowledge diagram component in more detailed level and it helps to identify the source of the knowledge and how the knowledge is supplied.

After the completion of knowledge model, the researcher develops a web based knowledge base prototype application to knowledge model using PHP programming language and MYSQL database. The knowledge base development activity include, writing codes, building databases, populating knowledge to the databases, and other activities needed to implement the knowledge model such as user management and security issues.

The deployment model of the prototype knowledge management system of this research uses three-tier architecture. The researcher uses UML deployment diagram that models the physical deployment of the prototype knowledge management system on hardware components. The deployment diagram show hardware components and software components run on hardware components.

In context of a web based application environment, three-tier architecture separates the application into three specific layers, namely, presentation tier, application tier and data tier.

The presentation tier defines the content displayed to the end users via a web browser. The presentation tier is served via a web server. The user sends knowledge request using web browser to web server.

Application tier is responsible for all the business logic processing. Apache web server is used for this research. Web Server receives the incoming knowledge request from web browser and interprets the knowledge request and request knowledge on application tier. Application tier services incoming knowledge request with business logic, interact with data tier to retrieve knowledge that meet specific user request. The application tier is also sends the response back to the end user via web browser.

Data tier is responsible for managing the persistence of knowledge management system content. MySQL database engine is used for this research. The data tier contains the knowledge database that stores the knowledge contents to be manipulated in the application tier. The data tier receives the queries from application tier execute the query and return the result to the application tier.

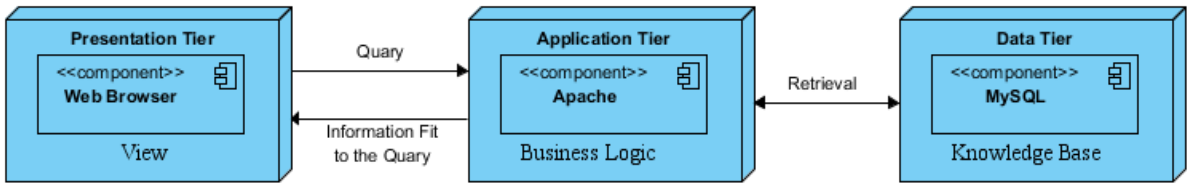

Figure 3. 2 : Deployment Diagram for Knowledge Management System

Evaluation:

Evaluation is the fourth step of selected design science research methodology. This is a crucial step in the design science research method. In this step the developed knowledge model evaluated to determine how well the developed prototype knowledge management system works. According to Fox and Gruninger (1998), models must be complete, accurate, relevant and valid. Knowledge modeling evaluation is a critical function that is achieved by reviewing the final knowledge management system with end users to ensure that the model is a true representation of business processed knowledge. Gomez-Perez (2001) reveals that evaluation and feedback based on the review are the two key factors to a successful knowledge management implementation.

Evaluation requires the identification of the evaluation method and criteria (Dieng et al., 1999). In identifying the evaluation criteria the key questions to be addressed are identification of who will evaluate the model, specification of when and how the evaluation process will be done and how the evaluation results will be taken into account (Dieng et al., 1999).

Many studies on knowledge management model reveal that it is difficult to define a set of criteria that satisfy all requirements (Gruninger et al., 2000). Although many literatures on evaluation of artifact indicate that there is no standard technique that can address all evaluation metrics, most companies evaluate the model using one of three approaches: comparing the model to a golden standard (for instance established benchmark), review the model using human experts or apply the model to the target domain using domain data (Brank et al, 2005). The researcher used human expert approach to review the model. The evaluation data is collected through interviews with custom clearance experts.

Conclusion:

Conclusion is the final step of this research. The lesson learned has summarized to show the significance of the research and to introduce the possible expanded ways of thinking about the research problem.

3.5. Sources of Data

The goal of data collection is to gain rich data that suits to achieve the research objective. Different researchers distinguish between primary and secondary sources of data. Primary data is data that is unpublished and has been collected directly from people, research participants or the organization. Secondary data refers to any materials that have previously been published, for example books, journals and articles. In this research both primary and secondary data collection method were used.

These are the two customs office found in Addis Ababa that are concerned with the import custom clearance procedure. In this research, the data were collected from customs procedures unit of Kality customs office, ERCA, Addis Ababa Airport branch office, support office from custom branch office, support and follow up directorate and management information system directorate of ERCA head office.

3.6. Methods of Data Collection

There are different types of data collection methods used for research studies. In this research interview and document analysis data collection method were applied.

Interviews:

According to Fontana and Frey (1998) interview is one of the most common and powerful ways used to understand the topic under investigation. The major role of research interview is to obtain relevant information from the perspective of the interviewee (Easterby-Smith et al).

An interview is defined as a social encounter that involves the interaction of the researcher and respondent (Wilson, 1996). According to King (1995) an interview process involves four major steps: defining the research question; creating the interview guide; recruiting participants; carrying out the interview. However, additional steps are essential to complete the process and these are transcribing the interview and writing the interview report.

Interviews can range from structured to unstructured interviews - the semi-structured interviews being in the middle of the two. Structured interviews involve the use of a set of predetermined questions and the interviewer has to ask them in the exact form and order prescribed. With unstructured interviews, the interviewer has greater freedom in formulating and ordering the questions and even asking new questions. However, an interview guide with a number of salient questions and issues to be investigated guides a semi-structured interview. But the interviewer is given flexibility in wording and ordering the questions asked (Erlandson et at, 1993).

In this research, personal or face-to-face semi-structured and unstructured interviews were selected. The interview approach has been selected because it is regarded as the best technique to enable the researcher to understand the import customs clearance business process, tasks and activities available in each business process, experience, required knowledge input for activities and to evaluate the final deliverable of the research.

The data were collected using multiple iterations of an in depth interview to the import customs clearance team leaders, system analyst and different senior customs officers. In order to understand the import customs clearance business process and the knowledge required of the business processes the team leaders and senior customs clearance experts are selected since, they have more experience than other officers. The interviewees participated in the interview and their branch presented as follows:

Customs procedures unit of Kality customs office

- One import customs clearance team leader, two senior facevate officers, two senior risk officers, two senior assessment officers and one senior physical inspection officer

Addis Ababa Airport branch office

- Import customs clearance team leader, two senior facevat officers, one senior document assessment officer and one senior inspection officer

Head office

- One business analysts from MIS directorate and one senior support officer form custom branch office support and follow up directorate

Document Analysis:

This is the second method used in this research to complement the interview method. Erlandson et al, (1993) describes this method as broad range of written records as well as any available material or data. Customs procedures, manuals and ERCA website were used as these sources.

CHAPTER FOUR

4. BUILDING KNOWLEDGE MODELING

4.1. Overview of ERCA

ERCA was established by merging the Ministry of Revenues, the Ethiopian Customs Authority and the Federal Inland Revenues in July 2008. ERCA is charged to administer the activities broadly indicated in the proclamation number (587/2008) and customs proclamation (622/2009). The Authority involves mainly in collecting revenue from domestic taxes and customs duties & taxes, enforcement of prohibitions and restrictions, trade facilitation, and compilation of statistics for economic planning.

In 2015, the authority has around 10,819 employees and operates throughout the country via its 100 Branch Offices and Tax Centers. Its current annual operating budget reaches 458 million birr. The customs administration division of ERCA contributes significantly to collect revenue, protecting the security and safety of citizens, as well as to increasing competitiveness through efficient, targeted controls and the facilitation of legitimate trade.

Revenue Collection

The customs administration division of the authority is responsible to collect revenue from following type of duties and taxes. Customs duties: on imported goods; export duties: on certain export goods; excise tax: on selected goods; value added tax (VAT): on imported goods; surtax: on imported goods and withholding tax: on imported goods.

In the last 5 years the total revenue collection ERCA was 35,708.47 in 2009/2010; 50,816.45 in 2010/2011; 70,745.94 in 2011/2012; 84,414.41in 2012/2013 and 106,798.27 in 2013/2014.

Enforcement of Prohibitions and Restrictions

Certain goods such as drugs, indecent or obscene material, specific weapons and counterfeit goods are prohibited from being brought into Ethiopia under any circumstances. Their attempted importation will result in seizure. Certain other goods may only be imported with a license issued by the appropriate regulatory bodies e.g. foods and medicine requires a license from Ethiopian Food, Medicine and Health Care Administration and Control Authority and pant and plant products requires a license from Ethiopian Ministry of Agriculture.

Trade Facilitation:

The customs administration division of authority is also responsible to facilitate international trade, which it does by providing accelerated clearance of goods through simplified and harmonized customs procedures.

A customs procedure refers to the treatment of goods by customs administration division which is protected in Ethiopia legislation. Customs procedures cover the whole spectrum of the Customs system of control and facilitation of imported and exported goods, the movement of passengers, and goods in transit. But this research focuses on import customs clearances processes because it is the major business process of customs administration organizations. The import customs clearance business process includes different service delivery and regulatory obligations requirements and it is knowledge intensive business processes.

4.2. Customs Clearance

Customs clearance is the accomplishment of the customs formalities necessary to allow goods to enter home as to be exported or to be placed under another customs procedure. Release is the action by the customs to permit goods undergoing clearance to be at the disposal of the person concerned.

4.2.1. ERCA Customs Clearance Formalities

According to the proclamation 622/2009, the formalities to be followed by the authority and other stakeholders are:

Customs Declaration

Customs declaration may be made in written form, orally, by bodily action or electronically. Customs deceleration to be presented in written form shall be filled in the prescribed form, signed and contain all the particular necessary for completing custom formalities.

Supporting Documents of Customs Declaration

For the submitted customs decelerations, the following original documents shall be supplied to customs in a number of copies determined by the authority. Some of the supporting documents are transportation document, invoice, bank permit, packing list, certificate of origin and other necessary documents.

Acceptance of Customs Declaration

The authority shall accept customs declaration where the declaration and supporting document contains the necessary particular required for the completion of customs formality

Calculation of Customs Value

The customs value for the purpose of applying the customs tariff and calculating other import charges.

Clearing Process

Receive and check the goods of declaration against the document produced whether it is per the instruction or not, then accept or reject, Identifying risk level of the document using the ASYCUDA++ system, examination of goods, this activity is undertaken to assure that the goods and conditions on the declaration are the same with the nature, origin, quantity and value of the goods and release of goods.

4.3. Building Knowledge Model

To build the knowledge model this paper uses a knowledge modeling methodology composed of five steps. The steps are business processes selection, identification of activities for selected business processes, knowledge input identification for each identified activity, knowledge diagram creation and documentation of knowledge diagram. This section shows customs clearance knowledge modeling processes.

4.3.1. Select the Business Process to Model the Knowledge

The first step of building knowledge modeling is identification of business process. This knowledge modeling is focus on import customs clearance business process of the customs procedure. Import customs clearance business process is selected because of its knowledge intensive nature and it is central to ERCA value creation. This step helps to define the conceptual framework and the scope of the knowledge model.

4.3.1.1. Understanding Import Customs Clearance Business Process

Import customs clearance is the execution of customs formalities necessary to allow goods to enter home use. It is the customs operations which shall be carried out by the importer or his agent and ERCA in order to comply with customs law. Import customs clearance is the most important procedure in customs administration. All goods imported into to Ethiopia must be declared to customs and cleared by customs with exception of some goods carried as passenger's personal effect items or some postal parcels exempted from duties by law.

Import customs clearance involves wide-ranging of knowledge to undertake customs declaration and clearance process including verify supporting document, assess documents, examine goods physically and release goods. Decision on the import clearance might have much consequence on revenue, social and environments as it is concerned with revenue collection, prohibition of illegal imports, control quality of imported goods, trade control. Developing an effective knowledge management capability/system can easily and rapidly provides knowledge that is required for activities involved in customs clearance process.

To carry out the import clearance process it is mandatory to present customs declaration with all supporting documents by importer or his agent. Customs import declaration is a form or document prepared by the ERCA in which the details of import are described for the accomplishment of customs formalities. It contains information about importer name, TIN, goods description, number of items, declaration entry date and time, mode of transport/transportation document, waybill number, examination place, warehouse number, quantity, net and gross weight, amount of duty and taxes paid and letter of credit number.

On the presentation of customs declaration, a number of original supporting documents shall be supplied to customs in a number of copies determined by the ERCA. The supporting documents are: transportation document, invoice, packing list, transit document, certificate of origin, assessment notice, technical certificate(if necessary), duty free privilege letter(if necessary), payment receipt, insurance receipt(if necessary), freight receipt(copy), declaration of facts, bank permit(if necessary), permit/certificates given by regulatory bodies and other necessary documents.

The major import customs clearance business process includes import cargo, import personal effects, import parcel and import travelers' goods clearance. Each import customs clearance business processes have the following major activities: accepting or rejection of lodged documents; verify the originality of supporting documents; verification of declaration against the supporting documents; identifying the risk level of goods; document assessment when the risk level is yellow and red; examination of goods when the risk level is red; request additional information if necessary and issue release notes\ release goods.

4.3.2. Identify Activities of the Business Processes

In this step the key activity for each type of import customs clearance business processes are identified. Each activity of the import customs procedure is filled with decision to be made and the knowledge requirements are analyzed from these activities. UML activity diagram is used to describe and analyzed the activity of business processes.

A. Process Description

Import cargo clearance is a customs clearance procedure performed based on the risk level of goods. To begin the cargo clearance process it is mandatory to terminate the transit customs procedure. The import customs clearance procedure begins by filling declaration using A++ electronically by the importer or his agent. The importer also made self-assessment, print and sign on the declaration. The declarant should also fill the form manually for non-automated customs offices on a pre-printed declaration form. The declarant pays duty and taxes at the bank and sends assessed electronic declaration with supporting documents. A++ assigns facevet officer. The declarant then submits hard copy of the original declaration together with the original supporting documents to the customs clearance facevet officer. Note that copy document may acceptable according to the customs procedure code declared.

