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ENHANCING KNOWLEDGE SHARING: CASE OF NILE BASIN INITIATIVE (NBI)

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ABSTRACT: Knowledge sharing has been identified as the key enabler of knowledge management. To leverage knowledge resources and to support knowledge sharing, organizations are employing knowledge management systems. While knowledge management systems are important, practical implementations have found that technology alone cannot guarantee that knowledge will be shared.

The objective of this research study was to examine the determinant factors that promote or discourage knowledge sharing behaviors of individuals with in NBI context and propose a technical and non-technical solution. Drawing from multiple streams of research including social psychology, organizational learning, knowledge management, information systems and so forth, this research developed an integrated theoretical model and unveiled three sets of critical factors: psychological, organizational and technological that are believed to affect the knowledge sharing behaviors.

The posited theoretical model was validated using a field survey of individuals from NBI, the case study area of this research study. The results of the study provide empirical support for the overall structure theorized in the research model. 9 of the 11 hypothesized relationships were supported. Knowledge sharing behavior was predicted by individual's intention towards knowledge sharing and perceived behavioral control. Knowledge sharing intention in turn was predicted by knowledge workers attitude towards knowledge sharing, subjective norm and perceived behavioral control. The strength of Social network and trust exerted positive effect towards favorable attitude towards knowledge sharing and subjective norms towards knowledge sharing. Perceived organizational incentives and benefits exerted a positive effect towards favorable attitude towards knowledge sharing. The perceptions of loss of knowledge power exerted a negative effect on the attitude. Organizational climate positively influenced knowledge workers subjective norm. Additionally, facilitating tools and technology was positively associated with high levels of perceived behavioral control towards knowledge sharing.

Based on the findings, the study discussed implications for theory and practice. Overall, the results of the study advance prior research in the area of knowledge sharing by shedding light on the determinants of knowledge sharing behaviors of individuals. In addition to contributing to theory, the findings of the study also yield insights for practice. These insights could be used by organizations in developing realistic environments that are conducive to knowledge sharing. Furthermore in the final section the study proposed a prototype knowledge portal that can be used as a common tool to minimize the effects of those factors identified during study through providing an easy means for collaboration, Community of practices, access to valuable knowledge, team building, knowledge sharing, to narrow the physical gap between individuals in organization like NBI and so forth.

KEYWORDS: knowledge Management, knowledge sharing, Knowledge, knowledge portals, Nile, Determinants and solutions, knowledge sharing factors.

1 INTRODUCTION

An organizations survival in today's world is highly dependent on its intelligent use of the knowledge resources it has due to the emergence of a new economy where knowledge has become a valuable resource and asset. "The dynamism of the new economy requires us to not only quickly create knowledge, but also to acquire and apply knowledge quickly."(Ming-Yu Cheng 1, Jessica Sze-Yin Ho1 and Pei Mey Lau2,2003). One possible way to do so is to share our knowledge effectively.

However, most organizations tend to over-emphasize on systems and tools, rather than on the core component that is knowledge sharing within the organization.

knowledge management (KM) is "a systemic and organizationally specified process for acquiring, organizing, and communicating both tacit and explicit knowledge of employees so that employees may make use of it to be more effective and productive in their work", Alavi and Leidner (1999).Therefore having an efficient KM initiative is important to understand and utilize organizational knowledge resources, tacit vs. explicit, as well as to implement the appropriate mechanisms to generate and share existing and new knowledge. Furthermore the analysis of the broad environment where the knowledge resources exit and knowledge sharing occurs is essential to identify and overcome barriers to the success of KM/KS efforts.

For organizations like NBI, where the management and development of trans-boundary knowledge resources takes place, knowledge sharing is important In order to effectively disseminate knowledge generated and Integration of the knowledge resources which might be captured in different systems developed with specific needs and scope of the projects and center specific events and activities. On the other hand, knowledge is the "power", holding knowledge is similar to holding the competitive power of the new economy. This dilemma of knowledge sharing and hoarding happened all the time between staffs, centers, stakeholders and academic Institutions conducting different studies and scientific analysis on those trans-boundary resources.

This research explored the knowledge sharing practices of organizations by taking the case of Nile Basin Initiative (NBI). It examined the behavior and intensity of knowledge sharing behavior of individuals using the theory of planned behavior (TPB) of Ajzen 2001, *Social-psychological model for explaining and predicting human behavior in specific contexts* to clearly identify and study those determinant factors of KS behavior. Furthermore the study explores common practices between staffs, stakeholders and NBI centers with the intension of providing useful insights ,best practices and opportunities useful for policy makers and management that can be used to set strategic direction to promote knowledge sharing, finally the study proposed a technical solution, web portal, which is intended to provide individuals with an efficient media for knowledge sharing, strengthen social network (collaboration and team work) and dissemination and/or integration of the vast volume of information/knowledge scattered throughout the wider riparian countries of the NBI.

1.1 BACKGROUND

The Nile Basin Initiative is a regional intergovernmental partnership that seeks to develop the River Nile in a cooperative manner, share substantial socio-economic benefits and promote regional peace and security. The partnership continues to be led by 10 Member States namely Burundi, DR Congo, Egypt, Ethiopia, Kenya, Rwanda, South Sudan, The Sudan, Tanzania, and Uganda and Eritrea participates as an observer. NBI was conceived as a transitional institution until the cooperative framework agreement (CFA) negotiations were finalized and a permanent institution created. The NBI has three centers (Nile SEC, ENTRO, and NELSAP-CU) governed by a Council of 10 Ministers (Nile-COM) in charge of water affairs in the NBI member states, which meets once a year. Nile-COM is the highest decision-making body and provides policy guidance. A Nile technical advisory committee (Nile-TAC), of 20 senior government officials from the partner states meets at least twice a year and oversees the work of NBI as well as offers technical support and advice to the Nile-COM on matters related to the management and development of the common Nile Basin water resources. In each country, the national NBI office headed by the respective Nile-TAC member serves as the focal point for all NBI-related activities.

The partnership is guided by a shared vision: 'To achieve sustainable socio-economic development through equitable utilization of, and benefit from, the common Nile Basin Water resources'. The shared belief is that countries can achieve better outcomes for all the peoples of the basin through cooperation rather than competition. At the heart of this challenge is the imperative to eradicate poverty. *A Shared Vision Program (SVP)* comprising a series of inter-related projects spread across the basin aimed at building cooperation and capacity for what we know these days as integrated water resource management (IWRM), all in trans-boundary context. *A Subsidiary Action Program (SAP)* aimed at early concrete investments 'on the ground'. This operates in two distinct sub-regions - the eastern Nile sub-region and the Nile Equatorial Lakes sub-region - though connected by the common thread of the Nile River.

To guide NBI, Nile-COM formulated a set of objectives for the SAP to enable all actions to be directed to the common cause in a common manner.

The objectives are:

- To develop the water resources of the basin in a sustainable and equitable way to ensure prosperity, security and peace for all its peoples.
- To ensure efficient water management and the optimal use of the resources.
- To ensure cooperation and joint action between the riparian countries seeking win-win gains.
- To target poverty eradication and promote economic integration.
- To ensure that the program results in a move from planning to action.

NBI, with an objectives that seeks to develop the river Nile in a cooperative manner, share substantial socio-economic benefits and promote regional peace and security, has taken numerous steps to improve its information systems, strengthen internally and externally focused knowledge-sharing activities, and foster region wide knowledge-sharing initiatives, all in support of enhancing the cooperation of the riparian countries towards realizing their shared vision.

1.2 STATEMENT OF PROBLEM

Most of the efforts, researches and practices in knowledge management seem to focus on the development of knowledge management systems, overlooking how knowledge is presented or communicated. Managing knowledge occurs within a complex structured social context. There are social and human factors in the creation and exchange of knowledge which is constituted in the organizational culture and nature. "Given the role of technology in transferring and disseminating knowledge, a true picture of knowledge is one where people voluntarily explore, use and adopt knowledge in the best interest of their organization."(Awad, Elias M. Awa, 2004).

Intergovernmental partnership organizations like NBI, are characterized by such a complex political, social and human factors which significantly determine the way knowledge is generated and shared. Within NBI, there is a vast volume of knowledge captured in different systems and used or accessed in limited manner or only within NBI centers in which they are developed. There is also quite a lot of knowledge not captured and shared but available in different format in the hand of staffs, centers and stakeholders.

In addition several studies have been conducted with respect to the common water resource (NILE) even if the outputs of those studies is not fully utilized or shared throughout the region due to identified and unidentified barriers. Furthermore NBI has taken various steps to advance its information systems and reinforce internally and externally focused knowledge-sharing activities such as the development of decision support system (DSS), knowledge web portals and websites. Again this technological solutions are not fully employed for their intended purpose, except being used with specific needs and scope of the projects/centers in which they are developed.

This visible gaps of knowledge sharing mentioned above needs to be clearly identified and studied for the success of KM/KS efforts, through exploring and examining individual's behavior towards knowledge sharing as well as identifying external factors of individuals knowledge sharing behavior which significantly determine the way knowledge generated and shared.

Motivated by the above mentioned significant factors these study developed a conceptual model based on theory of planned behavior (TPB) to clearly identify and study determinants of individual's behavior towards the actual knowledge sharing behavior to provide useful insights that could help strategists and management in tackling barriers in knowledge sharing and fostering relationships between centers, stakeholders and riparian countries of the NBI .Furthermore based on findings the study attempted to explore possible technical solutions and suggestions for practice that might contribute in maximizing the contribution of KM/KS efforts in achieving organizational objectives. .

Accordingly, the study is expected to answer the following two major research questions depicted below:

Q1: What are the major determinants of individual's knowledge sharing behavior within NBI?
Q2: What solution measures, technical and non-technical, can be proposed to address knowledge sharing challenges of NBI?

1.3 OBJECTIVES

1.3.1 GENERAL OBJECTIVE

The general objective of this research is to identify the significant determinant factors of Knowledge Sharing within NBI, with the intention to provide useful insights and an appropriate technical solution.

1.3.2 SPECIFIC OBJECTIVES

In responding to the above general objective, the research will address the following specific objectives;

- Assessing and identifying barriers in knowledge sharing behavior of individuals, & between related centers with in the riparian countries of the NBI.
- Pointing out the opportunities that are already existing but not fully utilized to promote knowledge sharing.
- Review of different literatures related to knowledge, knowledge sharing and knowledge management with the intent of providing useful perceptions and best practices.
- Design and develop knowledge portal to facilitate KS or to let sharing comes first.
- To evaluate and communicate the result.

1.4 SIGNIFICANCE OF THE STUDY

This study will be significant in order to effectively share the wealth of knowledge generated within NBI from different projects and programs by giving insights on those gaps and barriers in knowledge sharing behavior of individuals together with proposed solution measures which helps in making the vast volume of knowledge available in the hand of centers (Nile SEC, ENTRO, and NELSAP-CU), key stakeholders and staffs accessible for wider public throughout the region. In addition it will also help in improving the contribution of knowledge Management in the process of realizing NBI's shared vision, *"achieving sustainable socioeconomic development through the equitable utilization of, and benefit from, the common Nile Basin water resource*s ".in addition the findings of the study could be used as an input in the formulation of knowledge sharing policy and guidelines by providing useful insight for policy makers to take appropriate measures to improve knowledge sharing practices with in the NBI.