Verify supported documents are complete; verify declaration using document assessment; verify declaration using physical examination; reconcile document assigned to assessor and examiner; spot examination examine with surprise checking; compare and verify electronically and physically submitted document; checking proper completion of clearance processes are activities identified in import cargo customs clearance business process.

I. Verify Supported Documents are Complete

The facevet officer receives declaration and the supporting documents that are necessary for customs clearance formality and verify whether the supporting documents are complete or not.

In the verification of lodged documents, which is the first activity of import cargo clearance business process in the customs office, the facevat officer might reject the document/ return the document back to the importer/agent if supporting documents are not complete. He accepts and registers on facevat application if the supporting documents are complete. Verification of lodged documents knowledge is needed by facevet officer for making decision to accept or reject

documents. The supporting documents requirements of a given declaration are different based on the imported goods and the facevat officer confirms based on checklist.

In this activity it is also important to identify the transit procedure completion and the risk level of goods. If the transit procedure is not completed then the declaration will be suspended. If the transit procedure is completed, A++ determines the risk level and assigns officer for the next activity.

II. Verify Declaration Using Document Assessment

The second activity of the import customs clearance process is document assessment. In this activity electronically submitted documents completeness and correctness are verified. It is also checked that if the required duty and taxes are paid for goods or the goods have duty free privilege.

This activity is performed when the risk level of goods is determined as yellow and red. This activity is done by assessor, examiner and clearance team leader. The assessor verifies information filled on declaration against electronically filled supporting document. Based on the information obtained from ASYCUDA++ more attention can be given for tariff, price of goods, country of origin, goods description and other information in document verification processes.

Sub activities of the document assessment activity are: Confirm declaration is filled correctly. Verify duty and taxes payments are done, if the declaration requires duty and taxes. If the declaration does not require duty and taxes, confirm duty free privilege. Also important the foreign exchange amount permitted by the bank (weekly exchange rate). For goods imported through letters of credit, the exchange rate shall be the rate specified on the bank document against the utilized currency. For any other purchase the official rate of exchange prescribed at the time of acceptance of customs declaration shall be applicable. It should be the same with the total invoice amount and exchange rate of the currency shown on the invoice. Checking the amount of insurance and transport value are correctly fill and confirms the amount is added to duty payable value. Confirm goods tariff. Check and verify the customs declaration is filled correctly based on required supported documents. Verify country of origin of the goods from certificate of origins

If electronically submitted documents lack enough information for valuation and tariff or if there is any difference or uncertainties on verification, then the risk level is changed to red and the process directs to physical examination section. It might also necessary to request samples

physical examination. It is also important to checks if the difference is more than pre-defined range. Payment for additional duty, taxes and penalty is requested, when the difference is within pre-defined range. When the difference is outlined from the pre-defined range, it needs a decision to handle using administrative procedures.

Confirm the payment of duty and taxes are done based on payment notice. If the goods is duty free, assessment office checks the availability of duty free letter. Confirm all supporting documents are attached based on the goods type. If the documents are not complete suspend the clearance process.

The assessor also makes decision on correction and payments request, in so doing, to refer to term of release or to issue release note. He must know if the payment is done in some range of date.

Based on the verification from discrepancy review and decision from assessor to refer term of reference, the assessor identifies the required corrections and makes a decision if there is additional payment and penalties. The difference handler might request additional information from importer or agent.

III. Verify Declaration Using Physical Examination

Undertaking customs clearance physical examination of goods is very necessary. It helps to confirm the quantity, country of origin and type of goods arrived as the declaration submitted by importer or his agent. Physical examination is one of the major activities in import cargo customs clearance process. This activity is performed by assessor and examiner when the risk level of the goods is determined as red. This activity is done in parallel with document assessment.

Sub activities in physical examination of goods are: confirming packing lists contains all the detailed information. To request information from document assessment result for decision making. Identify the amount of sample and confirm the goods, packing list and declaration facts are the same. To compares the document assessment and physical examination result, if there is any discrepancy. To requests additional duty and taxes payment from declarant or directs the process to handle by administrative procedures.

If there is any uncertainty on document assessment, tariff, price and other physical examination related results or if any additional information is required for decision making, it is necessary to transfer the case to discrepancy review.

IV. Reconcile Document Assigned to Assessor and Examiner

This activity is needed to check the same documents are assigned to assessment officer and physical examination officer. This activity is done by team leader of the clearance procedure. If there is a difference in assigned document, correction is done by re-assign the documents to the officers.

V. Perform Spot Checking

This activity is important to confirm the reliability and significance of duty and taxes discrepancy report produced from document assessment and physical examination result. It is performed by senior assessor. It might also require additional information from importer or agent. Upon the submission of the requested additional information or explanation by importer/agent, it is necessary to makes decision based on the information submitted either to issue release note or ask the importer to pay additional duty and taxes payment. In this activity it might be necessary to request penalty payment. Based on administrative procedure it might also require to pay penalty or transfer to investigation team if it is difficult to cover by administrative procedure.

VI. Checking Proper Completion of Clearance Processes

This activity is important to confirm whether the customs clearance processes of the declaration is finished properly or not. It is done by documentation officer when documents are received from facevat application. If the customs clearance process is not properly finished and accepted, the declaration and supporting documents will be filed and stored in temporary folder. If the clearance process is properly finished and accepted, the declaration and supporting document permanently filed in documentation section.

B. Activity Diagram

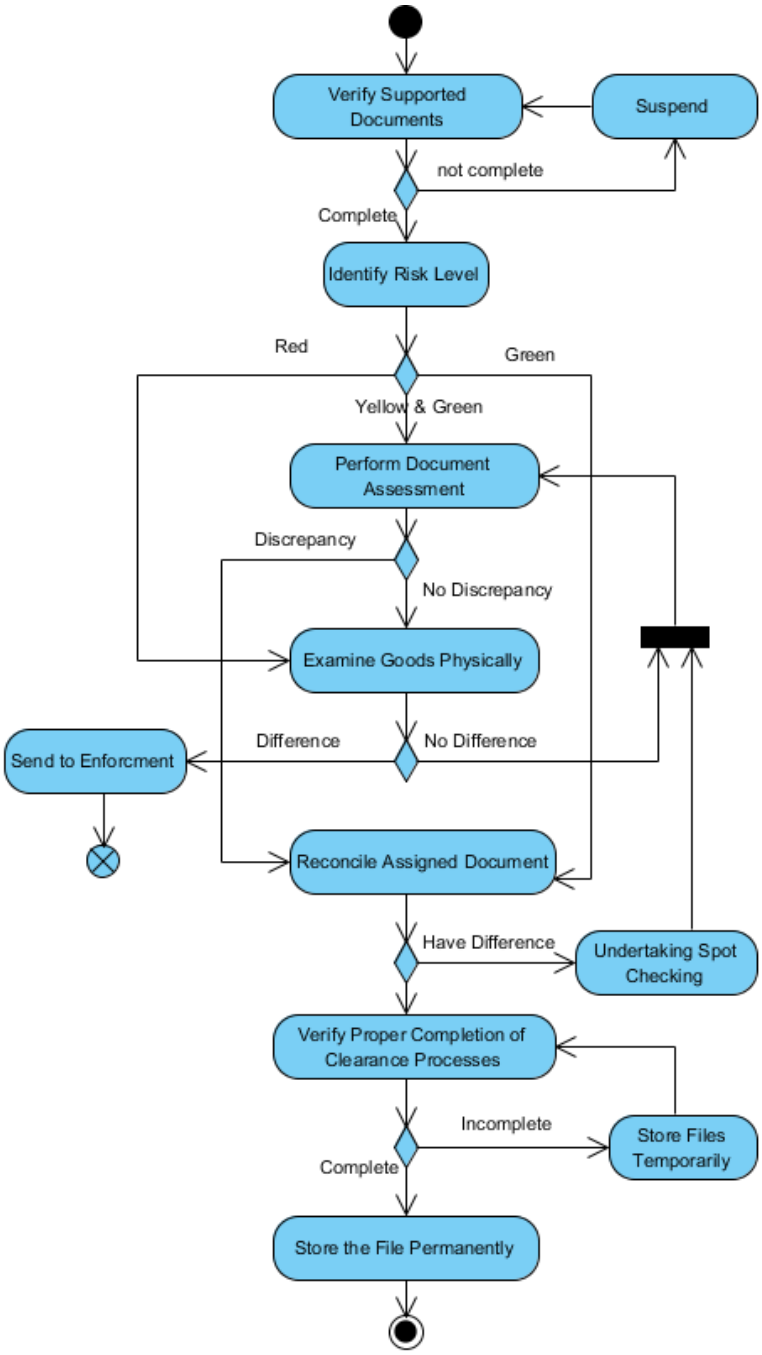

Figure 4. 1 : Import Cargo Clearance Activity Diagram

4.3.3. Identify Knowledge Input for each Activity

In this step each activity represented in the activity diagram is analyzed to identify the knowledge input. The knowledge input is a collection of related knowledge necessary to make a decision in each activity. It is a description of each import customs clearance business processes knowledge requirement and it must be identified for each activity in the activity diagram.

4.3.3.1. Import Cargo Clearance Business Process

Verifying the completeness of the supporting documents is the first activity of import cargo clearance business process. To perform this activity the facevat officer needs the following knowledge.

- Knowledge to identify list of supporting documents required for import cargo clearance process from the checklist and to verify the completeness of the document for a given declaration. This knowledge can be achieved from declaration, requirement, experienced facevat officer and facevat application manual.
- Knowledge to identify the transit procedure termination and the of risk level goods. This knowledge can be achieved through declaration, risk, transit and experienced facevat officer.

The second activity is document assessment to verify the declaration. To perform this activity, the assessment officer must have following knowledge.

- Knowledge to verify the information on electronically filled declaration against physically submitted supporting documents and knowledge to use ASYCUDA++ system and it is achieved through declaration, assessment, requirements, experienced assessment officer and ASYCUDA++ end user manual.
- Knowledge to verify duty and taxes payments are done or confirm duty free privilege letter is attached; to check the permitted foreign exchange amount are correct; to check the amount of insurance and transport value are correctly fill and confirms the amount is added to duty payable value; check goods tariff; to re-rout the risk level to red. This knowledge can be achieved through declaration, duties and taxes, requirement, tariff, valuation and ASYCUDA++ and Ethiopian Customs Valuation System (ECVS) end user manual.
- Knowledge to make decision for additional duty, taxes and/or penalty payment; to make decision the clearance process is handled by administrative procedure. This knowledge can be achieved through the declaration, duties and taxes, penalty, administrative procedure, experienced assessor, customs manual and ASYCUDA++ end user manual.

The third activity is physical good examination. To perform this activity, the examiner officer must have the following knowledge.

- Knowledge to check and verify all information included in packing list; review document assessment; compare goods, packing list and declaration facts; compare assessment and examination report. The knowledge can be achieved from the declaration, goods, requirements, assessment, examination, experienced physical examination officer, customs manual and ASYCUDA++ end user manual.
- Knowledge to make decision and calculate duty taxes and/or penalty; to identify additional information requirement. Knowledge to decide the clearance process to transfer the discrepancy review team. It is achieved through the declaration, assessment, duties and taxes, penalty and additional requirement, payment, experienced physical examiner officer, customs manual and ASYCUDA++ end user manual.

The next activity is reconciling document assigned to assessment and examination. The knowledge required for making a reconciliation of document assigned to assessor and physical examiner are:

- Knowledge to identify the document assigned to assessor and physical examiner from ASYCUDA++. Compare the two documents are the same based on goods of the declaration. This knowledge can be achieved through the declaration, requirements, assessment, examination, experienced customs clearance team leader and ASYCUDA++ end user manual.

The next activity is undertaking spot checking. To conduct a surprise checking much knowledge required. The knowledge requirements are:

- Knowledge to identify assessment and examination result; confirm the significance and correctness of assessment and examination result; to identify if there is difference in duty and taxes of electronically submitted documents, identify additional information required; to decide additional duty, taxes and/or penalty payment and to use ASYCUDA++ system. The knowledge can be accomplished through declaration, assessment, examination, duties and taxes, discrepancy, requirements, administrative procedure, spot checking customs manuals, experienced assessment and examination officers and ASYCUDA++ end user manual.

The last activity of import cargo clearance is approving the completion of clearance process and files (stores) declaration and all supporting documents in documentation section. In identifying the clearance process is completed properly it is mandatory to have the following knowledge:

- Knowledge to verify the completion of the clearance process, knowledge to use facevat application to retrieve supporting documents; to use ASYCUDA++ system for registering temporary and permanent documents. This knowledge can be obtained from declaration, requirements, documentation, experienced documentation officer and ASYCUDA++ end user manual.

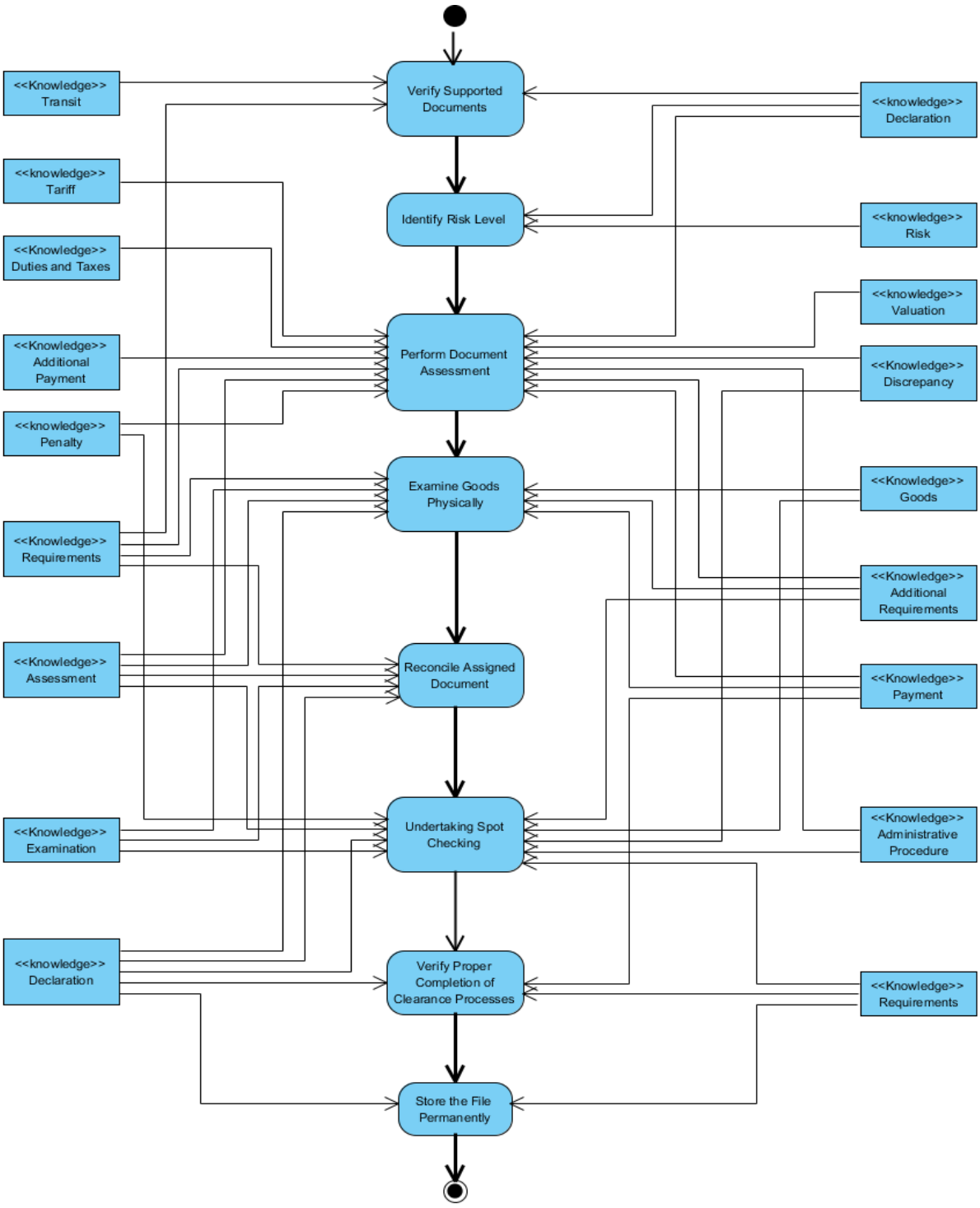

Figure 4. 2 : Knowledge Input to Import Cargo Clearance Activity Diagram

4.3.4. Construct a Knowledge Diagram for the Activities

In this step a knowledge diagram is constructed to show the relationship between different knowledge components. It is a modified class diagram to incorporate knowledge. The knowledge

diagrams also illustrate the association and whole and part relationship. The following knowledge diagrams are a broad and relatively high level overview of knowledge assets of import customs clearance business processes.

Each knowledge components consists explicit knowledge or information and tacit knowledge or expertise. The information part of the knowledge identified from different objects import customs clearance business processes. Expertise is experience, decision making skill, interpretation skill, analyzing skill, and monitoring and synthesizing capabilities of import customs clearance officers. Knowledge component is a collection of data without expertise and it is guess without information.

Note that the knowledge diagram is divided in to three parts to show the information and expertise parts of the knowledge components. The following figures illustrate import customs clearance business processes knowledge diagram with information and expertise parts of knowledge components.

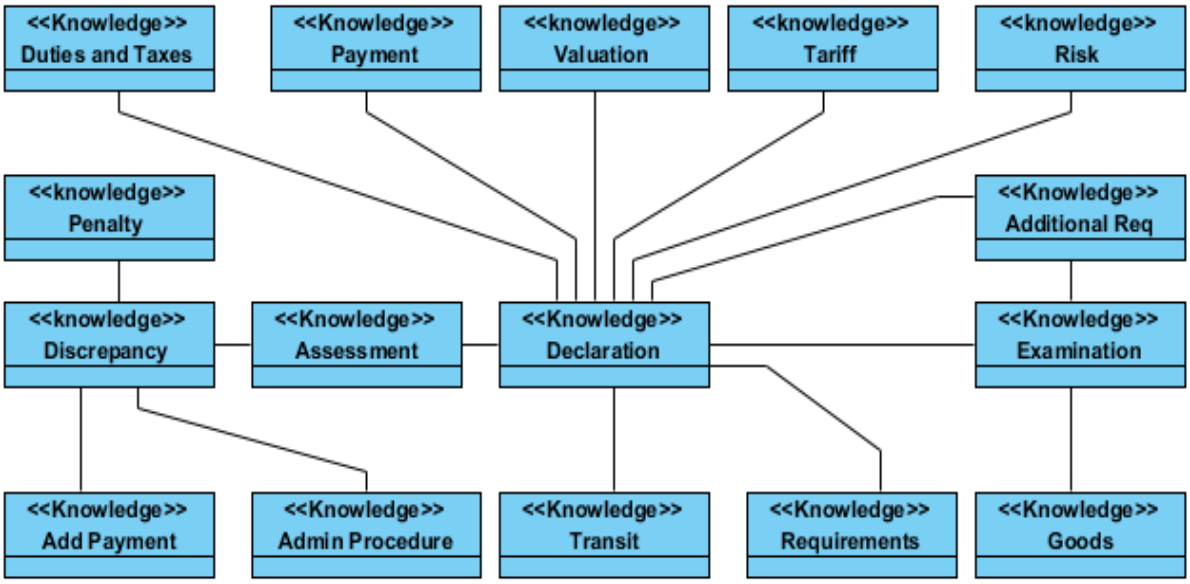

Figure 4. 3 : Import Cargo Clearance Knowledge Diagram

A. Import Cargo Clearance Knowledge Diagram Part 1

The first part of import cargo clearance knowledge diagram contains knowledge about requirements, declaration, payments, assessment and transit.

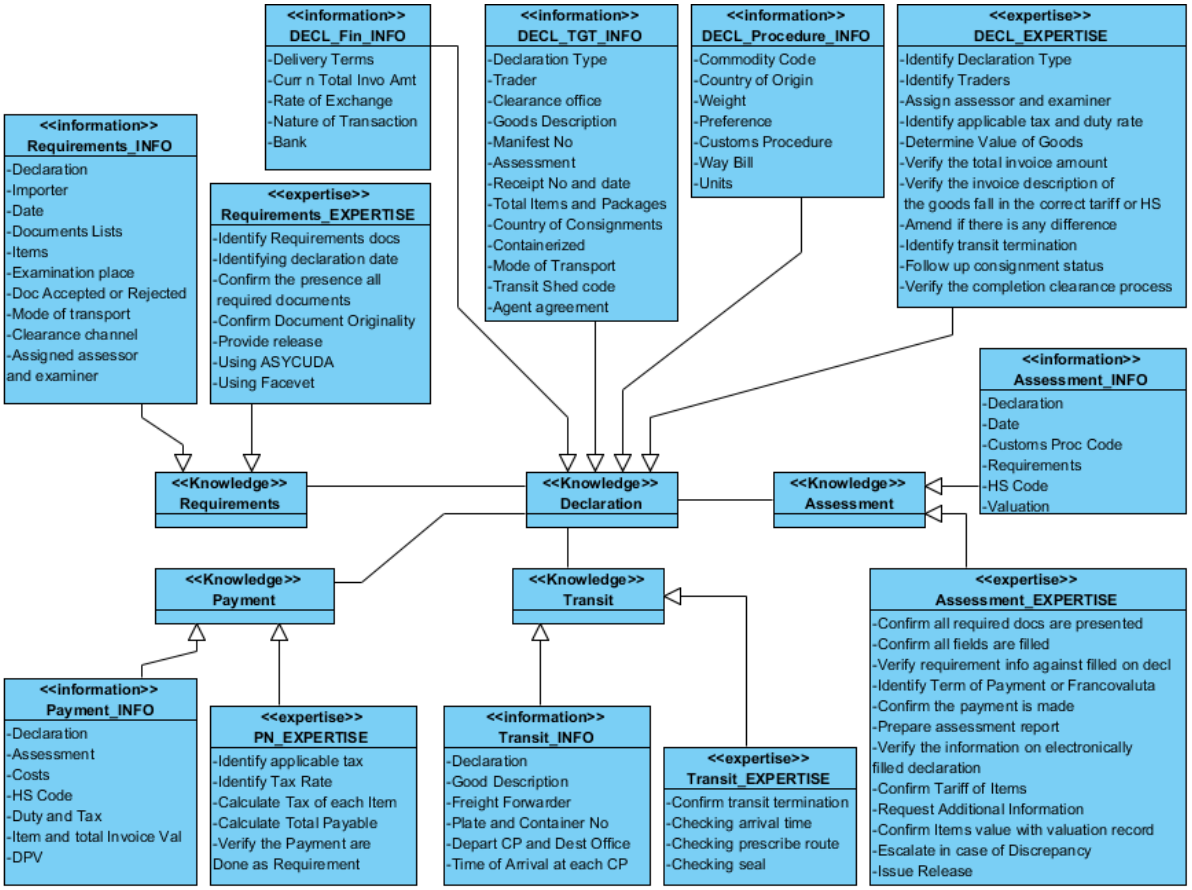

Figure 4. 4 : Import Cargo Clearance Knowledge Diagram Part 1

B. Import cargo clearance Knowledge diagram Part 2

The second part of import cargo clearance knowledge diagram contains knowledge about duty and taxes, additional payment, penalty, administrative procedure and discrepancy.

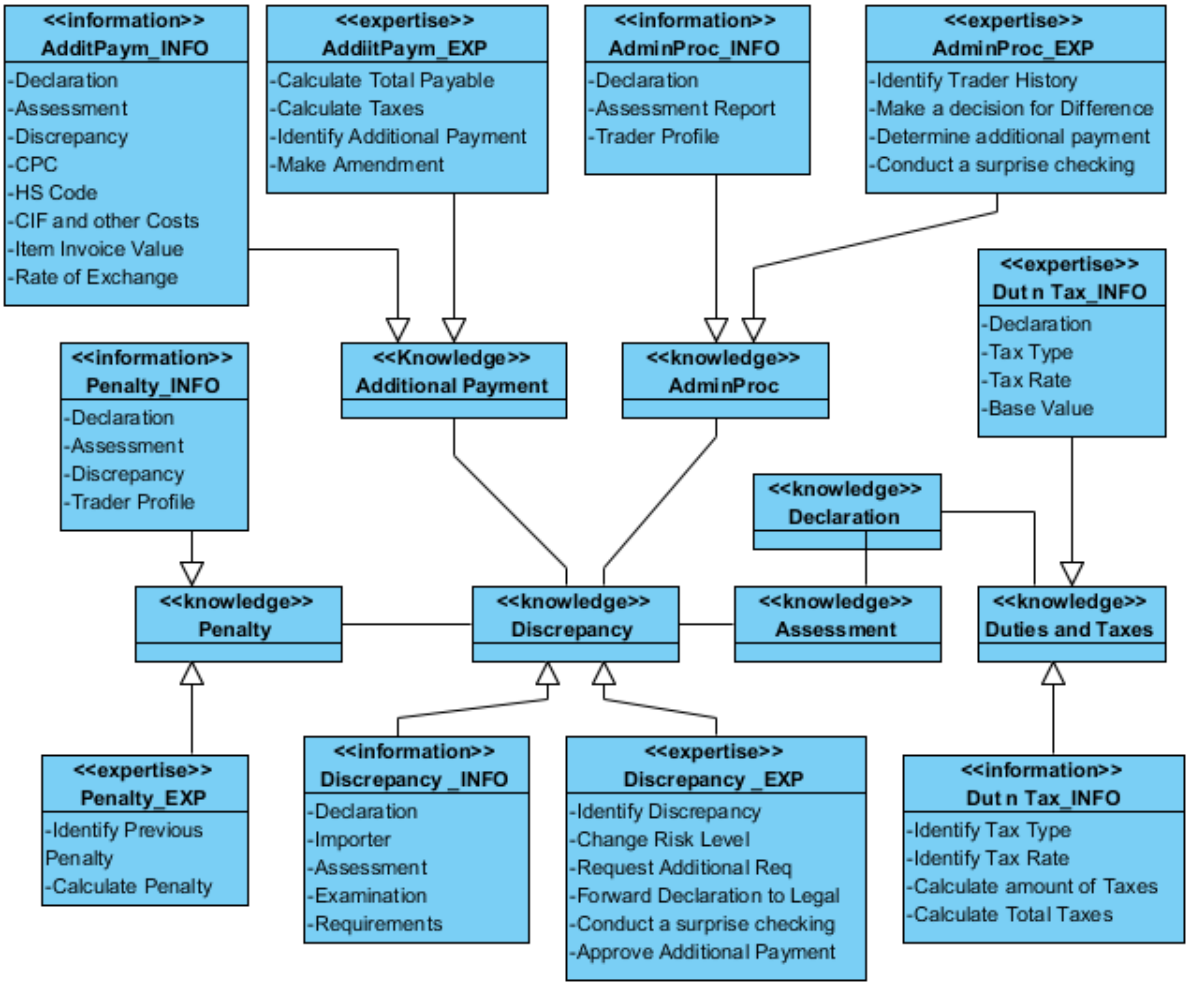

Figure 4. 5 : Import Cargo Clearance Knowledge Diagram Part 2

C. Import Cargo Clearance Knowledge Diagram Part 3

The third part of import cargo clearance knowledge diagram contains knowledge about additional requirement or information, valuation, risk, tariff, examination and goods.