By and large, the findings of this research are expected to make a significant contribution to enhance knowledge sharing efforts of NBI in particular and other knowledge based organizations in general.

1.5 SCOPE AND LIMITATION OF THE STUDY

1.5.1 SCOPE OF THE STUDY

The scope of this research study was strictly on identifying major determinants or barriers of individual's knowledge sharing behavior within NBI together with proposed solutions and pointing out existing opportunities and best practices of knowledge sharing in organizations by taking the case of Nile basin initiative, NBI.

1.5.2 LIMITATIONS OF THE STUDY

The following major limitations are identified for this study:

- Though PLS-graph handles small sample size, the statistical power of the study is limited with sample size of 103.
- The findings are not based on longitudinal examination. Which is important for organizations like NBI, where the organizational environment and activities are highly subjected to change based on different factors like political situations, countries economic interests etc.
- The study didn't consider all important determinant factors for organizations work environment context such as political factors, perceived ownership of knowledge, self-efficacy etc.
- The proposed prototype knowledge portal was not validated and tested with users due to time and development environment limitations.

1.6 ORGANIZATION OF THE STUDY

This paper is organized into six chapters. The first chapter is about the background of the study, statement of the problem, objectives, scope and limitation of the study. The second chapter presents review of related literatures to knowledge sharing and discus related works in that area. The third chapter discusses the methodologies and procedures followed for the data collection, analysis and interpretations. The fourth chapter presented the study findings, and presentation of the data and the fifth chapter followed with presentation of a proposed technical solution, prototype of knowledge portal that could contribute significantly in improving KM / KS efforts of NBI as well as other organizations. The

final chapter, chapter sixth, brings to an end of this survey research with the summary of findings, conclusion and recommendation.

2 LITERATURE REVIEW

2.1 OVERVIEW

Since establishment, with an objectives that seeks to develop the river Nile in a cooperative manner, share substantial socio-economic benefits and promote regional peace and security, NBI has taken numerous steps to improve its information systems, strengthen internally and externally focused knowledge-sharing activities, and foster region wide knowledge-sharing initiatives, all in support of enhancing the cooperation of the riparian countries towards realizing their shared vision ,"Achieving sustainable socioeconomic development through the equitable utilization of, and benefit from, the common Nile basin water resources "(NBI-vision statement).As background to an assessment and identification of determinant factors of knowledge sharing (KS) organizations by taking the case of NBI, this paper presents an exploration of the literature on the factors that can affect organizational knowledge sharing success.

Knowledge has been viewed as a competitive advantage and a source of power for those who possess it at the right place and at the right time (Van Der Bij et al., 2003, Yang and Wu, 2008).In the new era, knowledge is regarded as a factor of production together with land, labor, and capital. Knowledge is recognized as the most important resource in the organization (Nahapiet and Ghoshal, 1998; Spender and Grant, 1996). From the point-of-view of an organization, performance can be improved by providing useful and relevant knowledge to employees (Alavi and Leidner, 2001; Hansen et al., 1999). It is considered as the primary source of competitive advantage (Stewart, 1997) and critical to the long term sustainability and success of the organization (Nonaka and Takeuchi, 1995). On the other hand effective knowledge management is considered to play an increasingly important role in creating competitive advantage. While defined in many different ways, knowledge management generally refers to how organizations create, retain, and share knowledge (Argote, 1999; Huber 1991).

Knowledge sharing, which is the means by which an organization obtains access to its own and other organizations' knowledge, is the most important element to the overall success of organizational KM activates. Despite the fact there are a range of determinant factors that limits the KS practices from accomplishing their objectives, which is mainly due to the large diversity of potential sharing barriers.

The literature identifies four primary Frameworks that can affect successful knowledge-sharing implementations, including

- Knowledge sharing behaviors of knowledge workers
- Organizational culture and strength of relationships
- Nature of knowledge,
- The environment in which the sharing occurs.

The literature begins with providing different view of knowledge and knowledge sharing with the intention of identifying the nature and importance of the two terms, following this section it provides definitions on measures of knowledge sharing success and overview of researches on determinants of knowledge sharing.

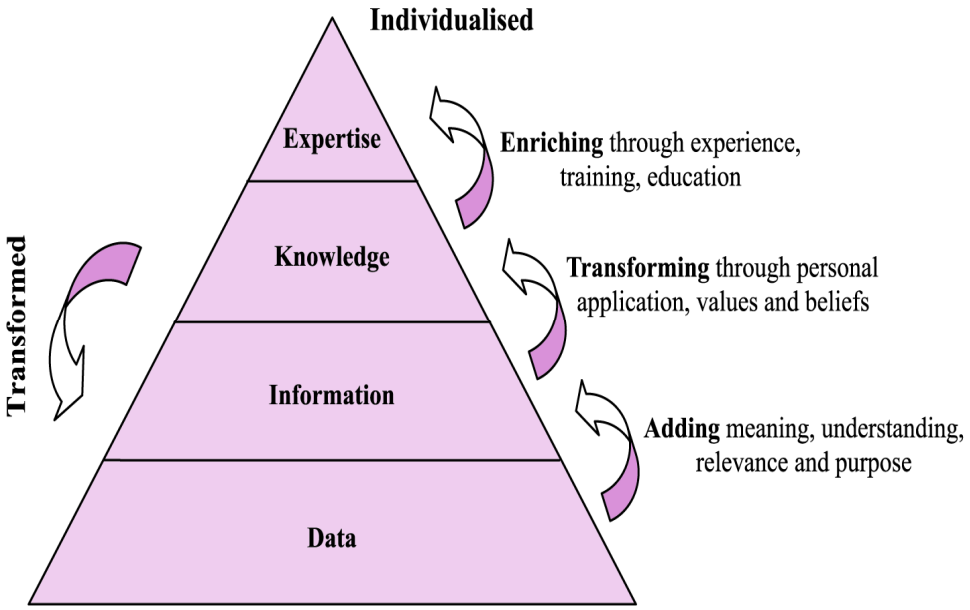
2.2 THE NOTION OF KNOWLEDGE

2.2.1 DEFINITIONS OF KNOWLEDGE

A review of the literature in strategic management, organizational theory, knowledge management and information systems disciplines indicate the existence of several definitions and viewpoints of knowledge. To begin with the definition adopted by much of the published research to date , knowledge is defined as a "fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information" ,Davenport and Prusak (1998).

On the other hand there is a commonly held view, mostly in information science literature, uses a hierarchy of data, information and knowledge to describe the characteristics of knowledge (Alavi and Leidner, 2001)[Fig:2.1].This hierarchical approach distinguishes data, information and knowledge incorporating additional elements at each level of the hierarchy (Vance, 1997; Davenport and Prusak, 1998; Tuomi, 1999).In this hierarchy Knowledge is validated and authenticated

information (Alavi and Liedner, 2001) that is ready to apply to decisions and actions, which includes a collection of skills, principles, insights, instincts, ideas, rules and procedures that aid in decision making behavior and actions.



[Fig: 2.1 Hierarchy of data, information and knowledge

Source: *Bender and fish (2000)*

Building on the above perspectives of knowledge hierarchy, Alavi and Leidner (2001) observe that the distinguishing factor between information and knowledge is not found in the content, structure, accuracy or utility of the information or knowledge. Rather, knowledge is simply information that exists in the individual's mind. It is personalized information associated to facts, procedures, concepts, interpretations, ideas, observations, and judgments. Researchers assert that this knowledge need not be new, unique, useful or accurate. They argue that information becomes knowledge, when it is processed by the individuals and knowledge becomes information when it is articulated and structured in the form of texts, graphics, words and other symbolic forms.

Other definitions of knowledge also exist. Zack (1999) define knowledge as "that which we come to believe and value on the basis of the meaningful organized accumulation of information through experience, communication, or inference".

2.2.2 CLASSIFICATIONS OF KNOWLEDGE

There are different forms or categorizations of knowledge. For instance, Nonaka (1994), categorizes knowledge into two forms: explicit and tacit. Explicit knowledge, according to the researcher, is knowledge that can be formalized, documented, archived, codified, and can easily be communicated or transferred between individuals. This includes theoretical approaches, manuals, databases, plans, business documents, guidelines, process models etc. Tacit knowledge, in contrast, is deeply rooted in individual's actions, experiences, ideals, values and is far more difficult to write down or articulate.[Table 2.1]. Polanyi (1966) summarizes the fundamental nature of tacit knowledge in the phrase "We know more than we can tell". He exemplifies tacit knowledge by providing everyday example such as the ability to recognize the face of an acquaintance. Nonaka (1994) observes that tacit knowledge comprises two components: technical and cognitive. The technical component refers to "know-how" or informal personal skills of crafts and the cognitive component refers to individual's deeply ingrained beliefs, ideals, values and mental models. The researcher notes that the cognitive component, while difficult to articulate and formalize, shapes the way we see the world.

Table 2.1 Explicit vs. Tacit knowledge

	Explicit Knowledge	Tacit knowledge
Nature	• Easily Identifiable • Relatively easy to share • Lacks context • Requires interpretation	• Within-person knowledge • Difficult to articulate • Hard to share • Can be shared only indirectly
Mechanisms to generate and sharing	• Codification • Documentation • Database and search engine • Blogs,wikis, and internet	• Practice • Personal and team reflection • Drawing mental maps • Apparent ships • Social interaction and mentoring • Story-telling and metaphors • New codification systems can make some tacit knowledge easier to share, through converting some elements of it in to explicit knowledge
Typical examples	• Information • Know-that • Theoretical knowledge	• Intuition and insights • Practical intelegence,skills and practice • Know-how and heuristics • Rules of thumb. • Mental models and beliefs.

Knowledge can also be viewed as individual or collective (Nonaka, 1994).Individual knowledge exists in the heads of individuals, while collective knowledge exists in the collective actions of the groups and organizations. Nonaka (1994) regards organizational knowledge creation as “knowledge spiral” in which there is a continuous interaction among individuals and continuous conversion of explicit knowledge to tacit knowledge and vice versa. This continual interaction and conversion in turn results in joint creation of knowledge by individuals and organizations. Organizations play an important role in activating the explicit and tacit dimensions of knowledge and in providing a forum for the knowledge spiral through four modes of knowledge creation: socialization, externalization, combination and internalization [Fig: 2.2]. Socialization refers to the exchange of tacit knowledge among members through the social interactions and shared experiences. Externalization refers to the translation of tacit knowledge into explicit knowledge through models, concepts, metaphors, analogies, stories etc. Combination refers to the generation of new explicit knowledge by combining and bundling together different bodies of explicit knowledge and internalization refers to the creation of new tacit knowledge from explicit knowledge. All of these conversion modes are highly interdependent and tangled.