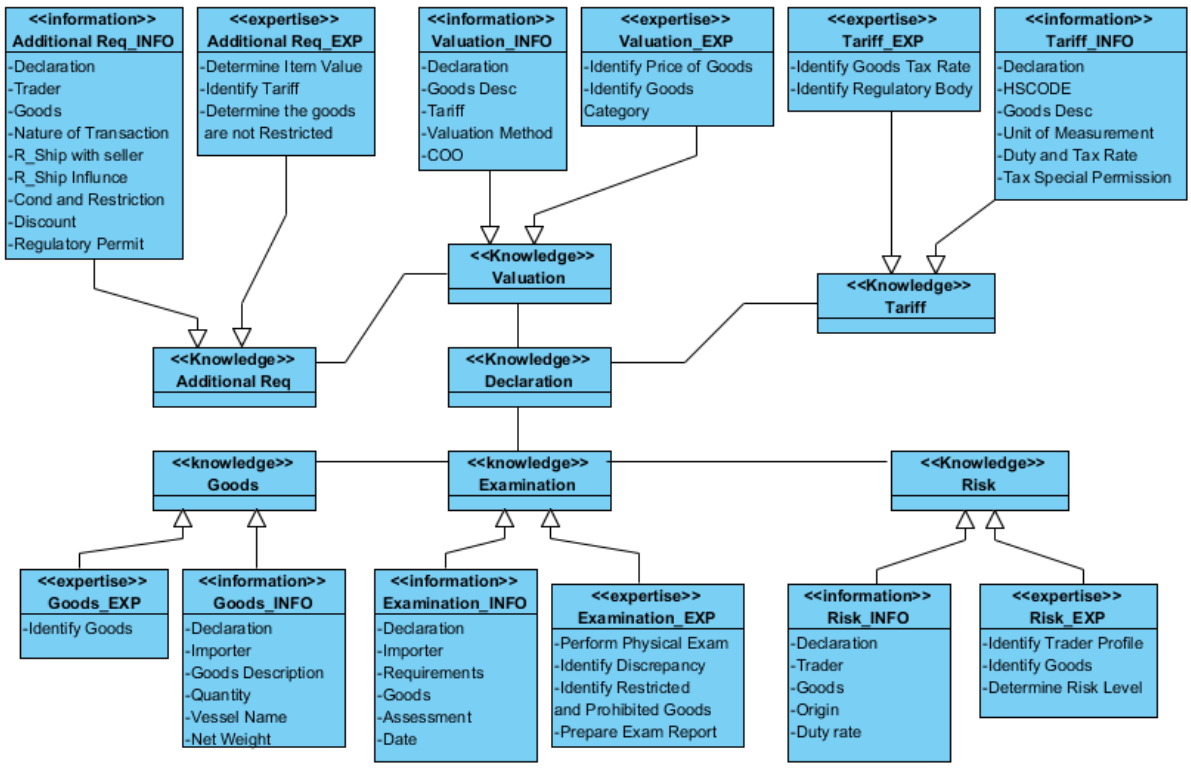

Figure 4. 6 : Import Cargo Clearance Knowledge Diagram Part 3

4.3.5. Document the Knowledge Diagram

This step is used to construct textual description using knowledge catalog. Knowledge catalog is used as a repository of knowledge components and detailed textual description of the internal structure of the knowledge component.

Knowledge Component – Requirements

Category	<<Knowledge>>
Knowledge ID	ICC-REQUIREMENTS
Name	Requirements
Related Task	Verify supported documents completeness Perform Document Assessment Examine Goods Physically Reconcile Assigned Document Undertaking Spot Checking Verify Proper Completion of Clearance Processes Store the documents in documentation section
Description	This knowledge is used to verify the supported documents completeness when the importer submits the supporting documents, perform document assessment and physical inspection, surprise check, confirm clearance

	process completion and stores the documents. The information part of the knowledge provides facevat officers with explicit information about the declaration, required supporting documents, consignment, assessment, examination and importer. The expertise part of this knowledge describes the expertise and skills needed for identifying required documents, identifying declaration date, confirming the presence all required documents, confirming document originality, issuing customs release and using information about the checklist.
Information Component	ICC- REQUIREMENTS -INF
Expertise Component	ICC- REQUIREMENTS -EXP
Comment	

Table 4. 1: ICC - Requirements Knowledge Component

Information Part – Requirements

Category	<<Information>>
Information ID	ICC-REQUIREMENTS-INF
Description	This information contains explicit knowledge identified from checklist.
Related Knowledge Component	REQUIREMENTS (ICC- REQUIREMENTS)
Properties	Declaration: XXXXXX
	Date: yyy-mm-dd
	Documents Lists: Complete and Compliant
	Number of Item: 3
	Declaration Entry Date and Time: mm/dd/yy hh:mm
	Examination Place: Warehouse
	Clearance Channel: RED
	Importer: Compliant
	Mode of Transport: See
	Document Accepted/Rejected: Accepted
	Assigned Assessor and Examiner: xxxx
Owner	Import Customs Clearance Team
Type	Explicit (Document)
Importance	Operational
Location	Checklist and Facvat (System name)
Attached Documents	Facevat checklist, required documents, import clearance manuals and procedures, MODCBR module of ASYCUDA++ system and

	Facvat application end user manual
Comment	

Table 4. 2 : ICC - Requirements knowledge component information part

Expertise Part – Requirements

Category	<< Expertise >>
Information ID	ICC- KWLDG1-EXP
Description	This expertise contains tacit knowledge identified from experienced facevat officers.
Related Knowledge Component	REQUIREMENTS (ICC-KWLDG1)
Properties	Identify Required documents
	Identifying declaration date
	Confirm the presence all required documents
	Confirm Document Originality
	Issue Customs release
	Using ASYCUDA
	Using Facevet
Owner	Import Customs Clearance Team
Type	Tacit
Importance	Operational
Comment	

Table 4. 3 : ICC - Requirements Knowledge Component Expertise Part

Knowledge Component - Declaration

Category	<<Knowledge>>
Knowledge ID	ICC- DECLARATION
Name	Declaration
Related Task	Verify supported documents completeness Identify Risk level of the consignment Perform document assessment Perform physical examination Reconciling assigned documents Undertaking spot checking Confirm proper completion of the clearance process
Description	This knowledge is used to verify documents requirements completeness, identify risk level of the consignment, perform document assessment, perform physical examination, reconciling assigned documents, undertaking spot checking and confirms proper completion of the clearance process. The information part of the knowledge provides

	clearance officers with explicit information about the declaration. The expertise part of this knowledge describes the expertise and skills needed for to identify declaration type, identify traders, assign assessor and examiner, identify applicable tax and duty rate, determine value of goods, verify the total invoice amount, verify the invoice description of goods fall in the correct tariff, amend if there is any difference, identify transit termination, follow up consignment progress, verify the completion clearance process and using information about the declaration.
Information Component	ICC-DECLARATION-TGT-INF, ICC-DECLARATION- PROCEDURE-INF, ICC-DECLARATION-FIN-INF
Expertise Component	ICC-DECLARATION-EXP
Comment	

Table 4. 4 : ICC – Declaration Knowledge Component

Trade operator, General and Transportation Information Part – Declaration

Category	<<Information>>
Information ID	ICC-DECLARATION-TGT-INF
Description	This information contains explicit knowledge identified from trade operator, general and transportation information of customs declaration.
Related Knowledge Component	DECLARATION (ICC-DECLARATION)
Properties	Declaration Type: IM, (1-9)
	Trader: Importer TIN, name & address and exporter name & address
	Clearance office: AAA/AAK (Addis Ababa Air Port/ Addis Ababa Kality Branch)
	Manifest: ETH30 06/04/2015
	Assessment: C 27150, A 27194
	Receipt No and Date: R 23823 06/04/2015
	Total Items and Total Packages: X and Y
	Country of Consignments: AE (Country code)
	Containerized: Yes/No
	Transporter: Ethiopia
	Mode of Transport: 1-5, 9 61, 62, 64
	Agent and its agreement: Agent information and agreement letter
Owner	Import Customs Clearance Team
Type	Explicit (Document)
Importance	Operational

Location	Single Administrative Document (SAD) and ASYCUDA++ Broker's Module (MODBRK) (System module name)
Attached Documents	SAD, Sample Agreement Letter, Sample Required Documents, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 5 : ICC – Information Part of Declaration Knowledge Component

Procedure Information Part – Declaration

Category	<<Information>>
Information ID	ICC-DECLARATION- PROCEDURE-INF
Description	This information contains explicit knowledge identified from procedure information of customs declaration.
Related Knowledge Component	DECLARATION (ICC-DECLARATION)
Properties	Goods: No. of Goods and their lists
	Commodity Code (HS): 84733090 000
	Country of Origin: CN
	Weight: 60.00 (kgs)
	Preference: Preferential code designated by customs for tax relief
	Customs Procedure Code: 4000 000 (exemptions applied to the goods imported - CPC for direct Import is 4000 and for Diplomatic goods is 4000 415)
	Way Bill: 000/0000/0000
	Units: XX
Owner	Import Customs Clearance Officers
Type	Explicit (Document)
Importance	Operational
Location	SAD and ASYCUDA++ MODBRK (System module name)
Attached Documents	SAD, Sample Agreement Letter, Sample Required Documents, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 6 : ICC – Information Part of Declaration Knowledge Component

Finance Information Part– Declaration

Category	<<Information>>
Information ID	ICC-DECLARATION-FIN-INF
Description	This information contains explicit knowledge identified from

	finance data requirements of customs declaration.
Related Knowledge Component	DECLARATION (ICC-DECLARATION)
Properties	Delivery Terms: FOB
	Currency & Total Invoice Amount: USD 67412.13
	Rate of Exchange: 20.5362
	Nature of Transaction: (Invoice Detail) Freight ETB 4461.87, Insurance ETB 1274.87, Others ETB 107.196
	Bank Code: CBE – Commercial Bank of Ethiopia
Owner	Import Customs Clearance Team
Type	Explicit (Document)
Importance	Operational
Location	SAD and ASYCUDA++ MODBRK (System module name)
Attached Documents	SAD, Sample Agreement Letter, Sample Required Documents, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 7 : ICC – Information Part of Declaration Knowledge Component

Expertise – Declaration

Category	<<Expertise>>
Information ID	ICC-DECLARATION-EXP
Description	This expertise contains tacit knowledge identified from different experienced customs clearance officers.
Related Knowledge Component	DECLARATION (ICC-DECLARATION)
Properties	Identify Declaration Type
	Identify Traders
	Assign assessor and examiner
	Identify applicable tax and duty rate
	Determine Value of Goods
	Verify the total invoice amount
	Verify the invoice description of goods fall in the correct tariff
	Amend if there is any difference
	Identify transit termination
	Follow up consignment progress
	Verify the completion clearance process
Owner	Import Customs Clearance Team
Type	Tacit

Importance	Operational
Comment	

Table 4. 8 : ICC – Expertise Part of Declaration Knowledge Component

Knowledge Component–Transit

Category	<<Knowledge>>
Knowledge ID	ICC-TRANSIT
Name	Transit
Related Task	Verify supported documents completeness Perform Document Assessment
Description	This knowledge is used to verify the transit process completion when the importer submits the supporting documents and perform document assessment. The information part of the knowledge provides facevat and assessment officers with explicit information about the declaration and transit status of the consignment of a declaration. The expertise part of this knowledge describes the expertise and skills needed for checking termination transit procedure, arrival time of the consignment, the consignment transported on prescribe route, confirm the seal of the consignment are not unlocked and using information about the transit.
Information Component	ICC-TRANSIT-INF
Expertise Component	ICC-TRANSIT-EXP
Comment	This knowledge is not needed for consignments that are transported thorough air transport.

Table 4. 9 : ICC – Transit Knowledge Component

Information Part –Transit

Category	<<Information>>
Information ID	ICC-TRANSIT-INF
Description	This information contains explicit knowledge identified from transit document.
Related Knowledge Component	Transit (ICC-TRANSIT)
Properties	Declaration: XXXXXX
	Importer: Importer TIN, name & address
	Good Description: Xxxx
	Freight Forwarder: ESLSE (Ethiopian Shipping Logistic Service Enterprise)

	Plate and Container: Plate and Container Number
	Departure and Destination Office: Customs Office
	Check Points: Customs office
	Time of Arrival at each check points: Time of arrival
Owner	Import Customs Clearance Team
Type	Explicit
Importance	Operational
Location	ASYCUDA++ MODBRK (System Module Name)
Attached Documents	Transit Document, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 10 : ICC – Information Part of Transit Knowledge Component

Expertise Part – Transit

Category	<<Expertise>>
Information ID	ICC-TRANSIT-EXP
Description	This expertise contains tacit knowledge identified from experienced facevat and document assessment officers.
Related Knowledge Component	Transit (ICC-TRANSIT)
Properties	Confirm transit termination
	Checking arrival time
	Checking prescribe route
	Checking seal
Owner	Customs Clearance Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 11 : ICC – Expertise Part of Transit Knowledge Component

Knowledge Component – Assessment

Category	<<Knowledge>>
Knowledge ID	ICC-ASSESSMENT
Name	Assessment
Related Task	Perform Document Assessment Examine Goods Physically Reconcile Assigned Document Undertaking Spot Checking
Description	This knowledge is used to carry out document assessment, inspection of goods, document reconciliation and spot checking. The information part of the knowledge provides and assessment officers with explicit

	information about the declaration and information required in assessment processes. The expertise part of this knowledge describes the expertise and skills needed for verify electronically filled information against supporting documents, approve duties and taxes amount and tariff and valuation information and using information about the declaration, assessment and examination.
Information Component	ICC-ASSESSMENT-INF
Expertise Component	ICC-ASSESSMENT-EXP
Comment	

Table 4. 12 : ICC – Assessment Knowledge Component

Information Part – Assessment

Category	<<Information>>
Information ID	ICC-ASSESSMENT-INF
Description	This information contains explicit knowledge identified from assessment reports.
Related Knowledge Component	Assessment(ICC-ASSESSMENT)
Properties	Declaration: XXXXXXXX
	Date : Assessment Date
	Customs Procedures Code: 4000-000
	Requirements: Required Supporting Documents
	HS Code: 00000000 (Commercial Description of the Goods)
	Valuation: 0000000.00 (Item Value)
Owner	Import Customs Clearance Team
Type	Explicit
Importance	Operational
Location	ASYCUDA ++ (System Name)
Attached Documents	SAD, Assessment Result Report, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 13 : ICC – Information Part of Assessment Knowledge Component

Expertise Part – Assessment

Category	<< Expertise >>
Information ID	ICC-ASSESSMENT-EXP

Description	The expertise part of the assessment knowledge component contains tacit knowledge identified from experienced assessment officers.
Related Knowledge Component	Assessment(ICC-ASSESSMENT)
Properties	Confirm all required docs are presented
	Confirm all fields are filled
	Verify requirement info against filled on declaration
	Identify Term of Payment or Francovaluta
	Confirm the payment is made
	Prepare Assessment Report
	Verify the Information on Electronically Filled Declaration
	Confirm Tariff of Items
	Request Additional Information
	Confirm Items Value with Valuation Record
	Escalate in case of Discrepancy
	Issue Release
Owner	Customs Clearance Directorate
Type	Tacit
Importance	Operational
Location	
Comment	

Table 4. 14 : ICC – Expertise Part of Assessment Report Knowledge Component

Knowledge Component – Discrepancy

Category	<<Knowledge>>
Knowledge ID	ICC- DISCREPANCY
Name	Discrepancy
Related Task	Perform Document Assessment Perform Goods Examination Undertaking Spot Checking
Description	This knowledge is used to identify any difference between taxes value declared by the importer and assessment/examination result performed by assessment/examination officer. It is also used to undertake surprise checking based on identified difference to confirm the reliability and significance of duty and taxes difference report produced from document assessment. The information part of the knowledge provides the assessment/examination officers with explicit information about the declaration, required supporting documents, importer, assessment result

	details and goods examination details. The expertise part of this knowledge describes the expertise and skills needed for identifying difference, change risk level and approve additional payment based on identified difference, request additional requirement, forward the case to legal when the discrepancy is above some threshold and conduct a surprise checking
Information Component	ICC- DISCREPANCY-INF
Expertise Component	ICC- DISCREPANCY-EXP
Comment	

Table 4. 15 : ICC – Discrepancy Knowledge Component

Information Part – Discrepancy

Category	<<Information>>
Information ID	ICC- DISCREPANCY-INF
Description	This information contains explicit knowledge identified from declaration, assessment and examination details.
Related Knowledge Component	Discrepancy(ICC-DISCREPANCY)
Properties	Declaration: XXXXXXXX
	Assessment: A 00000 with its assessment details
	Importer: Importer TIN, name & address
	Examination: A 00000 with its examination details
	Requirements: Supporting Documents
Owner	Import Customs Clearance Team
Type	Explicit
Importance	Operational
Location	ASYCUDA ++ (System Name)
Attached Documents	SAD, Assessment and Examination Report, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 16 : ICC - Information Part of Discrepancy Knowledge Component

Expertise Part – Discrepancy

Category	<< Expertise >>
Information ID	ICC- DISCREPANCY-EXP

Description	This expertise contains tacit knowledge identified from experienced document assessment and goods examination officers.
Related Knowledge Component	Discrepancy(ICC-DISCREPANCY)
Properties	Identify Discrepancy
	Change Risk Level
	Request Additional Requirement
	Approve Additional Payment
	Forward the Case to Legal
	Conduct a Surprise Checking
Owner	Customs Clearance Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 17 : ICC – Expertise Part of Discrepancy Knowledge Component

Knowledge Component – Payment

Category	<<Knowledge>>
Knowledge ID	ICC-PAYMENT
Name	Payment
Related Task	Perform Document Assessment Perform Physical Examination of Goods Verify Proper Completion of Clearance Processes
Description	This knowledge is used to assess documents, examine goods and verify proper clearance processes completion. The information part of the knowledge provides and clearance officers with explicit information about the declaration, assessment, freight and insurance cost, commodity code, individual item and total invoice value, duties and taxes and duty payable value. The expertise part of this knowledge describes the expertise and skills needed for assessment, examination and confirm clearance process completeness.
Information Component	ICC-PAYMENT-INF
Expertise Component	ICC-PAYMENT-EXP
Comment	

Table 4. 18 : ICC – Payment Knowledge Component

Information Part – Payment

Category	<<Information>>
Information ID	ICC-PAYMENT-INF
Description	This information contains explicit knowledge identified from declaration and payment notice.
Related Knowledge Component	Payment (ICC-PAYMENT)
Properties	Declaration: XXXXXXX
	Assessment: A 00000
	Costs: Freight- 000.00, Invoice-000.00 Other Costs- 000.00
	HS Code: 00000000
	Item and total Invoice Value: 00000.00
	Duty and Tax: 00000.00
	Duty Payable Value: 00000.00
Owner	Import Customs Clearance Team
Type	Explicit
Importance	Operational
Location	ASYCUDA ++ (System name)
Attached Documents	SAD, Payment Notice, Payment Receipt, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 19 : ICC – Information Part of Payment Knowledge Component

Expertise Part – Payment

Category	<<Expertise>>
Information ID	ICC-PAYMENT-EXP
Description	The expertise part of the payment knowledge component contains tacit knowledge identified from assessor.
Related Knowledge Component	Payment (ICC-PAYMENT)
Properties	Identify Applicable Duties and Taxes
	Identify Tax Rate
	Calculate Duty and Tax of each Item
	Calculate Total Payable
	Verify the Payment are made based on the requirement
Owner	Customs Clearance Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 20 : ICC – Expertise Part of Payment Knowledge Component

Knowledge Component – Goods

Category	<<Knowledge>>
Knowledge ID	ICC-GOODS
Name	Goods
Related Task	Examine Goods Physically Undertaking Spot Checking
Description	This knowledge is used to perform goods examination and spot checking. The information part of the knowledge provides assessment and examination officers with explicit information about the goods. The expertise part of this knowledge describes the expertise and skills needed for identifying goods.
Information Component	ICC-GOODS-INF
Expertise Component	ICC-GOODS-EXP
Comment	

Table 4. 21 : ICC – Goods Knowledge Component

Information Part – Goods

Category	<<Information>>
Information ID	ICC-GOODS-INF
Description	This information contains explicit knowledge identified from declaration and packing list.
Related Knowledge Component	Goods(ICC-GOODS)
Properties	Declaration: XXXXXXX
	Importer: Importer TIN, name & address
	Goods Description:
	Quantity: 00
	Vessel Name: Name of the Vessel
	Weight: 0000.00
Owner	Import Customs Clearance Team
Type	Explicit
Importance	Operational
Location	ASYCUDA ++ (System Name)
Attached Documents	SAD, Packing List, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 22 : ICC – Information Part of Goods Knowledge Component

Expertise Part – Goods

Category	<<Expertise>>
Information ID	ICC-GOODS-EXP
Description	The expertise part of the payment knowledge component contains tacit knowledge identified from experienced assessor and examiner.
Related Knowledge Component	Goods(ICC-GOODS)
Properties	Identify Goods
Owner	Customs Clearance Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 23 : ICC – Expertise Part of Goods Knowledge Component

Knowledge Component – Examination

Category	<<Knowledge>>
Knowledge ID	ICC-EXAMINATION
Name	Examination
Related Task	Examine Goods Physically Reconcile Assigned Document Undertaking Spot Checking
Description	This knowledge is used to perform goods examination, reconcile document assigned to assessment and examination and spot checking. The information part of the knowledge provides assessment and examination officers and clearance process team leader with explicit information about the examination. The expertise part of this knowledge describes the expertise and skills needed for perform physical examination, identify discrepancy, identify restricted and prohibited goods and prepare examination report.
Information Component	ICC-EXAMINATION-INF
Expertise Component	ICC-EXAMINATION-EXP
Comment	

Table 4. 24 : ICC – Examination Knowledge Component

Information Part – Examination

Category	<<Information>>

Information ID	ICC- EXAMINATION -INF
Description	This information contains explicit knowledge identified from SAD and packing list.
Related Knowledge Component	Examination(ICC-EXAMINATION)
Properties	Declaration: XXXXXXX
	Importer: Importer TIN, name & address
	Requirements: Supporting Documents
	Goods: No. of Goods and their lists
	Assessment: A 00000
	Date: mm/dd/yyyy
Owner	Import Customs Clearance Team
Type	Explicit
Importance	Operational
Location	ASYCUDA ++ (System Name)
Attached Documents	SAD, Assessment Result, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 25 : ICC – Information Part of Examination Knowledge Component

Expertise Part – Examination

Category	<<Expertise>>
Information ID	ICC-EXAMINATION-EXP
Description	The expertise part of the payment knowledge component contains tacit knowledge identified from experienced assessor and examiner clearance process team leader.
Related Knowledge Component	Examination (ICC-EXAMINATION)
Properties	-Perform Physical Examination
	-Identify Discrepancy
	-Identify Restricted and Prohibited Goods
	-Prepare Examination Report
Owner	Customs Clearance Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 26 : ICC – Expertise Part of Examination Knowledge Component

Knowledge Component – Additional Requirement

Category	<<Knowledge>>
Knowledge ID	ICC-ADDITIONALREQ
Name	Additional Requirement
Related Task	Perform Document Assessment Examine Goods Physically Undertaking Spot Checking
Description	This knowledge is used to perform document assessment, goods examination and surprise checking. The information part of the knowledge provides assessment and examination officers with explicit information about the additional requirements. The expertise part of this knowledge describes the expertise and skills needed for determine item value, identify tariff and mine the goods are not restricted and prohibited.
Information Component	ICC-ADDITIONALREQ-INF
Expertise Component	ICC-ADDITIONALREQ-EXP
Comment	

Table 4. 27 : ICC – Additional Requirement Knowledge Component

Information Part – Additional Requirement

Category	<<Information>>
Information ID	ICC- ADDITIONALREQ-INF
Description	This information contains explicit knowledge identified from assessment detail and valuation detail declaration.
Related Knowledge Component	Additional Requirement(ICC-ADDITIONALREQ)
Properties	Declaration: XXXXXXX
	Importer: Importer TIN, name & address
	Goods: No. of Goods and their lists
	Nature of Transaction: Sales
	Relationship with seller: No
	Relationship Influence: No
	Condition and Restriction: No
	Discount: No Discount
	Regulatory Permit: Regulatory Requirements
Owner	Import Customs Clearance Team
Type	Explicit
Importance	Operational
Location	Valuation Detail Declaration (VDD) (System Name)
Attached Documents	VDD, Assessment Result, Import Clearance Manuals and

	Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 28 : ICC – Information Part of Additional Requirement Knowledge Component

Expertise Part – Additional Requirement

Category	<<Expertise>>
Information ID	ICC- ADDITIONALREQ-EXP
Description	The expertise part of the additional requirement knowledge component contains tacit knowledge identified from experienced assessment officer.
Related Knowledge Component	Additional Requirement(ICC- ADDITIONALREQ)
Properties	Determine Item Value
	Identify Tariff
	Determine the goods are not restricted and prohibited
Owner	Customs Clearance Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4.28 ICC – Expertise Part of Additional Requirement Knowledge Component

Knowledge Component – Tariff

Category	<<Knowledge>>
Knowledge ID	ICC- TARIFF
Name	Tariff
Related Task	Perform Document Assessment
Description	This knowledge is used to perform document assessment. The information part of the knowledge provides assessment officers with explicit information about the tariff. The expertise part of this knowledge describes the expertise and skills needed for identifying tax rate of goods and regulatory body of imported goods.
Information Component	ICC-TARIFF-INF
Expertise Component	ICC-TARIFF-EXP
Comment	