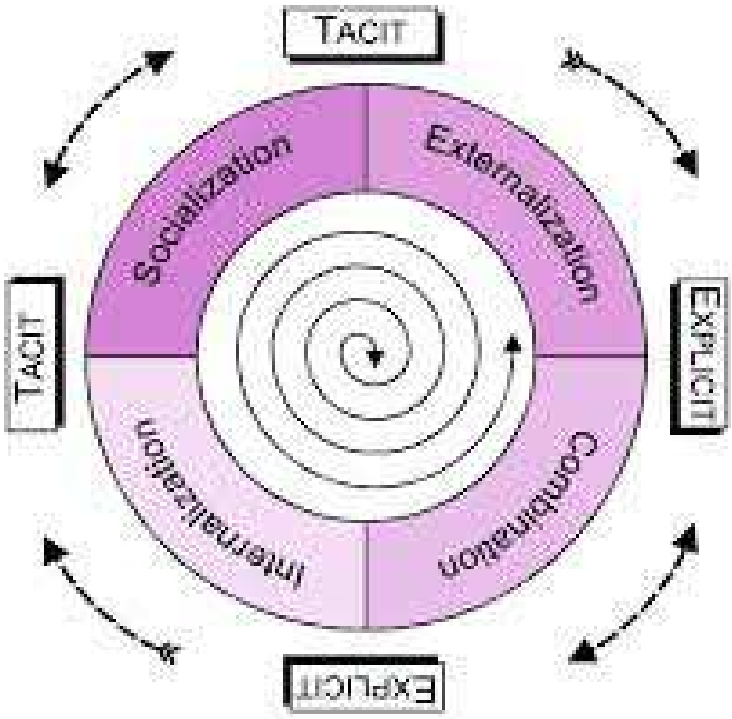


Fig: 2.2 Modes of knowledge Creation

Source: *Theorized by Nonaka and Takeuchi (2005)*

Although explicit-tacit dichotomy of knowledge is widely cited, other classifications of knowledge have also been presented. For instance, Zack (1999) categorized knowledge into declarative (know-what), procedural (know-how) and causal (know-why). Another classification from a purely practical perspective includes knowledge about customers, knowledge about products, knowledge about processes, knowledge about competitors, and knowledge about business frameworks (Alavi and Leidner, 2001).

2.2.3 PERSPECTIVES OF KNOWLEDGE

Knowledge can be looked at from several perspectives. For instance, knowledge can be considered as a process, an object, a state of mind, a condition of having access to information and a capability (Alavi and Leidner, 2001; Wasko and Faraj, 2000).

- **Knowledge as process**: this perspective of knowledge as a process depends on applying expertise. It hypothesizes that knowledge does not exist independent of human action. Instead, it builds through social construction of meaning.
- **Knowledge as an object:** this perspective regards knowledge as a thing or object; free of human action." Knowledge can be stored, retrieved and manipulated." (Wasko and Faraj, 2000).
- **Knowledge as state of mind**: this viewpoint centers on enhancing individual's personal knowledge so they can effectively apply it to the organization's requirements.
- **Knowledge as a condition of access to information**: is an extension to the object view, contends that organizational knowledge must be organized in a way that it is easy to access and retrieve.
- **Knowledge as a capability**: this standpoint builds on capability view and asserts that knowledge has a potential to influence future action. It speculates that knowledge has the capability to build intangible assets and intellectual capital.

Alavi and Leidner (2001) underlines each of the above knowledge perspectives require different strategies and different type of tools and technologies to manage knowledge. For instance, view of knowledge as object requires KM initiatives to highlight the significant of building knowledge management system in the organization, like wise view of knowledge as process entails strong focus on the flow of knowledge as in the processes of knowledge creation, knowledge sharing and knowledge distribution.

2.3 KNOWLEDGE MANAGEMENT

Review of the prior research on knowledge management (KM) indicates the existence of multiple definitions of KM. For instance, Alavi and Leidner (1999) define knowledge management (KM) as "*a systemic and organizationally specified process for acquiring, organizing, and communicating both tacit and explicit knowledge of employees so that other employees may make use of it to be more effective and productive in their work*". Beckman (1999) define KM as "the formalization of and access to experience, knowledge and expertise that create new capabilities, enable superior performance, encourage innovation and enhance customer value."O'Dell et al., (1998) define KM as "a conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into action in ways that strive to improve organizational performance." Malhotra (1998), also explains KM as "Knowledge Management caters to the critical issues of organizational adaptation, survival, and competence in face of increasingly discontinuous environmental change. Essentially, it embodies organizational processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings."

As the above definitions illustrate, KM is a set of things involving various activities. It encompasses theories, models, processes and technologies that support the protection, development and exploitation of knowledge assets. By managing intellectual capital that exists in both explicit and tacit forms, KM enhances an organization's ability to learn from its environment and to incorporate knowledge into business processes. It creates a new value for the organization by improving its efficiency, effectiveness and competitiveness. Davenport, De Long and Beers (1998) regard most KM projects as having one of the following objectives:

- Making knowledge visible through KMS such as maps, yellow pages and hypertext tools.
- Promoting knowledge intensive culture that encourage knowledge sharing, particularly the proactive acquisition and contribution of knowledge.
- Developing knowledge infrastructure which includes a web of people and technologies with the objective of promoting interaction and collaboration among employees.

2.4 DEFINITIONS OF KNOWLEDGE SHARING (KS).

Review of the extant literature on knowledge sharing indicates that there is no all-inclusive definition of knowledge sharing. Many researchers have defined knowledge sharing from their own point of view. Some researchers even considered knowledge sharing, knowledge flows and knowledge transfer as exchangeable terms and defined them as such. For instance, Alavi and Leidner (2001) relate knowledge sharing to knowledge transfer and define it as the process of disseminating knowledge throughout the organization. The dissemination can happen between individuals, groups or organizations using any type or number of communication channels. Similarly, Gupta and Govindarajan (2000), equating knowledge sharing to knowledge flows theorize that knowledge flows comprise of five elements: value of the source knowledge, willingness of the source to share knowledge, media richness of the communication channel, willingness of the recipient to acquire knowledge and the absorptive capacity of the recipient.

Davenport and Prusak (1998) define knowledge sharing as process that involve exchanging knowledge between individuals and groups. Connelly and Kelloway (2003) define knowledge sharing as "a set of behaviors that involve the exchange of information or assistance to other". It is separate from information sharing, which typically involves management making information on the organization available to employees. Whereas knowledge sharing contains an element of mutuality, information sharing can be unidirectional and unrequested".

The general concept of knowledge sharing is the processes through which knowledge is routed between a source and a recipient, in other words regardless organizational role the objective of any knowledge-sharing process is to transfer source knowledge successfully to a recipient. In addition KS is key in the spiral through four modes of knowledge creation: socialization, externalization, combination and internalization.

Table 2.2: knowledge sharing and knowledge creation process

	Knowledge sharing	Process
1	Knowledge sharing happens when an individual try to communicate his/her tacit knowledge with others through for example writing ideas and through in the form of theory.	Tacit to explicit **(Externalization)**
2	Knowledge is shared during social interaction such as story telling that enable transfer of complex tacit knowledge from the source to the recipient.	Tacit to tacit. **(Socialization)**
3	Human can get knowledge when rational behind a document is informed by other individuals. When Knowledge is put into action by 'learning by doing.'	Explicit to tacit. **(Internalization)**
4	When knowledge is written in a form of document and shared with other people. If individuals combine their knowledge, it will create new ideas that is written on paper.	Explicit to explicit. **(Combination)**

2.5 KNOWLEDGE SHARING SUCCESS

After understanding the general concept of knowledge sharing, which is transferring source knowledge successfully to a recipient, one approach to defining knowledge-sharing success focuses on the degree to which the knowledge is re-created in the recipient. Consistent with the innovation literature knowledge can be seen as knowledge packages embedded in different structural elements of an organization, such as in the people and their skills, the technical tools, and the routines and systems used by the organization, as well as in the networks formed between and among these elements (Argote & Ingram, 2000; Leonard-Barton, 1992). From this perspective, knowledge transfer involves the re-creation of a source's knowledge-related elements – its knowledge package – in the recipient (winter, 1995). Thus, knowledge-transfer success is defined as the degree to which the underlying knowledge elements have been re-created in the recipient to conform to those of the source.

In addition to the fact that it is often difficult to know what aspects of knowledge are important (Sowell, 1980), there is significant evidence that effective re-creation also requires that the knowledge package is made accessible to the recipient so that 'the local doers of development' can convert it, adapt it or reconfigure it to their localized needs (Dixon, 1994; Nonaka, 1994; Epple, Argote & Murphy, 1996). Thus, even if the elements of the knowledge package can be clearly identified, they may be hard to determine in their adapted forms within the recipient. As a result, rather than using some notion of knowledge re-creation to gauge sharing success, Kostova (1999) argues that a recipient's internalization of knowledge is more appropriate.

Knowledge internalization can be characterized by three different aspects, which are the degree of recipient's ownership, commitment and satisfaction with the transferred knowledge. Control of an object look like to be a key characteristic of the sensations of ownership, which relates to the degree that an individual invests energy, time, effort, and attention in the knowledge; as such investments tend to cause individuals to develop ownership of the knowledge (Csikszentmihalyi & Rochberg-Halton, 1981).The second aspect of knowledge internalization is Commitment, since the relative strength of an individual's identification and constant involvement with the knowledge can also affect the degree to which the recipient puts the knowledge into use (Mowday, Steers & Porter, 1979), Individuals develop knowledge commitment to the extent that they see the value of the knowledge, develop competence in using the knowledge (Leonard-Barton, 1990), maintain a working relationship or interaction with the knowledge, and are willing to put in extra effort to work with the knowledge (Mowday, et al., 1979). The last aspect of knowledge internalization is satisfaction. Recipient satisfaction with the knowledge is important because it can reduce resistance levels in adapting and using the knowledge (Leonard-Barton & Deschamps, 1988) as well as reduce the likelihood of the not-invented-here syndrome (Katz & Allen, 1982) occurring.

In order to foster knowledge internalization, research suggest that an organization needs to adopt an active learning perspective through which it fosters situations where the knowledge sharing parties catalyze the recipient's learning experiences and such a process requires the clients to have the discretion to localize the knowledge, see the value in doing so, invest in doing so, etc.

2.6 THE STUDY OF DETERMINANTS OF KNOWLEDGE SHARING

Knowledge sharing has emerged as a key research area from a broad and deep field of study on technology transfer and innovation, and more recently from the field of strategic management. Increasingly, knowledge-sharing research has moved to an organizational learning perspective. Different research's suggest that successful knowledge sharing involves extended

learning processes rather than simple communication processes, as ideas related to development and innovation need to be made locally applicable with the adaptation being done by the 'incumbent firms' (Nelson & Rosenberg, 1993).

Early research's found that greater knowledge-sharing experience was associated with lower transfer costs (Mansfield, Romeo & Wagner, 1979; Teece, 1976, 1977). Other studies have focused on how organizations can best accomplish international technology transfers. Another topic was concerned with the speed through which organizations are able to transfer innovations to subsidiaries (Mansfield & Romeo, 1980; Davidson, 1980; 1983). Other researchers examined the influences of the mode of association between the parties (Mason, 1980; Balasubramanyam, 1973), the level of technological development of the host country (Baranson, 1970), and the appropriateness of the technology with respect to its capital- or labor-intensiveness (Schumacher, 1973). Gupta and Govindarajan (1991). They suggested that the key variables affecting organizational knowledge flows were the broad task environments in which the flows occur, organizational structural characteristics that can affect the relationship between the parties, and organizational cultural norms with respect to a willingness to keep knowledge proprietary or accept outside knowledge.