Table 4. 29 : ICC – Tariff Knowledge Component

Information Part – Tariff

Category	<<Information>>
Information ID	ICC-TARIFF-INF
Description	This information contains explicit knowledge identified from declaration and tariff book.
Related Knowledge Component	Tariff(ICC-TARIFF)
Properties	Declaration: XXXXXXX
	HS CODE: 00000000
	Goods Description: Model, Type …
	Unit of Measurement: kgs
	Duty and Tax Rate: Excise 5%, Vat 15% …
	Tax Special Permission: No/ Second Schedule
Owner	Import Customs Clearance Team and Tariff Directorate
Type	Explicit
Importance	Operational
Location	Tariff Book Table (Electronic or Hard Copy Document)
Attached Documents	SAD, Tariff Book, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 30 : ICC – Information Part of Tariff Knowledge Component

Expertise Part – Tariff

Category	<<Expertise>>
Information ID	ICC-TARIFF-EXP
Description	The expertise part of the tariff knowledge component contains tacit knowledge identified from experienced assessment and tariff officer.
Related Knowledge Component	Tariff (ICC-TARIFF)
Properties	Identify Tax Rate of Goods
	Identify Regulatory Body
Owner	Customs Clearance and Tariff Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 31 : ICC – Expertise Part of Tariff Knowledge Component

Knowledge Component – Administrative Procedure

Category	<<Knowledge>>

Knowledge ID	ICC- ADMINPROC
Name	Administrative Procedure
Related Task	Perform Document Assessment Undertaking Spot Checking
Description	This knowledge is used to perform document assessment and undertaking spot checking. The information part of the knowledge provides assessment officers with explicit information about the administrative procedure. The expertise part of this knowledge describes the expertise and skills needed for identify trader history, make a decision for difference, determine additional payment and conduct a surprise checking.
Information Component	ICC- ADMINPROC-INF
Expertise Component	ICC- ADMINPROC-EXP
Comment	

Table 4. 32 : ICC – Administrative Procedure Knowledge Component

Information Part – Administrative Procedure

Category	<<Information>>
Information ID	ICC- ADMINPROC-INF
Description	This information contains explicit knowledge identified from declaration and assessment detail.
Related Knowledge Component	Administrative Procedure(ICC- ADMINPROC)
Properties	Declaration: XXXXXXX
	Importer: Importer TIN, name & address
	Importer: Importer Profil
Owner	Import Customs Clearance Team
Type	Explicit
Importance	Operational
Location	ASYCUDA ++ and Trader Profile (TRDP) (System Name)
Attached Documents	SAD, Assessment Result, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 33 : ICC – Information Part of Administrative Procedure Knowledge Component

Expertise Part – Administrative Procedure

Category	<<Expertise>>
Information ID	ICC- ADMINPROC-EXP
Description	The expertise part of the administrative procedure knowledge component contains tacit knowledge identified from experienced assessment and risk officer.
Related Knowledge Component	Administrative Procedure (ICC-ADMINPROC)
Properties	Identify Trader Risk Profile
	Make a decision for identified Discrepancy
	Determine Additional Payment
	Conduct a Surprise Checking
Owner	Customs Clearance Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 34 : ICC – Expertise Part of Administrative Procedure Knowledge Component

Knowledge Component – Penalty

Category	<<Knowledge>>
Knowledge ID	ICC- PENALTY
Name	Penalty
Related Task	Perform Document Assessment Undertaking Spot Checking
Description	This knowledge is used to perform document assessment and undertaking spot checking. The information part of the knowledge provides assessment officers with explicit information about the penalty. The expertise part of this knowledge describes the expertise and skills needed for identifying previous penalty and calculate penalty base on the discrepancy and previous penalty.
Information Component	ICC- PENALTY-INF
Expertise Component	ICC- PENALTY-EXP
Comment	

Table 4. 35 : ICC – Penalty Knowledge Component

Information Part – Penalty

Category	<<Information>>
Information ID	ICC- PENALTY-INF

Description	This information contains explicit knowledge identified from declaration, assessment, and discrepancy and trader profile.
Related Knowledge Component	Penalty(ICC- PENALTY)
Properties	Declaration: XXXXXXX
	Assessment: A 00000
	Discrepancy: 000000.00
	Importer: Importer TIN, Name, Address & Profile
Owner	Import Customs Clearance Team
Type	Explicit
Importance	Operational
Location	ASYCUDA ++ and TRDP (System Name)
Attached Documents	SAD, Assessment Result, TRDP, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 36 : ICC – Information Part of Penalty Knowledge Component

Expertise Part – Penalty

Category	<<Expertise>>
Information ID	ICC-PENALTY-EXP
Description	The expertise part of the penalty knowledge component contains tacit knowledge identified from experienced assessment and risk officer.
Related Knowledge Component	Penalty (ICC-PENALTY)
Properties	Identify Previous Penalty
	Calculate Penalty
Owner	Customs Clearance Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 37 : ICC – Expertise Part of Penalty Knowledge Component

Knowledge Component – Valuation

Category	<<Knowledge>>
Knowledge ID	ICC- VALUATION
Name	Valuation
Related Task	Perform Document Assessment
Description	This knowledge is used to perform document assessment. The information

	part of the knowledge provides assessment officers with explicit information about the valuation. The expertise part of this knowledge describes the expertise and skills needed for identifying price of goods and identify goods category.
Information Component	ICC- VALUATION-INF
Expertise Component	ICC- VALUATION-EXP
Comment	

Table 4. 38 : ICC – Valuation Knowledge Component

Information Part – Valuation

Category	<<Information>>
Information ID	ICC-VALUATION-INF
Description	This information contains explicit knowledge identified from declaration and ECVS.
Related Knowledge Component	Valuation(ICC-VALUATION)
Properties	Declaration: XXXXXXX
	Goods Description: Model, Type …
	Tariff: HS Code of the Goods
	Valuation Method: Identical
	COO: Country Name
Owner	Import Customs Clearance Team and Valuation Directorate
Type	Explicit
Importance	Operational
Location	ASYCUDA ++ and ECVS (System Name)
Attached Documents	SAD, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 39 : ICC – Information Part of Valuation Knowledge Component

Expertise Part – Valuation

Category	<<Expertise>>
Information ID	ICC-VALUATION-EXP
Description	The expertise part of the valuation knowledge component contains tacit knowledge identified from experienced assessment and valuation officer.

Related Knowledge Component	Valuation (ICC-VALUATION)
Properties	Identify Price of Goods
	Identify Goods Category
Owner	Valuation Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 40 : ICC – Expertise Part of Valuation Knowledge Component

Knowledge Component – Risk

Category	<<Knowledge>>
Knowledge ID	ICC-RISK
Name	Risk
Related Task	Identify Risk Level
Description	This knowledge is used to identify risk level. The information part of the knowledge provides risk officers with explicit information about the risk. The expertise part of this knowledge describes the expertise and skills needed for identifying trader profile, goods and determine risk level.
Information Component	ICC-RISK-INF
Expertise Component	ICC-RISK-EXP
Comment	

Table 4. 41 : ICC – Risk Knowledge Component

Information Part – Risk

Category	<<Information>>
Information ID	ICC-RISK-INF
Description	This information contains explicit knowledge identified from declaration and Risk book.
Related Knowledge Component	Risk(ICC-RISK)
Properties	Declaration: XXXXXXX
	Importer: Importer TIN, Name, Address & Profile
	Goods Description: Model, Type …
	Origin: Country of Origin
	Duty Rate
Owner	Import Customs Clearance Team and Risk Directorate
Type	Explicit
Importance	Operational

Location	Risk Book Table (Electronic or Hard Copy Document)
Attached Documents	SAD, Risk Book, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 42 : ICC – Information Part of Risk Knowledge Component

Expertise Part – Risk

Category	<<Expertise>>
Information ID	ICC-RISK-EXP
Description	The expertise part of the Risk knowledge component contains tacit knowledge identified from experienced assessment and Risk officer.
Related Knowledge Component	Risk (ICC-RISK)
Properties	Identify Trader Profile
	Identify Goods
	Determine Risk Level
Owner	Customs Clearance and Risk Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 43 : ICC – Expertise Part of Risk Knowledge Component

Knowledge Component – Additional Payment

Category	<<Knowledge>>
Knowledge ID	ICC-ADDITIONALPAY
Name	Additional Payment
Related Task	Perform Document Assessment
Description	This knowledge is used to perform document assessment. The information part of the knowledge provides assessment officers with explicit information about the additional payment. The expertise part of this knowledge describes the expertise and skills needed for calculating duty payable value and taxes, identify additional payment and make amendment of declaration.
Information Component	ICC- ADDITIONALPAY-INF
Expertise Component	ICC- ADDITIONALPAY-EXP
Comment	

Table 4. 44 : ICC – Additional Payment Knowledge Component

Information Part – Additional Payment

Category	<<Information>>
Information ID	ICC- ADDITIONALPAY-INF
Description	This information contains explicit knowledge identified from declaration and assessment details.
Related Knowledge Component	Additional Payment (ICC- ADDITIONALREQ)
Properties	Declaration: XXXXXXX
	Assessment: A 00000
	Discrepancy: 00000.00
	CPC: 4000
	HS Code: 00000000
	CIF and other Costs: 00000.00
	Item Invoice Value: 0000.00
	Rate of Exchange: 00.00
Owner	Import Customs Clearance Team Directorate
Type	Explicit
Importance	Operational
Location	ASYCUDA ++ (System Name) and Assessment Result (Document)
Attached Documents	SAD, Assessment Report, Import Clearance Manuals and Procedures, MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 45 : ICC – Information Part of Additional Payment Knowledge Component

Expertise Part – Additional Payment

Category	<<Expertise>>
Information ID	ICC- ADDITIONALPAY -EXP
Description	The expertise part of the additional payment knowledge component contains tacit knowledge identified from experienced assessment officer.
Related Knowledge Component	Additional Payment (ICC- ADDITIONALPAY)
Properties	Calculate Total Payable
	Calculate Taxes
	Identify Additional Payment

	Make Amendment
Owner	Customs Clearance Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 46 : ICC – Expertise Part of Additional Payment Knowledge Component

Knowledge Component – Duties and Taxes

Category	<<Knowledge>>
Knowledge ID	ICC- DUTYANDTAX
Name	Duties and Taxes
Related Task	Perform Document Assessment
Description	This knowledge is used to perform document assessment. The information part of the knowledge provides assessment officers with explicit information about the duties and taxes. The expertise part of this knowledge describes the expertise and skills needed for identifying tax type, identify tax rate, calculate amount of taxes and calculate total taxes.
Information Component	ICC- DUTYANDTAX-INF
Expertise Component	ICC- DUTYANDTAX-EXP
Comment	

Table 4. 47 : ICC – Duties and Taxes Knowledge Component

Information Part – Duties and Taxes

Category	<<Information>>
Information ID	ICC- DUTYANDTAX-INF
Description	This information contains explicit knowledge identified from declaration, tariff book and evaluation.
Related Knowledge Component	Duties and Taxes (ICC- DUTYANDTAX)
Properties	Declaration: XXXXXXX
	Tax Type
	Tax Rate
	Base Value
Owner	Import Customs Clearance Team Directorate
Type	Explicit
Importance	Operational
Location	ASYCUDA ++ and ECVS (System Name) and Tariff Book
Attached Documents	SAD, Tariff Book, Import Clearance Manuals and Procedures,

	MODCBR Module of ASYCUDA++ System End User Manual
Comment	

Table 4. 48 : ICC – Information Part of Duties and Taxes Knowledge Component

Expertise Part – Duties and Taxes

Category	<<Expertise>>
Information ID	ICC- DUTYANDTAX -EXP
Description	The expertise part of the Duties and Taxes knowledge component contains tacit knowledge identified from experienced assessment officer.
Related Knowledge Component	Duties and Taxes (ICC- DUTYANDTAX)
Properties	Identify Tax Type
	Identify Tax Rate
	Calculate amount of Taxes
	Calculate Total Taxes
Owner	Customs Clearance Directorate
Type	Tacit
Importance	Operational
Comment	

Table 4. 49 : ICC – Expertise Part of Duties and Taxes Knowledge Component

CHAPTER FIVE

5. EVALUATION OF THE KNOWLEDGE MODEL

After building the knowledge model, evaluation is a critical task. Evaluation is achieved through reviewing the knowledge model with domain experts to confirm that the model is accurate representation of the organizational knowledge.

The researcher used human expert evaluation methods to evaluate the effectiveness of the knowledge model. The evaluation data was collected through interviews with custom clearance officers. This human expert evaluation method was important to validate that the knowledge model can achieve its intended goals.

Four customs clearance officers were interviewed. The interview had five open ended questions divided in to two categories: general importance of the knowledge model and knowledge content of the knowledge model. The first category used to review the ability of the knowledge model to facilitate the knowledge management activities within the context of import customs clearance and the second category used to review completeness of the knowledge content of the knowledge model.

The researcher explained some of the key concepts about knowledge management including knowledge, type of knowledge, knowledge management system, knowledge management processes and knowledge model in order to facilitate better understanding and conducting of the interview. After key concepts explanation, the researcher presented the knowledge model and explained its information and expertise components, the implementation plan and how it will be accessible after implementation for respondents or customs clearance officers. The finding with list of responses for the interview questions by the respondents are organized based on the previously mentioned groups and discussed as follow.

Category1: The knowledge model capability to facilitate the knowledge management processes

In general, the respondents recognized that the knowledge model is very significant and helps customs officers to find knowledge quickly, reduce knowledge acquiring tasks for new officers, reduce knowledge loss due to high employee turnover and increase knowledge sharing among

different teams with in the customs clearance business processes. The senior assessment officer said the following:

> *I found this knowledge model invaluable, for its standard means of managing the customs clearance procedure knowledge, ease of access and understanding for any experts. Every procedure that is involved in each customs process has been cited as coherently and explicitly as possible. It vitally helps to understand the knowledge in a clear and precise ways.*

The following senior examination officer statements offer confirmation how the knowledge model facilitates knowledge management processes and how it reduces the knowledge loss due to employee turnover.

> *Most of the time when somebody hire in an organization they need job training on how to perform their activities. This knowledge model helps for new employees how to perform his/her duties without assist/support another person. I hope it also helps our organization in order to solve the problems when experienced employee resign from their jobs without transfer their experience or knowledge for others.*

The knowledge model can better facilitate information and expertise or skill capturing process and offers record of more information and skills for the future related to import clearance procedures as the model explicitly recorded what information and expertise is required to do particular activities and by whom it is done. As the senior facevat officer explained:

> *The knowledge model looked like it would very useful means of knowledge capturing specially for new customs officers and it reduces many of the previous difficulties with knowledge retention processes.*

Another senior assessment officer described the knowledge model as:

> *I understand the model contains both the information and skills about import customs clearance business processes that help the customs clearance officer to perform most of his/her tasks by referring the knowledge in the model.*

The respondents also have positive response about the capability of knowledge model to facilitate knowledge sharing among customs clearance officer. The examination officer also further explained his understanding about the knowledge sharing process capability of the knowledge model as:

> *I think the knowledge model is very helpful to share import customs clearance procedure knowledge in simplest way to different clearance officer. The knowledge in the model is classified and stored based on customs clearance business processes. This clear and flexible classification of the knowledge is very important and could improve the knowledge storage for future retrieval process.*

Category2: Completeness of the knowledge content of the knowledge model

Knowledge content is the major concern of knowledge model that helps to successful implementation of knowledge management system. It provides value for the import customs clearance business processes. The success of the knowledge model is determined by knowledge content of the import clearance business process. Currently, knowledge contents of the import customs clearance is found in different documents and clearance officer mind. The knowledge model collects and analyzes exhaustively the knowledge content.

The majority of the respondents felt that the knowledge model contains most of the knowledge content needed to perform import customs clearance processes. The senior assessment officer mentioned the following about the knowledge content:

> *In addition to its standard means of managing import customs clearance knowledge and ease of access the knowledge model is rich in content. The model contains complete information and skill contents needed by facevate and document assessment officers.*

Positive comments were also received from the senior physical examination officer. He felt that the knowledge model provided useful knowledge content to perform physical examination. He explained his understanding as follow:

> *Most of the knowledge contents necessary to undertake consignment examination are incorporated in the knowledge model. Moreover, the knowledge content directly concerned with import customs clearance procedure.*

However, the senior officer was doubtful about the knowledge content completeness of the knowledge model. Her response to the knowledge content issue was as follows:

> *The knowledge model contains most information and skills; however, I don't think it incorporate all skills that the import customs clearance business process required. I don't' think the model solely helps the customs officers to perform their tasks.*

The senior officer also added:

> *In my opinion this model is more helpful when it incorporates the knowledge to manipulate different systems such as ASYCUDA++, ECVS. These systems contain different modules that are the most difficult tasks for most new customs officers. So that if the users have sufficient knowledge about the system easy to perform his/her duties.*

The knowledge model evaluation demonstrates that the model is helpful and can be productive for import customs clearance business processes. The knowledge model can reduce knowledge loss due to high employee turnover, facilitates knowledge management processes and contains most of the knowledge content needed to perform import customs clearance processes.

CHAPTER SIX

6. IMPLEMENTATION

In this chapter, knowledge management system prototype for the import customs clearance process knowledge model is discussed. The chapter is organized into two sections from which the first provides list of tools and technologies utilized and the second section describes the user interface of the prototype.

6.1. Software Development Tools Used

The researcher used different software development tools for each of the components as it is discussed in chapter three.

- The first component is the user interfaces that are basically web pages. The researcher used a graphic designing tool called Adobe Photoshop CS4 HTML and code generating tool called and Adobe Dreamwaver CS5. The two tools help the researcher in designing a good user interface different components such as forms, textbox, buttons, and hyperlinks to navigate from one page to another.
- For the business logics of the prototype, the researcher used a PHP/5.5.9 programing language with Integrated Development Environment (IDE) tool called Netbeans IDE 8.0. PHP is one of the best programing languages in developing web based application.
- The researcher used Apache/2.4.7 as application server to deploy the business logic of the prototype. The application server receives the incoming knowledge request from end user or web browser and interprets the user request, interacts with database to retrieve data meet specific user request and sends the response back to the end user via web browser.
- To manage the data MySQL/5.6.16 is used by the researcher.

6.2. User Interface Description

The prototype has web user interfaces for different type of users and purposes. The overall structure of the prototype is shown in Figure 6.1 below. The interface will be accessible by appropriate users to carry out their duties. There are two types of users: administrator with access to all features and staff with limited features.

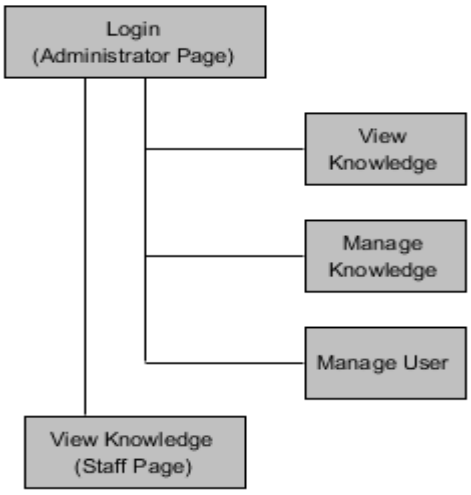

Figure 6. 1 : Overall Structure of the Prototype

There are two primary pages to access the prototype: Login Page and Home Page, and each of these may be accessed directly from the URL. When the staff accesses the prototype using its home page URL it will present the content of the knowledge. When the administrator tries to access the administrator page the prototype will ask him to log in. There are three pages in the prototype if the administrator successfully logged in, and each of the pages can be accessed directly from the main menu.

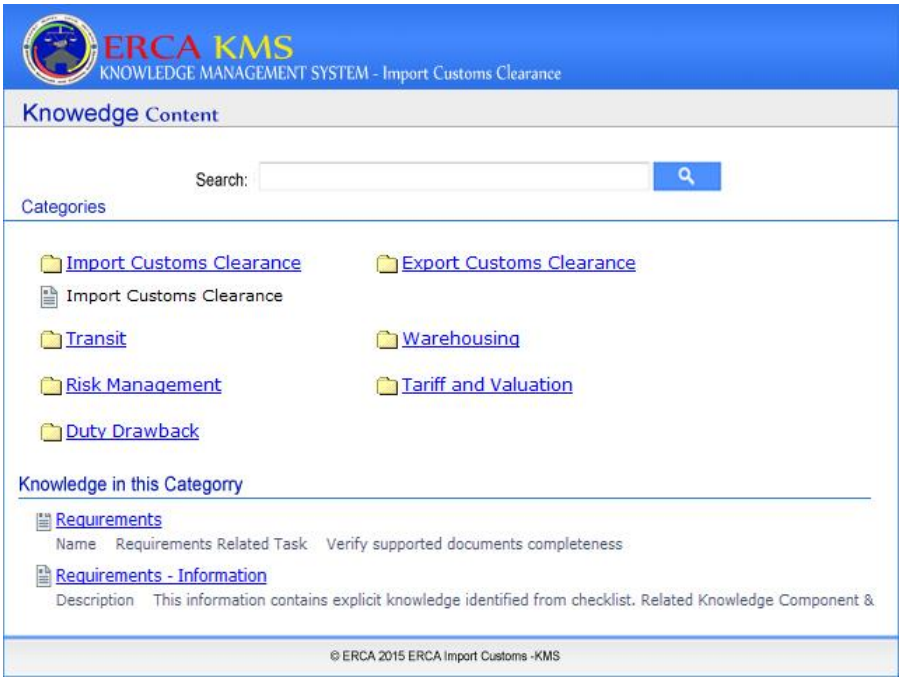

Figure 6. 2 : Knowledge View Page

View Knowledge Page (Figure 6.2): this page enables the user to browse the knowledge component using knowledge categories. The system presents list of knowledge categories and their knowledge components.

Login Page (Figure 6.3): login page is intended for system administrators that are authorized and are given username and password to view, manage knowledge and user.

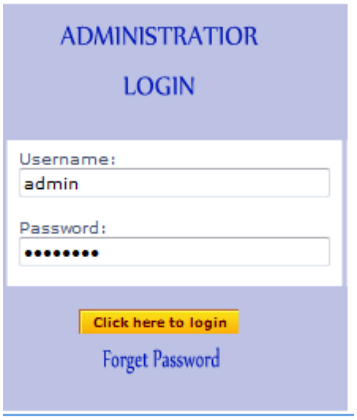

Figure 6. 3 : Login Screen

Manage Knowledge Page: this page as shown in the Figure 6.4 displays a hierarchical structure of knowledge categories. It presents a links to create new knowledge categories and knowledge components.

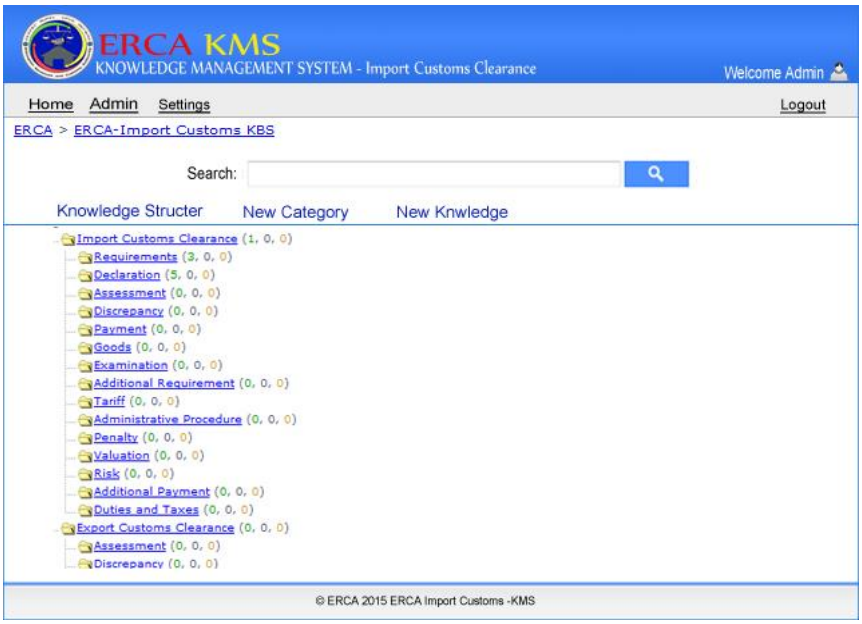

Figure 6. 4 : Manage Knowledge Page

List of Knowledge Page: List of knowledge page contains a list of knowledge component for the selected knowledge categories. The list of knowledge page is shown in Figure 6.5.

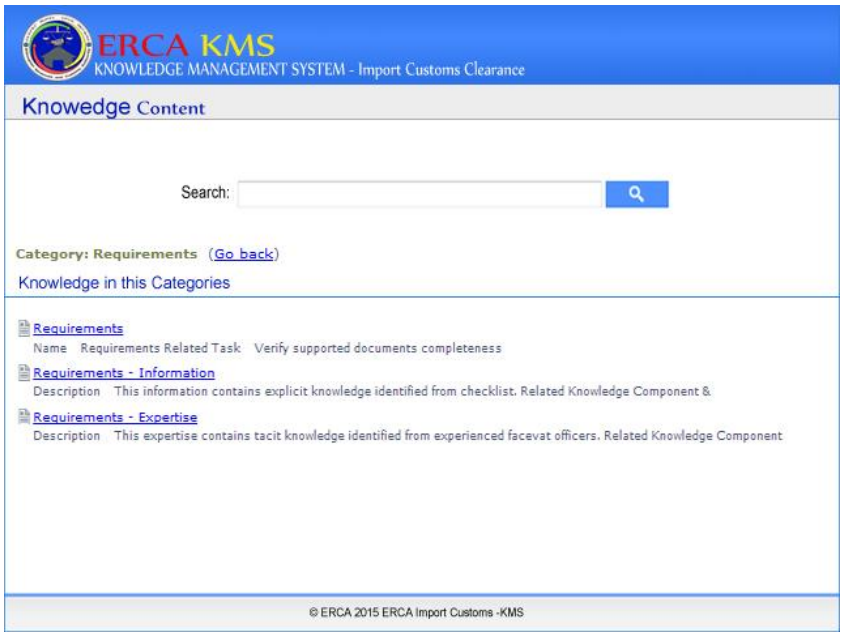

Figure 6. 5 : List of Knowledge Page

Knowledge Component Content Page: this page as shown in the Figure 6.6 displays a detail content of the selected knowledge component. It presents the link to information and expertise knowledge parts of the knowledge component. The page also has metadata of the knowledge component including number of visits and date of creation.