This study categorized previous studies on determinants of KS in to three as;

- Organizational and Individual Factors
- Technological factors
- Knowledge management and business strategy factors

2.6.1 ORGANIZATIONAL AND INDIVIDUAL FACTORS

Researches identify several key knowledge sharing determinants related to organizational as well as individual factors, Connelly and Kelloway (2003) investigated a number of factors that impact employee's perceptions of a knowledge sharing culture. The identified factors can be broadly categorized into groups: organizational factors and individual factors. Organizational factors include individuals' perceptions regarding management support for knowledge sharing, their perceptions about a positive social interaction culture, organization's size, and the presence of technology that can facilitate knowledge sharing. Individual factors include age, gender and organizational tenure. The research findings suggest perceptions about management's support for knowledge sharing, and perceptions of a positive social interaction culture to be significant predictors of a positive knowledge sharing culture. Organizational size was negatively related to positive knowledge sharing culture such that smaller organizations were linked more with positive knowledge sharing culture.

Chow, Deng and Ho (2000) studied how individual's openness in knowledge sharing is affected by the interaction between national culture and the two contextual factors: the nature of the available knowledge for sharing and the knowledge sharer's relationship to the potential recipient. The study investigated the impact of individualism/collectivism, concern for face, Confucian dynamism, in-group / out-group attributes that researchers hypothesized would affect knowledge sharing. The research employed quantitative and open-ended questionnaires to two scenarios and collected data from 104 managers from United States (US) and 38 managers from People's Republic of China (PRC). The findings of the study indicate that when there is no conflict between self and collective interests, both the managers in the individualistic (US) and collectivistic (PRC) cultures were equally willing to share knowledge. However, when there is a conflict, managers in the collectivistic culture (PRC) exhibited a higher tendency to share, thereby placing collective interests ahead of their own. On the other hand, individualistic cultures do not give much importance to group enhancing behavior. They noted that certain organizational forms, where there is no conflict between self and collective interest, have the capacity to crowd out essential motivation and therefore are detrimental to the effective transfer of knowledge.

Wing S. Chow, Lai Sheung Chan, (2008) in there exploratory study of Social network, social trust and shared goals significance in organizational knowledge sharing success using Survey, measurement tool, theoretical framework (TRA) which is the early version of TPB and relationship confirmatory factoring analysis techniques identified that Social network and shared goals significantly contributing towards individuals desire to share knowledge, and directly contributed to the perceived social pressure of the organization. The social trust has however showed no direct effect on the attitude and subjective norm of individuals towards knowledge sharing behavior.

See Kwong Goh and Manjit Singh Sandhu (2013), using a research model which includes TPB and and the two affective components examined knowledge sharing Among Malaysian Academics to identify Influence of Affective Commitment & Trust and examine whether the perception of knowledge sharing in public universities differs from private universities. a survey was conducted with a total respondent of 545 academics from 30 universities in Malaysia. Multiple linear regression was used to examine the research model. On the other hand, t-test was used to examine the differences between public and private universities. Their finding pointed out emotional influence (affective commitment and affective trust) is crucial for knowledge sharing behavior. Accordingly they addressed the need to implement policies and activities to strengthen

emotional bonding between universities. In addition their t-test analysis showed a significant differences between public and private universities.

Bock, Zmud, Kim and Lee (2005) examined factors that are believed to influence individuals' knowledge-sharing intentions. Researchers drew upon the Theory of Reasoned Action (TRA) (Ajzen and Fishbein 1980) for the study's theoretical framework. To this framework, they have added extrinsic motivators, social psychological forces and organizational climate factors. Using field survey of 154 managers from 27 Korean organizations, the researchers found that the attitude towards knowledge sharing along with the subjective norms and organizational climate influence individual's intention to engage in knowledge sharing behavior. Other findings of the study indicate that anticipated reciprocal relationships positively influence attitudes towards knowledge sharing while sense of self-worth and organizational climate influence subjective norms. A surprising finding of the study is that anticipated extrinsic rewards negatively influence the knowledge sharing behavior.

Using theories of collective action, Wasko and Faraj (2005) examined why individuals in wider environment, such as NBI, share their knowledge through electronic networks of practice to others. The study defined electronic networks of practice as computer-mediated discussion forums where individuals exchange ideas on problems with others based on common interests. Researchers employed archival, network, survey and content analysis data to examine the knowledge sharing activities of members in an electronic network supporting a professional legal association. The results of their study indicate that individuals contribute their knowledge when they believe that participation enhances the professional reputation, when they have necessary expertise to share and when they become part of the structural network. An interesting finding of this study is that individuals contribute regardless of expectations of mutuality or high levels of commitment to the network.

The importance of culture for effective knowledge management is also highlighted by Janz et al's (2003) theoretical model which explains the relationships between knowledge related activities and organizational or individual characteristics that promote the creation and dissemination of knowledge throughout organization. Researchers note that knowledge flow in an organization depends on the trust in the organization as a whole as well as the specific individuals and suggest that organizations provide a climate of trust built on culture that encourages and provides incentives for sharing knowledge in all its manifestations such as learning, mentoring, collaboration, sharing ideas and stories etc.

2.6.2 TECHNOLOGICAL FACTORS

The applications of technology to KM are manifold. As such, a new class of information systems applications called knowledge management systems (KMS) have emerged. Alavi and Leidner (2001) define knowledge management systems (KMS) as "*a class of information systems applied to managing organizational knowledge. That is, they are IT-based systems developed to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer and application*". Some of the examples of KMS include knowledge repositories, knowledge networks, directories of subject matter expertise, intranets including corporate portals, group ware and collaboration tools, desktop computer conferencing and so forth.

Research has identified different determinants of knowledge sharing related the technology or the information system in use. Jarvenpaa and Staples (2000) studied the factors affecting the use of collaborative technologies such as electronic mail, World Wide Web, list serves, and other collaborative systems for sharing information in an organization. Their Findings suggest that the significant predictors of individual's use of collaborative technology for information sharing to be task characteristics, perceived information usefulness and the user's computer comfort.

Markus (2001) emphasizes the role knowledge management systems and knowledge repositories play in increasing organizational effectiveness. The researcher developed a theory of knowledge reusability by synthesizing a wide variety of sources and identified four distinct knowledge reuse situations involving different types of reusers and reuse. The four types of knowledge reusers are: shared work producers, shared work practitioners, expertise seeking novices and secondary knowledge miners. Markus asserts that each type of knowledge reuser has different needs from knowledge repositories and therefore the successful reuse of knowledge is dependent upon the quality and content of repositories.

Constant, Keisler and Sproull (1994) studied the factors that support or constrain information sharing in technologically advanced organizations. The factors they looked into are work experience, computer experience, year of training and perceptions about organizational ownership of information. The results of their laboratory studies indicate that attitudes about information sharing depend on the form of information. While sharing tangible information depend on pro-social attitudes and norms of organizational ownership, sharing expertise depends on people's own identity and self-expressive needs.

Kankanhalli, Tan and Wei (2005) investigated factors affecting electronic knowledge repositories (EKR) usage from the perspective of knowledge contributors. An interesting result of this study is that contextual factors (generalized trust, pro-sharing norms, and identification) moderate the impact of extrinsic benefits (mutuality and organizational reward) on EKR usage by contributors but not the intrinsic benefits (knowledge self-efficacy and enjoyment in helping others).Another finding of this study is that loss of knowledge power and image does not impact EKR usage by knowledge contributors.

Raafat George Saadé, Weiwei Tan, & Dennis Kira (2008), empirically examine the validity of behavioral intention's prediction on actual system usage by construction and using an integrated model which uses constructs of the two closely related theoretical paradigm namely theory of acceptance model and theory of planned behavior. (TAM and TPB) to explain user's technology acceptance. They used questionnaire to gather the system usage perceptions of students who took an online management information system (MIS) and partial least square (PLS) approach. Their finding using the data collected from 105 students showed a very good fit of the model with 60% explanation of the variances in behavioral intention. However the relationship between the intention and actual system use was found to be insignificant and weak. The finding of their study questions the validity of using self-reported intention to represent system usage and provides insight into future research directions on technology acceptance behavior.

2.6.3 KNOWLEDGE MANAGEMENT AND BUSINESS STRATEGY FACTORS

Knowledge management is a dazzling, multi-faceted, and controversially discussed concept. (Nonaka and Takeuchi, 1995).knowledge management can be defined as all the activities that utilize knowledge to accomplish the organizational objectives in order to face the environmental challenges and stay competitive in the market place. The attention and importance given to the acquisition of knowledge increased in the past years (Alavi and Leidner, 2001). Knowledge management promises to help organizations to be faster, more efficient, or more innovative than the competition. Also, the term ''management'' implies that knowledge management deals with the interactions between the organization and the environment and the ability of the organization to react and act (Maharini, 1999).

On the other Organizations aware of their knowledge resources possess a valuable, unique resource that is difficult to imitate and can be exploited to achieve a sustainable competitive advantage (Alavi and Leidner, 2001). An organization's strategy of knowledge management is not arbitrary but depends of the ''way the company serves its clients, the economics of its business, and the people it hires'' (Hansen et al., 1999), means KM depends on organizational business activities.

Accordingly, different studies suggest the need to align KM with business strategies .And IT to continuously capture, maintain, and reuse the key information, and arbitrates the strategic knowledge assets that improve business performance (Cedar, 2003). *In addition KM should not be implemented because it is just ''nice-to-have' 'Thus, it should be tightly related to objectives and business strategies of the organization or subunit of the organization* (Davenport et al., 1998; Zack, 1999).

Vera (2001) views learning as the core of a knowledge strategy. However, argues that it is not sufficient to learn something new and suggests that learning has to be aligned with the core business activities to ensure that new products, systems, procedures, and structures, are developed in line with the firm's business strategy. In her study she investigates ideal matches between business strategy and know1edge strategy and argues the greater the alignment between both strategies the better the firm's performance. Vera identifies four ideal matches, which she terms "innovative prospector,' the "lone defender,' the "exploring prospector,' and the "exploiting analyzer '.

- **Innovative Prospectors**: Prospectors have the ability to proactively find and exploit new product and market opportunities and to quickly change strategies to outperform competitors.
- **Exploring Prospectors:** These types of prospectors have limited resources and pursue more focused approaches to business strategy by offering fewer but very innovative products and services.
- **Lone Defenders:** Defenders emphasize a limited number of products and services at a more narrowly defined market, and offer higher product and service quality or lower prices to defend their current market position against competitors.
- **Exploiting Analyzers:** Analyzers combine elements of both prospectors and defenders. They pursue an advanced differentiation or cost leadership business strategies. Analyzers focus on a defined scope of products and services offered to customers.

According to Jones (2002), technology-focused knowledge management solutions offer little more than the implementation of groupware and documentation management. In his study, he recommends that knowledge strategies have to focus on knowledge resource development to support the firm's business strategy. Firms need to identify, which knowledge supports best strategic business goals. Jones (2002) argues that knowledge strategy follows business strategy and technology follows both. Furthermore, Jones identifies three strategic domains firms typically engage a) growth and value b) operational effectiveness and c) customer intimacy. Within these strategic domains, firms pursue a number of strategic

relevant core business and knowledge activities to achieve defined corporate goals. The possible relationships of these activities are graphically represented in table 2.3.

Table 2.3: Domains of Knowledge Strategy and Business Strategy

	Growth & Value	Operational Effectiveness	Customer Intimacy
Knowledge Strategy	• Product Innovation • Process Innovation • Intellectual Capital	• Process innovation • Knowledge sharing • Developing knowledge Culture	• Product Innovation • Customer knowledge • Integration • Branding Knowledge
Business Strategy	• Product sales • Time to money • Distribution networks • Pricing strategy • Patent and product leverage	• Process Streaming • Supply chain management • Accounting and finance	• Customer relation • Customer product needs • Revenue growth • Partnering /Alliance

***Source**: jones (2002)*

Zack (1999) recommends firms to align knowledge management with firm strategy. He argues firms have to map their organizational knowledge base relative to their competitors. He classifies Ihe organizational knowledge base into core, advanced, and innovative knowledge. Zack (1999, p. 136) suggests firms to perform a gap analysis using the SWOT framework to identify opportunities and threats, which refers to '."What the firm must know'· and strength and weaknesses "what the firm can do. See [Fig: 2.3]. According to Zack, the K-SWOT analysis helps managers to identify critical knowledge resources that can be exploited and knowledge that needs to be developed to maintain or grow its competitive market position.

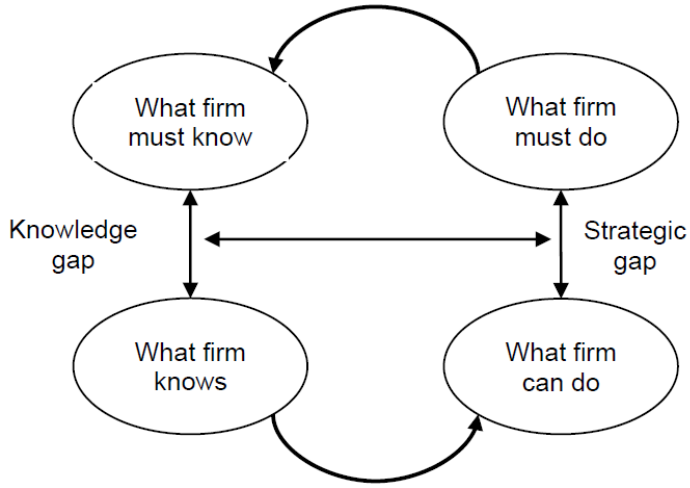


Fig: 2.3: Approach to perform gap analysis

***Source**: zack (1999, p. 136)*

Consequently, the literature like to underline the need to evaluate and understand determinant factors that create gap or the lack of matching between business and KM strategies to succeed in knowledge management as well as knowledge sharing initiatives of organizations. Furthermore implementing the appropriate KM strategy through careful analysis and understanding of the business needs and its relation to knowledge management helps in improving business performance. In addition organizations must be aware of their knowledge resources since it is essential to achieve efficient product development or innovation excellence.

2.7 SUMMERY

After reviewing different research's related to this study general objective which is identifying major determinant factors of individuals knowledge sharing behavior for NBI .The study like to underline that the focus for the successful knowledge-sharing effort is beyond simply transferring a specific knowledge from the source to the recipient. Instead, related factors such as individuals, organizational, technological and KM – Business strategic needs to be given strong emphasis.

Accordingly, any evaluations of the knowledge-sharing efforts need to incorporate assessments individuals' behavior, evaluation of organizational environment for establishing and managing appropriate administrative structures and exploration of technological factors. In addition facilitating the transfer of the knowledge and understanding the strategic gaps that may exist between the organization business and KM strategies. Moreover special attention need to be given to organizational learning, since it are a preeminent tool to improve the capability of individuals to efficiently involve in a given KS activity and learn about essential knowledge resources of the organization. Furthermore organizations need to develop extensive, deep, friendly relationships between the parties so as to bridge any relational distances through creating socialization means like staff retrets,knowledge transfer meetings and workshop's. Furthermore having the appropriate KM system or information system in place is important, because it provides the platform to capture, codify and share knowledge efficiently.

2.8 SUMMERY OF RELATED WORKS

The study also reviewed different studies related to individuals, organizational, and technological factors of the actual knowledge sharing behavior of individuals. Table 2.4 below summarize some of the related studies reviewed.

Table 2.4: Related works

Title	Author	Method used	Objective	Key Findings
Determinants of Knowledge Sharing Behavior,	Elham Aliakbar, Rosman Bin Md Yusoff and Nik Hasnaa Nik Mahmoud. (2012).	• Review the previous researches and Theories used to understand individuals KS behavior.	• To find out the most important factors which influence KS behavior. • Identify how various examined factors influence knowledge sharing behavior. • Point out how different perspectives could correctly formulate the knowledge sharing behavior.	The need of more profound studies related to social capital theory since it is a significant issue affecting KS behavior. Considering different cultural characteristics and economical situations, recommends the need to conduct more investigations in areas like middle East and African countries. Identifying important theories and conceptual models which are vastly used and critical to understand human behavior, such as SET, TRA, TPB and TAM.
Knowledge Management in a Research organization: International Livestock Research Institute (ILRI)	Ezra ondari-Okemwa (2006)	• Intensive face-to-face interviews, • literature review and a critical analysis and synthesis of the available KM/KS/knowledge creation and transfer materials and • Observation.	• To identify how a non-profit research organization may build its internal knowledge base; • To dispel the view that knowledge management is only possible in knowledge-based economies of the developed regions; • To demonstrate that good knowledge management practices are possible in a non-profit research organization and to establish the nature of the critical challenges of establishing and running a successful knowledge management programme in a non-profit research organization environment.	Proves that : • ILRI KM programme stands out as a good example of the best practices that may be emulated in sub-Saharan Africa. • KM challenges of ILRI are adaptive, flexible and minimized by adjusting to the environments in which it operates. • ILRI demonstrates that IT is only one of the tools which support efficient knowledge management. • Having suitable environment for knowledge Management initiatives is important for its success. Such as socialization mean's like group training, internal / external collaborative relationships,

Inter- and Intra-Organizational Barriers to Sharing Knowledge in the Extended Supply-Chain	Richard J Barson, Gillian Foster, Thomas Struck, Svetan Ratchev, Kulwant Pawar, Frithjof Weber, and Michael Wunram. (2000)	• literature review • Case studies done in industrial companies.	The major objective was to outline barriers to knowledge sharing.	• Majority of KS barriers are concerned with people issues. • More emphasis should be given to on how to best enable people to participate in knowledge sharing than on technological solutions. • More emphasis should be given to • How can people be encouraged to share? • How can trust be established between collaborating organizations? • How can cultural barriers be overcome? • How can fear be replaced by enthusiasm?
Three-dozen knowledge-sharing barriers managers must consider	Andreas Riege,(2005)	Detailed review of current KM and related literatures	To Offer a more comprehensive and structured starting-point for senior managers when auditing their organization's current knowledge base and knowledge-sharing requirements.	The finding of this study is extensive list of potential individual, organizational and technological knowledge sharing barriers.
Motivations and barriers to participate in virtual KS community of practice.(in multi-national organization)	Alexander Ardichvili; Vaughn Page; Tim Wentling (2003).	• Interview • Document analysis • Observation. • Selection of CoP using purposive sampling approach. (qualitative Case Study design)	To identify motivations and barriers to employee participation in Virtual CoP.	The study indicates that when employees enable to view knowledge as a public good belonging to the whole organization, knowledge sharing will be a success or knowledge will flow easily. An organization trying to create a network of efficient virtual Community of knowledge sharing would need to create a supportive environment such as • Norms promoting institution based trust, • Multiple Face-to-face CoP, which provides a foundation for knowledge based trust. • A set of clearly communicated norms and standards for knowledge sharing.
Why Share Knowledge? The Influence of ICT on the Motivation for Knowledge Sharing	Paul Hendriks (1999)	• Survey questionnaire. • Research conceptual model	To answer the question : How do information systems, and more particularly information and communication technology (ICT), relate to the motivation for knowledge sharing?	Points out improving knowledge sharing is not the same as stimulating knowledge-sharing behavior .Understanding the motivation factors of knowledge sharing is a first, essential step towards understanding how knowledge sharing can be managed and ICT can be an important instrument in this respect. Suggests ," ICT can make a difference for KS and Understanding what this difference will be cannot be learned by looking at the technology only" Identifies three points that relates ICT and KS or KS management. 1. The role of ICT for knowledge sharing can only be fully understood if it is related to the KS, and not just to maintenance factors. 2. The role of ICT and its role as motivation to KS should be identified and studied since it may vary under different concepts. 3. Other factors, such as personal preferences and a knowledge sharing culture should be considered explicitly.

3 METHODOLOGY

3.1 OVERVIEW

The research method is the heart of a research because it helps researchers to decide how they are going to achieve their stated objectives, what new data they need in order to shed light on the problem they are going to address and how they are going to collect data and process the data. Therefore, it needs much attention on choosing the appropriate methods which can provide the desired or expected outputs.

Mixed and action research methodologies are the most popular forms of research methods where both the quantitative and qualitative research methods are integrated in order to get a bigger and better picture (Christ, Thomas 2013). Accordingly the study selected mixed research method to capture the most relevant information through applying both qualitative and quantitative research methods.

3.2 STUDY AREA

The general objectives of NBI are targeted to poverty eradication and economic integration of the riparian countries by developing the common water resources of the basin through efficient water management, cooperation between member states seeking win-win gains and maintaining prosperity, security and peace for all its peoples.

Nile basin initiative (NBI) is selected for the research because there is a huge volume of important knowledge or information available within the wide region of NBI which needs to be efficiently captured, codified and shared for the realization of the shared Vision of those riparian countries. In addition proficient identification of the determinants of knowledge sharing is important to the success of significant effort that NBI has taken to advance its information systems, reinforce internally and externally focused knowledge-sharing activities realizing the importance of proper understanding and management of knowledge resources. The other reason NBI is selected for this research is due to the broad environment it covers, there are potential KS barriers related to social, cultural, economic, organizational and political that needs to be clearly identified and studied to the success of knowledge sharing (KS) as well as knowledge management (KM) efforts as a whole.

3.3 STUDY DESIGN

Researchers can use different types of design depending on the type of problem, the knowledge already available about the problem and the resources available for the study. Accordingly, the study used a mixed research approach where both quantitative and qualitative research designs are applied. Mixed methodology was selected basically to gather all the relevant insights that might support each other which is important in maximizing the reliability of findings. Furthermore to increases the validity or accuracy of findings by examining the same study area in different ways and gain better /greater understanding of findings.

For the quantitative method web based self-administered questionnaires are used whereas for the qualitative data collection methods including interview, observation and document analysis were used.

3.4 STUDY POPULATION

In NBI there are a total of 139 employees working for the three centers, namely Nile SEC, ENTRO, and NELSAP-CU as permanent staff which includes support staff and regional/national consultants and professionals.

The population of the study consists all of the permanent employees in order to get detailed and relevant information about the knowledge sharing behavior at the individual as well as organizational level. In addition 41 NBI stake holders like national focal points at the ministry of water and those professional who closely work with NBI such as senior staffs at the water resource ministries, water resource specialists/professors at different universities throughout the NBI region and different consultants/interns are included.

3.4.1 SAMPLE SELECTION

The sample population for quantitative study was determined from the categories of office workers like water resources study unit, project planning and monitoring and development, Human resource management, finance and ICT workers who are permanent workers with minimum educational qualification of diploma as an inclusion criteria ,since this individuals are

the one who involved in the creation ,development and exchange of knowledge , they could provide us with the more reliable informations.Inadditions for those individuals or stakeholders of NBI who are not direct employees, more than one year close work relation with NBI is used as an inclusion criteria because the reliability of information is in question for those with less than one year experience with NBI.