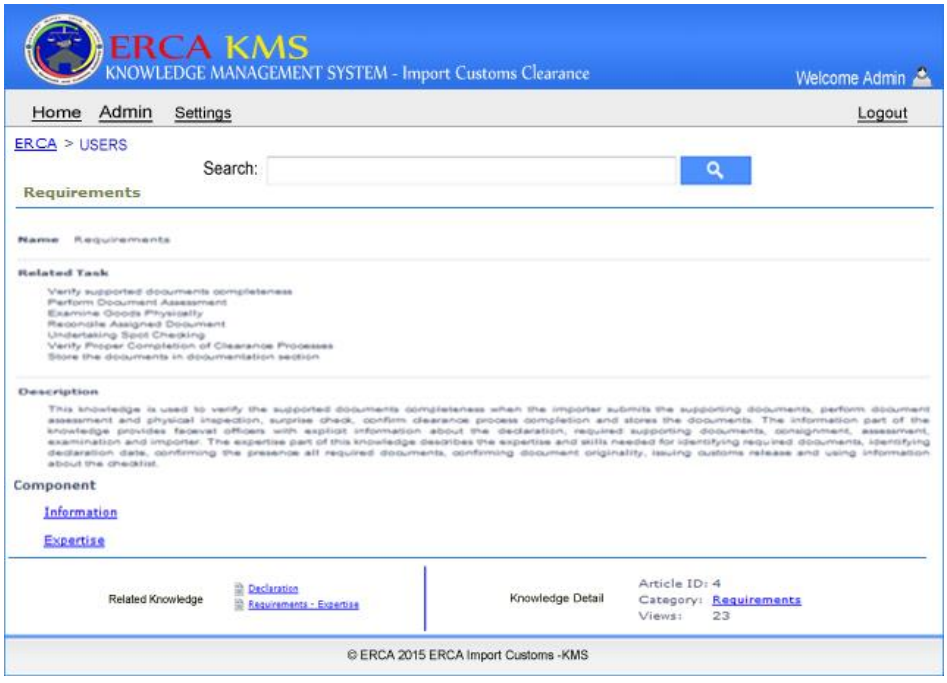

Figure 6. 6 : Knowledge Component Content Page

Information Part of Knowledge Component Page: this page as shown in the Figure 6.7 presents the information part of the selected knowledge component. It also contains the link to the knowledge component it relates and its metadata.

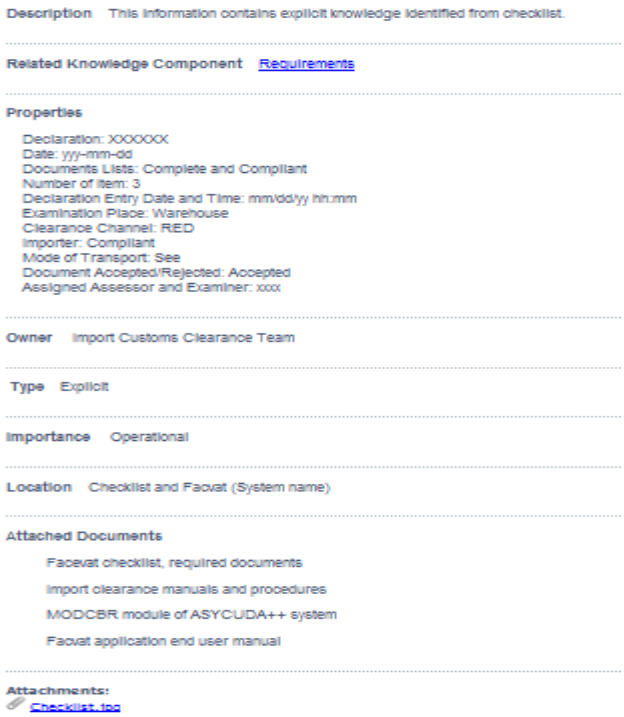

Figure 6. 7 : Information Part of Knowledge Component Page

Expertise Part of Knowledge Component Page: this page as shown in the Figure 6.8 presents the expertise part of the selected knowledge component. It also contains the link to the knowledge component it relates and its metadata.

Figure 6. 8 : Expertise Part of Knowledge Component Page

Manage Users Page: this page as shown in the Figure 6.9 presents a list of users that can manage the knowledge and knowledge categories. The manage users page can also enables the user to create new users and edit and update an existing users.

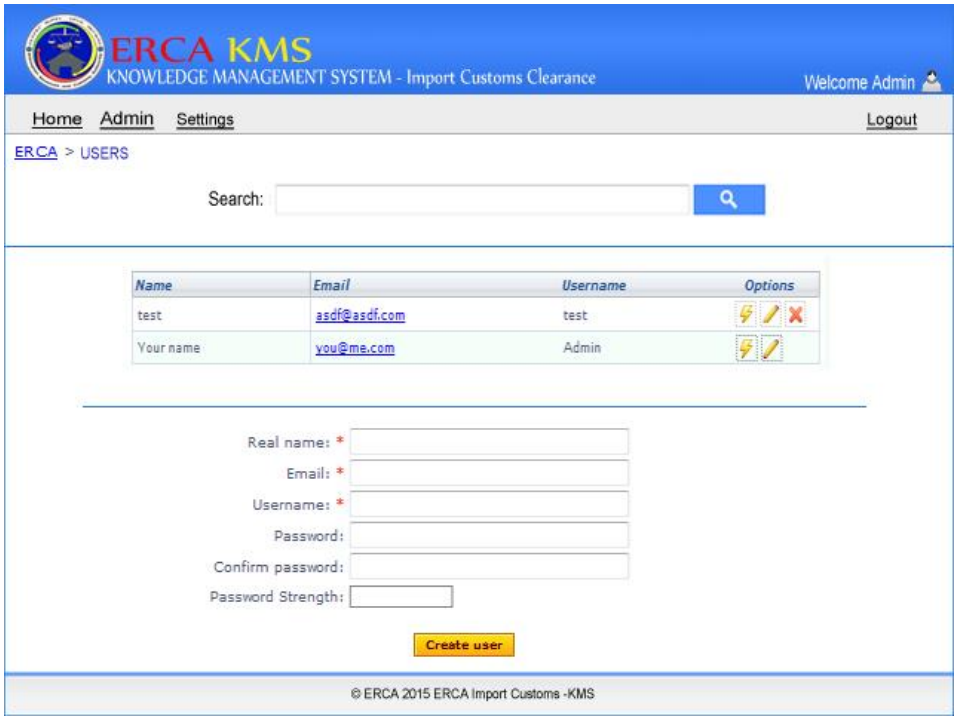

Figure 6. 9 : Manage Users Page

CHAPTER SEVEN

7. CONCLUSION AND RECOMMENDATION

The last chapter of this research aims to present the main findings and conclusions achieved during the knowledge modeling building. It also discusses recommendations for further studies.

7.1. Conclusion

Knowledge has become one of the major factors of production in addition to labor, land, capital and entrepreneurship due to the emergence of a knowledge economy. Managing organizational knowledge plays a great role on organizations performance. Knowledge management helps organization to improve their profits, to be competitively innovative or to survive. However, managing knowledge as organization resource is not easy task. Organizations are trying to leverage their knowledge resources by employing knowledge management systems.

Knowledge management system is a collection of information system applied to managing knowledge. These systems enhance use of knowledge by simplifying the capture, stores, distribution and availability of organizational knowledge.

Successful knowledge management system development and implementation is the key concern to effectively managing organizational knowledge. The knowledge modeling approach is now considered as an appropriate technique for knowledge management systems development. Knowledge model is a simplified representation of a knowledge needs, structures, and relationships among components of the knowledge management system. The knowledge model will help specify knowledge contents and show their flows into the business processes.

ERCA is one of the governmental authorities of Federal Government of Ethiopia which is entitled for collecting revenue from customs duties and domestic taxes. In addition to raising revenue, ERCA is responsible protecting the security and safety of citizens, as well as to increasing competitiveness through efficient, targeted controls and the facilitation of legitimate trade. However, recent human resource directorate studies reveal that ERCA has many difficulties in accomplishing its objectives. The research also indicates that one of the main reasons in failing to achieve its objectives is the presence of high employee turnover. This high employee turnover significantly losses ERCA’s operational knowledge and has significant

impact on the performance of ERCA. To reduce the effect of knowledge losses, in ERCA it is possible to use knowledge management systems in managing this knowledge.

Managing the customs administration division of ERCA operational knowledge is very essential to generate additional revenue, reduce levels of mis-declarations and reduce fraud. The business process that helps to achieve these benefits including service delivery requirements and regulatory obligations are knowledge intensive business processes. The significance of knowledge management is recognized in customs administration industry. Knowledge management can also create an opportunity for the customs offices to improve their effectiveness and increase the quality of customs offices professional performance. ERCA can take the advantage of knowledge management to increase its performance.

Currently, ERCA has no explicit knowledge management system that helps to manage its significant operational knowledge. The researcher identifies this problem as a research gap that needs further knowledge. Therefore, is very important to promote the benefits knowledge management and solid foundation laid for knowledge management system implementation in ERCA and customs administration organizations.

This research is aimed to build a knowledge model for the development and implementation of knowledge management system for ERCA import customs clearance procedures. During the execution, the research addressed vital questions including what are the import customs clearance business processes, activities in the processes and knowledge requirement to perform these activities. The research also answered the question how to build, evaluate and implement the knowledge model for import customs clearance business processes.

The research used a decision making knowledge model method to systematically collect, analyze and represent the import customs clearance business processes of ERCA and their knowledge contents or requirements. The method also used to describe the relationship between knowledge. It is conducted using business processes oriented knowledge modeling techniques with UML knowledge modeling language. The business process oriented knowledge management provides a conceptual framework for modeling knowledge by focusing on business processes.

The objective of this research was achieved, firstly, by a review of literature in the areas of knowledge management related concepts and knowledge model. Then, based on the review, the key problem were identified and defined, business processes for which to build the knowledge

model were selected, and knowledge model was built based on the selected knowledge modeling. A prototype knowledge management system was developed for the knowledge model. Finally, the prototype knowledge management system evaluated using domain experts to determine the effectiveness of the knowledge model.

The use of the knowledge model that has been built and its prototype knowledge management a system function shows that ERCA customs clearance directorates knowledge management activities is improved and the required knowledge content is incorporated in the knowledge model.

7.2. Findings

This research has two deliverables: knowledge modeling of import customs clearance of ERCA and web based knowledge management system prototype. The knowledge model contains the knowledge diagram and knowledge catalog. The knowledge diagram shows the knowledge component of the import customs clearance processes and relationship between the knowledge components. The knowledge diagram also shows the information and expertise parts of each knowledge component. The knowledge catalog is a detailed textual description of the internal structure of each knowledge component of the knowledge diagram. It is a repository of knowledge components of the import customs clearance business processes. The web based knowledge management system prototype contains the captured knowledge content of the knowledge model for import customs clearance business processes and the expert owned the expertise or tacit knowledge.

The deliverable of this research and evaluation result of the respondents suggests that the proposed knowledge model can impacts the import customs clearance business processes of ERCA by improving knowledge management processes. Therefore, knowledge model reduces knowledge loss due to high employee turnover. The model also suggests that the knowledge management system development efforts in ERCA can concentrate on the knowledge contents or requirements of the import customs clearance business processes rather than the knowledge management development processes and technologies.

The researcher and respondents involved in knowledge model evaluation realize that the knowledge model can support the knowledge management process in import customs clearance business processes of ERCA by:

- Capturing explicit knowledge or information from the activity of the business processes related to the import clearance activities. The model also captures tacit knowledge or expertise that is needed to undertake a given activity in customs clearance processes and identifies and point toward the expert who possesses the required knowledge.
- Providing structured way of import customs clearance knowledge storage for later retrieval and better understanding of knowledge for customs clearance officers. The knowledge model also provides knowledge coding capability that facilitates ease the future retrieval.
- Sharing import customs clearance knowledge collected during the knowledge modeling through customs clearance directorate. The knowledge model also enables to find knowledge from senior clearance officer or facilitate knowledge expert discovery process.
- Providing a way of collecting and analyzing knowledge requirements exhaustively by concentrating on the knowledge content or what to manage rather than the knowledge management development processes.

Generally, the findings of this research offered a better understanding of how the knowledge model supports the knowledge management process and their implementation in import customs clearance business processes of customs administration organization. It offered good understanding of how to collect and analyze knowledge contents or requirements of import customs clearance business processes of customs administration organization. The research also provides a solid foundation for future research for the development of successful knowledge management systems in customs administration organizations.

7.3. Recommendations for Further Research

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

As shown in this research, only the import customs clearance procedure of single directorate was covered. Further research should be aimed at building knowledge model for other customs procedures including export clearance, transit procedures, risk management, warehousing, tariff

and valuation and duty drawback procedures and to further investigate the relationship between knowledge throughout the authority.

The research was conducted for existing business process and the knowledge is modeled based on the existing business process. However, business process of an organization and its knowledge requirement evolves, therefore the knowledge model can be extended to support continuously update the knowledge.

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ANNEX

Annex I: Interview Checklist for Identification Activities and Knowledge Input

1. What is your position in the organization?
2. What are the businesses processes in import customs clearance directorate?
3. Who interacts and perform these business processes to accomplish tasks?
4. What are the sequences of actions/activities in these processes; i.e. processes and procedures required and the decision point to perform the clearance processes?
5. What are the relevant forms and documents as well as laws, rules and regulations you uses to perform these business processes?
6. What are the knowledge requirements for these activities of the business processes or your work?
7. What are the contents of knowledge or the information needed to use the knowledge for performing your tasks?
8. What are the sources of knowledge or the documents or people with expertise or sources containing the knowledge?

Annex 2: Interview Checklist for Knowledge Model Evaluation

1. Do you think that the knowledge model contains all the required knowledge of business process activities related to your jobs?
2. Do you think that the knowledge model promote ease of access and understandable for experts especially new customs officers?
3. Do you think that the knowledge model simplify the knowledge capturing and application process?
4. Do you think that the knowledge model facilitate knowledge sharing among different clearance officer?
5. Do you think that the knowledge model preserves customs clearance business processes knowledge loses and supports store for future uses?