3.5 SAMPLE SIZE

The study used sampling to select those respondents who satisfy the inclusion criteria set to maximize the reliability of information provided by respondents. The URL to the web where the questionnaires designed was sent through email. A total of 180 surveys were distributed which includes the 139 permanent employees of NBI and 41 reachable NBI stake holders. A total of 120 questionnaires were returned; of which 17 incompletes and not complied with the inclusion criteria of the sampling were discarded. The final numbers of usable questionnaires were 103 .The overall response rate of the survey was 66.67 %.Which is greater than the acceptable good (60%) response rate for online administered surveys according to instructional assessment resource (IAR) of the University of Texas at Austin (2007).

Furthermore 15 senior employees, who are at the management level and highly involved in decision making as well as knowledge management issues, were selected for an interview. In addition KM related activities and documents with in the three centers were observed and analyzed as part of the qualitative research method employed.

3.6 DATA COLLECTION PROCEDURE

3.6.1 QUANTITATIVE DATA

Data collection for this study began on second week of February, 2014, and ended in the last week of March 2014.The primary data for the research was gathered by using a web based self-administered survey questionnaire. The questionnaire was divided into two parts namely part 1 and part 2.

- **Part 1**: comprised 60 questions organized in to 11 constructs are designed to ascertain the views of the employees and stakeholders of NBI on the significance of knowledge sharing, strategies to encourage knowledge sharing, identify the barriers in knowledge sharing, use and challenges related to information technology infrastructures, to identify knowledge sharing behaviors and intentions of individuals and identify individuals view of their social network, trust and common goal.
- **Part2**: comprised questions eliciting demographic characteristics of respondents.

A five point Likert scale was used and the respondents were required to state the extent to which they agreed or disagreed with the statements in the questionnaire part 1. (Refer Annex- I).

3.6.2 QUALITATIVE DATA

Qualitative data were also collected using unstructured interview to 15 professionals such as Regional project coordinators, water resource specialists,Monitring and evaluation experts ,IT/GIS specialists,etc.The interview questions were designed to capture the views of those individuals according to the constructs identified which are important for the context of the study(Refer Annex-II). In addition review of KM strategic and other related documents is also used to gather secondary qualitative data important for the research context.

3.7 VALIDITY AND RELIABILITY OF DATA

Validity is concerned with the extent that a scale accurately represents the construct of interest. Where possible this should be supported by past research and consideration given to the practical things that affect the research (Hair et al., 1998). Accordingly the research adopted categories of constructs of the research questions from Wing S. Chow *, Lai SheungChan (2008) with some modification and addition to address research objectives. [See: Table 3.2].Wing S. Chow *, Lai SheungChan (2008) by using Confirmatory factor analysis model and theory of reasoned action (TRA) concepts to test their hypotheses about the relationships between the adopted categories of constructs, provides an empirical evidence about the influence of a social network, social trust, and shared goals on employees' intention to share knowledge. Their study offers insights to practitioners on the value of social capital and reasons why people are or are not willing to engage in knowledge sharing within an organization.

Furthermore to provide with a conceptual model for explaining, predicating and studding the knowledge sharing behavior of individuals theory of planned behavior (TPB) of Ajzen (1991) was adopted.TPB is a popular social-psychological model for explaining and predicting human behavior in a specific context. Accordingly a new construct named perceived behavioral control is incorporated which is based on the validated scales developed by Taylor and Todd (1995).In addition the survey uses other constructs [See Table :3.2] which model behavioral ,normative and control beliefs and major determinants to individuals attitude, subjective norm and perceived behavioral control. Which includes:

- **Perceived loss of knowledge power,** adopted from Kankanhalliet al. (2005) study.
- **Perceived Organizational Incentives and benefits of knowledge sharing**, adapted from Kankanhalli et al. (2005) study.
- **Usage of tools/technology**, adopted from Teng and Song's scale for tools and technology, which was derived from DeLone and McLean's (2003) study.
- **Perceived organizational climate,** adapted from the validated instrument developed by Bock et al., (2005).

Table 3.2: Research Constructs together with their definition and number of items

Construct	Definition	Items
Social Network And Trust	The degree of contact, accessibility and willingness to vulnerable to the actions of other people.	6
Shared goal	The degree to which one has collective goals, missions and visions with other people	3
Attitude toward knowledge sharing	The degree of one's favorable or positive feeling about sharing one's knowledge	5
Subjective norm about knowledge sharing	The degree of one's perceived social pressure from important others to share or not to share one's knowledge	3
Intention to share knowledge	The degree of one's belief that one will engage in knowledge-sharing behavior	5
Perceived Loss of Knowledge Power	The degree of one's belief that one will lose his power of knowledge if engaged in knowledge sharing	4
Perceived organizational Incentives and benefits of knowledge sharing	The degree of one's expectation of organizational incentives and benefits related to sharing his knowledge	4
Perceived Behavioral Control	The degree of one's belief that it is easy or difficult to engage in the knowledge sharing behavior.	6
Usage of tools and technology	The Degree of individual's usage of, access to and availability of essential tools and technologies to knowledge sharing.	10
Perceived organizational climate.	The Degree of affiliation (perception of togetherness), innovativeness (perception that change and creativity are encouraged) and fairness (perception that organizational practices are equitable and non-arbitrary) in the organization. (Adopted from :Bock et al., (2005)	8
Knowledge sharing behavior	The Degree of individual's knowledge sharing behavior.	7

Furthermore the validity of each constructs against the research objective and NBI context was discussed with 10 participants. The feedback also led to minor modifications aimed at increasing the questionnaires validity and clarity. See, for the complete presentation of the survey instruments used.

3.7.1 CONSTRUCT MEASURES

The measures used to operationalize constructs were generated based upon previously validated instruments (Ajzen, 1991; Bock et al, 2005; Taylor and Todd, 1995; Kankanhalli et al., 2005; DeLone and McLean's, 2003; and Wing S. Chow *, Lai SheungChan, 2008).

The scale used to measure each construct had a number of items and a five point Likert scale was used to measure the degree to which they agreed or disagreed with the statement in the items. [See Table 3.3] and See (Appendix I), for the complete presentation of the survey instruments used.

Table 3.3: Research constructs and associated measurement items

No	Construct	Items
1	Social Network And Trust**(SN)**	**SN-1**.In general, I have a very good relationship with my organizational members and related NBI stake holders
		SN-2.In general, I am very close to my organizational members and related NBI stake holders.
		SN-3.I always hold a lengthy discussion with my organizational members and related NBI stake holders.
		SN-4.I know my organizational members will always try and help me out if I get into difficulties
		SN-5.I can always trust my organizational members to lend me a hand if I need it
		SN-6.I can always rely on my organizational members to make my job easier
2	Shared Goals**(SG)**	**SG-1**.My organizational members and I always agree on what is important at work,
		SG-2. My organizational members and I always share the same ambitions and vision at work.
		SG-3. My organizational members and I are always enthusiastic about pursing the collective goals and missions of the whole organization.
3	Attitude toward knowledge sharing**(ATT)**	**AT-1**.Sharing of my knowledge with organizational members is always good
		AT-2. Sharing of my knowledge with organizational members is always beneficial
		AT-3. Sharing of my knowledge with organizational members is always an enjoyable experience
		AT-4. Sharing of my knowledge with organizational members is always valuable to me
		AT-5. Sharing of my knowledge with organizational members is always a wise move
4	Subjective norm about knowledge sharing**(SNK)**	**SU-1**.My chief executive officer (CEO) always thinks that I should share my knowledge with other members in the organization.
		SU-2. My boss always thinks that I should share my knowledge with other members in the organization.
		SU-3. My colleagues always think that I should share my knowledge with other members in the organization.
5	Intention towards sharing knowledge**(INS)**	**IN-1**.I will share my work reports and official documents with my organizational members more frequently in the future.
		IN-2.I will always share my manuals, methodologies and models with my organizational members in the future.
		IN-3.I will always share my experience or know-how from work with my organizational members in the future.
		IN-4.I will always share my know-where or know-whom at the request of my organizational members.
		IN-5.I will always try to share my expertise obtained from education and training with my organizational members in a more effective way.
6	Usage of tools and technology**(UTT)**	**UT-1**.Whenever I want to share knowledge, I can easily access tools and technology in our organization
		UT-2.I am satisfied with the overall quality of tools and technology for sharing knowledge in our organization
		UT-3.I hesitate to use tools and technology to share knowledge for fear of making mistakes
		UT-4. Tools and technology for sharing knowledge can be customized to fit individual needs
		UT-5.I use e-mail to share knowledge with my co-workers
		UT-6.I use discussion forum (using tools like electronic bulletin board, chat room etc.) to share knowledge with my co-workers
		UT-7.I share knowledge by inputting it into knowledge repository/company databases (containing existing expertise, lessons learned, best practices etc.)
		UT-8.I use intranet (including corporate portal) to share knowledge with my co-workers
		UT-9.I use video and teleconferencing to share knowledge with my co-workers.
		UTT-10.I share knowledge through face-to-face discussions with my coworkers

7	Perceived Loss of Knowledge Power**(LK)**	**LK-1**.Sharing knowledge with my co-workers makes me lose my unique value in the organization.
		LK-2. Sharing knowledge with my co-workers makes me lose my power base in the organization.
		LK-3. When I share knowledge with my co-workers, I believe I will lose my knowledge that no one else has.
		LK-4. Sharing knowledge with my co-workers makes me lose my knowledge that makes me stand out with respect to others.
8	Perceived Organizational Incentives and benefits of knowledge sharing**(IB)**	**IB-1.** Sharing knowledge with my co-workers improves the likelihood of getting a better work assignment or promotion for me.
		IB-2. Sharing knowledge with my co-workers improves the likelihood of getting a higher salary or bonus for me.
		IB-3. I expect to get more job security when I share knowledge with my co-workers.
		IB-4. When I share knowledge with my co-workers, I believe that my queries for knowledge will be answered in the future.
9	Perceived Behavioral Control**(PBC)**	**PBC-1**. I have enough time available to share knowledge with my co-workers
		PBC-2.I have the necessary tools to share knowledge with my co-workers.
		PBC-3.I have the ability to share knowledge with my co-workers.
		PBC-4. Sharing knowledge with my co-workers is within my control.
		PBC-5.I am able to share knowledge with my co-workers easily.
		PBC-6. Even if I wanted to share, I do not have the means to share knowledge.
10	Perceived organizational climate**(OC)**	**POC-1**.Members in our department keep close ties with each other.
		POC-2. Members in our department consider other members standpoint highly.
		POC-3. Our department encourages suggesting ideas for new opportunities.
		POC-4. Our department puts much value on taking risks even if that turns out to be a failure.
		POC-5. Our department encourages finding new methods to perform a task
		POC-6. In our department, objectives which are given to us are reasonable.
		POC-7. In our department, our boss doesn't show favoritism to anyone
		POC-8. Members in our department can trust department head's judgment to be good.
11	Knowledge sharing behavior**(KSB)**	**KSB-1**.I shared factual knowledge (know-what) from work with my coworkers.
		KSB-2.I shared business knowledge about the customers, products, suppliers and new technology with my co-workers.
		KSB-3.I shared internal reports and other official documents with my coworkers
		KSB-4.I shared work experiences with my co-workers.
		KSB-5.I shared know-how or tricks of the trade from work with my coworkers.
		KSB-6.I shared expertise from education or training with my co-workers.
		KSB-7.I shared know-why knowledge from work with my co-workers

A comprehensive survey instrument was constructed using the adopted constructs and measurement Items to test the research conceptual model.The questionnaire is well designed, clear and applicable. Though the questions are adapted fromWing S. Chow *, Lai SheungChan (2008),Bock, Zmud, Kim and Lee (2005),Kankanhalliet al. (2005),DeLone and McLean's (2003) andTaylor and Todd (1995) some modifications and contextualization are made in order to meet research context. A five point Likert scale was used and the respondents were required to state the extent to which they agreed or disagreed with the statements in the questionnaire. The questionnaire was also circulated and pre-tested by 5 senior permanent employees of NBI to determine the understandability of the items included in the questionnaire (See Appendix-I).Thus improvement and modification including rephrasing and rewording were done based on the feedback obtained since limitations can lead to wrong interpretation of the results of the survey.

3.8 RESEARCH CONCEPTUAL MODEL AND HYPOTHESIS

The focus of this section is to develop a conceptual research measurement model and the hypothesis for examining the factors influencing knowledge sharing behaviors in knowledge based organization context such as NBI. This study adopts the theory of planned behavior (TPB) as theoretical framework to model knowledge sharing behaviors.

3.8.1 THEORY OF PLANNED BEHAVIOR (TPB)

TPB of Ajzen (1991) is the most influential and popular social-psychological model for explaining and predicting human behavior in specific contexts (Ajzen, 2001) and it is an extension of the researcher's earlier work Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980).

The extension was a result of a finding that behavior appeared to be not 100% voluntary and under control and resulted in the introduction of a new determinant, perceived behavioral control. With this introduction, the theory was named theory of planned behavior. According to TPB, the primary determinants of an individual's behavioral action are intention and perceived behavioral control (PBC).Intention in turn is a function of individual's attitude towards a behavior , subjective norm and perceived behavioral control (PBC) with each determinant weighted for its significance in relation to the behavior and population in question .

According to TPB, Attitude is based on behavioral beliefs, which are beliefs about the expected consequences of a specified behavior and the favorable or unfavorable evaluation of these consequences. Subjective Norm is based on normative beliefs about the perceived social pressure from important referent group to perform or not to perform a specified behavior.in addition Perceived Behavioral Control (PBC) is based on control beliefs about the perceived presence or absence of factors that may facilitate or impede the performance of behavior in interest. Control beliefs together with the perceived power of each factor determine perceived behavioral control (PBC). PBC boosts intention because individuals are not motivated to undertake tasks at which they fail. Additionally, PBC is also expected to influence actual behavior. Fig: 3.1 presents the components of the theory of planned behavior.

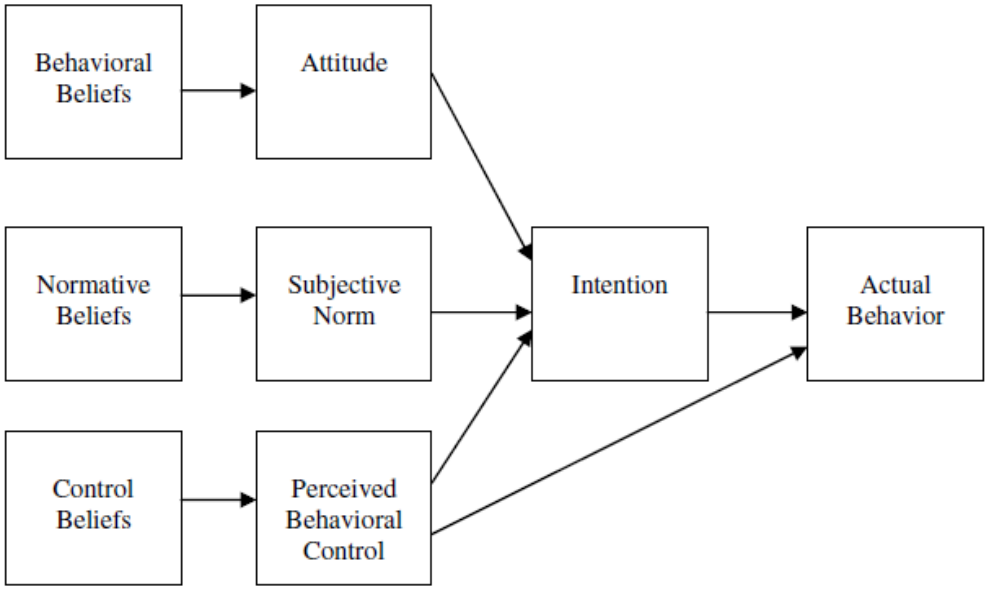


Fig 3.1 Components of the theory of planned behavior, Source: Ajzen (1991)

3.8.2 RESEARCH MODEL

The research model uses theory of planned behavior (TPB) as theoretical framework and supplements it with the constructs fromWing S. Chow *, Lai SheungChan (2008) theory and adopting other important constructs from literature to meet research objectives as well as to analyze the motivational factors that influence knowledge sharing behaviors of individuals. [Fig: 3.2] presents the conceptual research model of this study.

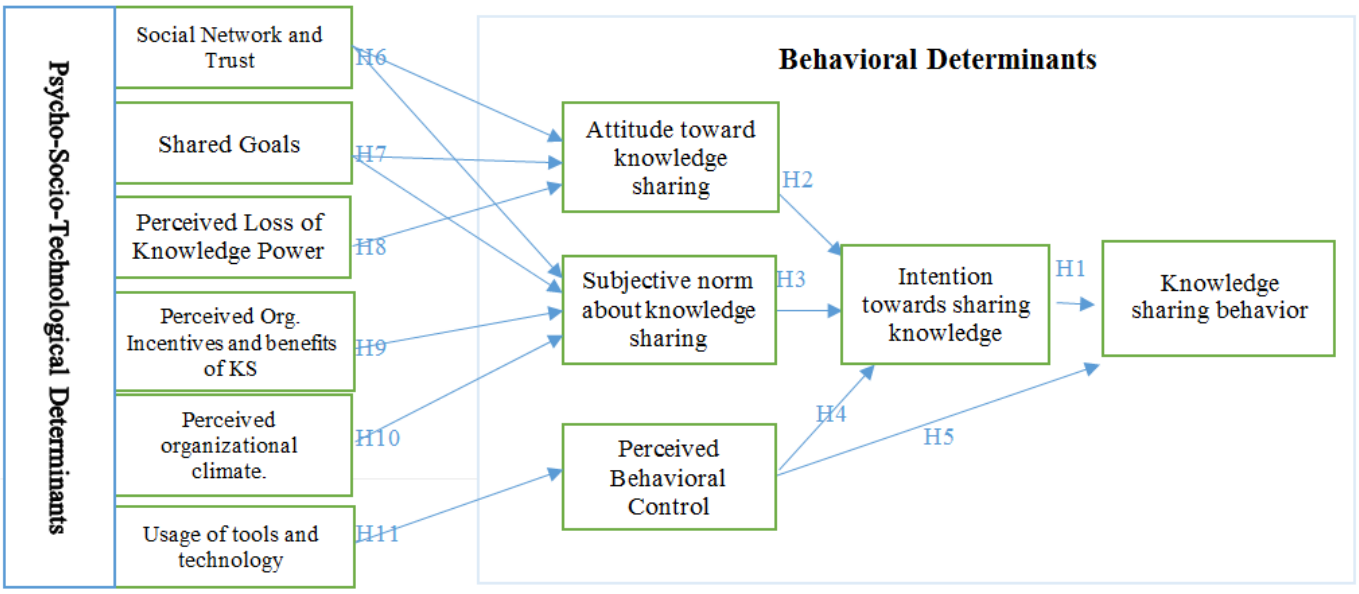


Fig 3.2: Research conceptual model based on TPB of Ajzen (1991)

As presented on the above graphical description, the conceptual model contains 11 constructs integrated with reflexive indicators, where changes in the construct are expected to be manifested in changes in all of its indicators.in other words indicators depends on the latent variable and should be highly/positively correlated. The conceptual model has got two major components. The first one, models external factors to the actual human behavior namely behavioral beliefs, normative beliefs and control beliefs modeled on the original TPB of Ajzen(see fig: 3.1).The study uses six latent constructs for explaining and predicting external psychological ,social and technological dimensions towards the actual knowledge sharing behavior of individuals.

The second part models the actual knowledge sharing behavior of individuals based on TPB. In addition the conceptual model represents the relationship between behavioral determinants and other external factors depicted as psych-socio-technological determinants. The values H1 – H11 represented the hypothesized relationships in the following section (3.8.3).

3.8.3 RESEARCH HYPOTHESIS

To examine the research model, the following 11hypothesis are proposed which demonstrates the relationships between the identified constructs as well as their impacts towards the overall knowledge sharing behavior of individuals.

- **H1**: *A higher level of intention towards knowledge sharing will lead to greater sharing of knowledge.*
- **H2:** *A more favorable attitude toward knowledge sharing will lead to greater intention to share knowledge.*
- **H3**: *A higher level of subjective norm supportive of knowledge sharing will lead to greater intention to share knowledge.*
- **H4:** *A higher level of behavioral control towards knowledge sharing will lead to greater intention to share knowledge.*
- **H5:** *A higher level of behavioral control towards knowledge sharing will lead to greater sharing of knowledge.*
- **H6:** *The greater the social network and trust among organizational members, the more favorable will be the attitude and subjective norm toward knowledge sharing.*
- **H7:** *The greater the shared goals among organizational members, the more favorable will be the attitude and subjective norm toward knowledge sharing.*
- **H8:** *Perceived loss of knowledge power has a negative effect on the knowledge worker's attitude towards knowledge sharing.*
- **H9:** *Perceived Organizational Incentives and benefits have positive effect on the knowledge worker's attitude towards knowledge sharing.*
- **H10:** *Tools and Technology have a positive effect on knowledge worker's perceived behavioral control towards knowledge sharing.*
- **H11:** *A* **higher** *level of perceived organizational climate characterized by fairness, innovativeness and affiliation will lead to greater subjective norm to share knowledge.*

3.9 DATA ANALYSIS PROCEDURE

As recommended by Hair et al., (1998), the current study used two-stage model building process for analyzing data. *Assessment of the measurement model* was conducted in the first stage of the analysis followed by the *examination of structural relationships* of research constructs proposed on the research hypothesis. The study also used *line-by-line open coding* techniques for the analysis of qualitative data gathered to explore findings relevant to support the proposed conceptual model.

This research study chose Partial Least Squares (PLS) as the primary data analysis technique.(PLS) is *a latent structural equation modeling technique that assesses the psychometric properties of the cales used to measure the theoretical constructs and estimates the hypothesized relationships among the onstructs*.(Barclay et al., 1995). The main reason for this study to choose PLS over alternative structural equation modeling techniques such as LISREL, AMOS, EQS is the fact that it is prediction oriented and handles reflective type of indicators which is directly related to objective and the type of indicators (reflective indicators) of this exploratory research study, to develop an integrated model of factors that predict knowledge sharing behaviors. The other reason was the fact that PLS places minimal demands in terms of sample size. As rule of thumb for testing the research model in PLS is equal to the larger of the following two possibilities: (1) 10 times the number of indicators on the most complex formative construct (2) 10 times the largest number of independent constructs leading to an endogenous construct (Chin, 1998; Chin & Newsted, 1999).The final usable number of cases were tested against this rule of thumb and complied. Accordingly PLS Graph 3.00, academic version software was used for both model building process of the study.

The row data (quantitative) was extracted from web platform, SurveryMonkey, and prepared in *.raw format that PLS graph require for the input data, which is Plain ASCII file with the names of the variables first followed by each data case in the same order as the variables listed .PLS-Graph also requires for missing data points to be imputed a-priori or given a code such as –99,-1 etc. Otherwise an error message will occur if the number of numeric data points counted is not an even multiple of the variables listed. Accordingly missing data was replaced with -1, and finally the *.raw file was imported to modeling software for processing and analysis .In addition Bootstrap Resampling procedure with size of 200 was configured which samples with replacement from the original sample set until it reaches the maximum. As per the guidelines given in the PLS-Graph-v3 bootstrap procedure utilizes a confidence estimation procedure and resamples size of 200 tend to provide reasonable standard error estimates.

The following section discussed in detail the data analysis procedures used for both quantitative and qualitative data, respectively.

3.9.1 ASSESSMENT OF THE MEASUREMENT MODEL (QUANTITATIVE)

The measurement model specifies the relationship between the indicators and the latent construct they are intended to measure. Assessment of the measurement model requires examining two type of validities: convergent validity, and discriminant validity (Chin, 1998). Convergent validity indicates the degree to which theoretically similar constructs are highly correlated with each other. Alternatively, discriminant validity indicates the degree to which a given construct is different from other constructs. Collectively, these two validities provide some evidence regarding the goodness of fit of the measurement model.

3.9.1.1 CONVERGENT VALIDITY

Convergent validity was assessed in two ways: First by evaluating the t-values of the Outer Model Loadings and second by extracting the composite reliabilities. According to (David Geffen, 2005) Convergent validity is shown when the t-values of the Outer Model Loadings are above 1.96.The t-values of the loadings are, in essence, equivalent to t-values in least-squares regressions. Which implies that more than 50% of the variance is shared between the measurement item and its theorized construct (Barclay et al., 1995).

55 of the original 61 items had t-values of the outer model loadings greater than the recommended value of 1.96 (David Geffen, 2005).the 6 measurement items namely SG1,IB1,IB2,POC4,UT3 and UT9 are trimmed from the model since they presented t-values below the recommended. The trimmed constructs together with their weight, mean, standard error and t-statistics value are extracted from the PLS-Graph and presented on table 3.4 below.

Table 3.4: Extracted relationships between constructs and their indicators,(Outer Model Loadings)

		Weights	Mean	Standard Error	T-Statistic
SN : Social Network and Trust					
	SN1	0.2203	0.2158	0.0294	7.4826
	SN2	0.2634	0.2631	0.0328	8.0335
	SN3	0.2139	0.2157	0.0313	6.8396
	SN4	0.2793	0.2755	0.0347	8.0537
	SN5	0.1453	0.1428	0.0422	3.4421
	SN6	0.1840	0.1841	0.0488	3.7731
SG : Shared Goals					
**	SG2	0.3706	0.39	0.0716	5.175
	SG3	0.4419	0.4718	0.1138	3.8845
LK : Perceived Loss of Knowledge Power					
	LK1	0.2418	0.2457	0.0312	7.7595
	LK2	0.2825	0.2782	0.0288	9.7933
	LK3	0.2771	0.2738	0.0341	8.1309
	LK4	0.2934	0.302	0.0546	5.3768
IB :Perceived Organizational Incentives and Benefits					
**	IB1	0.6734	0.7387	0.1384	4.865
	IB4	0.5198	0.4295	0.2149	2.4187
UT :Usage of tools and technology					
**	UT1	0.2157	0.2161	0.0428	5.0453
	UT2	0.185	0.1868	0.0469	3.9459
	UT4	0.1133	0.1072	0.0544	2.0845
	UT5	0.2389	0.2441	0.0459	5.2025
	UT6	0.1953	0.185	0.0556	3.5103
	UT7	0.2335	0.2205	0.0455	5.1363
	UT8	0.1602	0.1516	0.0509	3.149
	UT10	0.3708	0.3643	0.0912	4.0663
OC : Perceived Organizational climate					
**	POC1	0.2129	0.2058	0.0487	4.3732
	POC2	0.1345	0.1237	0.0575	2.3382
	POC3	0.2879	0.2848	0.0475	6.06
	POC5	0.2159	0.2212	0.0547	3.9445
	POC6	0.188	0.1869	0.0788	2.3862
	POC7	0.1465	0.1428	0.0742	1.9745
	POC8	0.276	0.28	0.049	5.6375
ATT : Attitude Towards Knowledge sharing					
	AT1	0.2146	0.2181	0.0453	4.7379
	AT2	0.2832	0.284	0.0305	9.2901
	AT3	0.2034	0.2089	0.0399	5.0926
	AT4	0.2866	0.2841	0.0375	7.6449
	AT5	0.2427	0.2327	0.0386	6.2866
SNK : Subjective norms Towards Knowledge Sharing					
	SU1	0.4412	0.4372	0.0397	11.1225
	SU2	0.3828	0.3785	0.0407	9.395
	SU3	0.3258	0.3263	0.0658	4.9487
PBC : Perceived Behavioral Control					
	PBC1	0.1685	0.1632	0.0463	3.636
	PBC2	0.2962	0.2983	0.0291	10.1933
	PBC3	0.3177	0.3122	0.0325	9.7881
	PBC4	0.2494	0.2486	0.0458	5.4488

	PBC5	0.26	0.2532	0.0357	7.2846
	PBC6	-0.1537	-0.1577	0.0658	2.3368
INS : Intentions Toward knowledge Sharing					
	IN1	0.2114	0.2078	0.0234	9.0238
	IN2	0.2428	0.2433	0.0159	15.2835
	IN3	0.2495	0.2553	0.0217	11.5112
	IN4	0.2525	0.2534	0.0182	13.9012
	IN5	0.2651	0.2671	0.0197	13.4485
KSB : Knowledge sharing Behavior					
	KSB1	0.1665	0.1648	0.0186	8.9638
	KSB2	0.171	0.1727	0.0195	8.7911
	KSB3	0.133	0.1292	0.0225	5.9092
	KSB4	0.1887	0.1883	0.0221	8.5569
	KSB5	0.1564	0.1546	0.0149	10.5221
	KSB6	0.2202	0.2218	0.0268	8.2209
	KSB7	0.1979	0.1971	0.0141	14.0778
Constructs where insignificant indicators are trimmed**					

The second step taken to evaluate the convergent validity of measurement items was extracting the composite reliabilities. According to Nunnally et al. (1994) composite reliability values greater than 0.80 indicate good internal consistency. Consequently composite reliabilities and average variance together with number of items in each constructs of the trimmed model from the first step was extracted. [See table 3.5].As is evident from Table 3.5, the composite reliabilities range from 0.808 to 0.954 exceeding the recommended value of 0.80.

Table 3.5: Extracted composite reliabilities and average variance

	Composite Reliability	Average Variance
SN	0.891	0.578
SG	0.917	0.787
LK	0.954	0.839
IB	0.954	0.839
UT	0.808	0.313
OC	0.855	0.438
ATT	0.905	0.656
SNK	0.898	0.749
PBC	0.823	0.453
INS	0.913	0.680
KSB	0.935	0.674

3.9.1.2 DISCRIMINANT VALIDITY

Two procedures were used to assess discriminant validity (Chin, 1998; Geffen and Straub, 2005), which is the extent of one construct is different from all other constructs in the research model. The first procedure is the Analysis of the correlations of the latent variable scores with the measurement items. To establish discriminant validity, measures of a construct should be distinct and the measures should load more strongly on their theorized construct than on the other constructs in the research model. The second one is the Examination of the average variance extracted (AVE) to ensure that each construct shares larger variance with its measures than with the other latent constructs in the research model. Partial Least Squares (PLS Graph, academic version 3.0) was used to evaluate the discriminant validity.

As a rule of thumb, the square root of the AVE for an individual construct should be greater than 0.5 recommended value (Fornell and Larcker, 1981) and should be much larger than the variance shared between the construct and other constructs in the model (Chin, 1998) . AVE loading greater than 0.5 implies that the construct accounts for at least 50% of measurement variance.

Table 3.6 presents the loadings and cross loadings. Examination of the loadings and cross-loadings points out that all the measurement items load highly on their own latent construct than on other constructs.

Table 3.6: Measurement Indicator to Construct Correlation

	SN	SG	LK	IB	UT	OC	ATT	SNK	PBC	INS	KSB
SN1	**.847****	.286**	-.122	-.028	.136	.091	.353**	.395**	.440**	.366**	.369**
SN2	**.816****	.245*	-.242*	-.049	.078	.114	.411**	.496**	.419**	.402**	.314**
SN3	**.737****	.300**	-.085	.001	.157	.103	.401**	.426**	.338**	.375**	.176
SN4	**.834****	.403**	-.084	.074	.304**	.106	.419**	.548**	.549**	.339**	.340**
SN5	**.644****	.413**	-.171	-.005	.214*	-.020	.295**	.226*	.376**	.268**	.256**
SN6	**.685****	.291**	-.166	-.003	.260**	.014	.328**	.325**	.277**	.356**	.291**
SG1	.294**	**.738****	-.061	.051	.197*	.109	.200*	.185	.314**	.256**	.165
SG2	.259**	**.902****	.052	.105	.268**	.107	.185	.199*	.181	.142	.032
SG3	.270**	**.921****	-.115	.094	.134	.106	.227*	.231*	.228*	.217*	.089
LK1	-.203*	.011	**.733****	.062	.282**	.207*	-.284**	-.177	-.142	-.303**	-.198*
LK2	-.173	.013	**.716****	.064	.306**	.195*	-.277**	-.188	-.140	-.350**	-.208*
LK3	-.166	-.049	**.760****	.077	-.005	.196*	-.298**	-.183	-.194*	-.407**	-.217*
LK4	-.147	-.090	**.701****	.131	.176	.168	-.319**	-.126	-.068	-.357**	-.175
IB1	.067	.094	.340**	**.826****	.158	.335**	.186	.264**	.004	.174	.111
IB2	-.023	.148	.302**	**.646****	.238*	.370**	.032	.057	.002	-.009	.008
IB3	.021	.057	.188	**.658****	.153	.390**	.071	.246*	.021	.074	-.015
IB4	.073	.200*	.209*	**.864****	.046	.459**	.140	.203*	.042	.132	.037
UT1	.191	.127	.034	.064	**.659****	.104	.315**	.205*	.301**	.394**	.357**
UT2	.154	.203*	.032	.037	**.714****	.115	.096	.064	.262**	.143	.189
UT4	.095	.166	.236*	.161	**.619****	.350**	.095	-.039	.130	.084	.070
UT5	.124	.210*	.240*	.308**	**.712****	.282**	.045	-.018	.233*	.131	.224*
UT6	.155	.533**	.196*	.178	**.619****	.163	.126	.171	.340**	.169	.148
UT7	.079	.066	.265**	.066	**.567****	.234*	.078	-.038	.242*	.032	.132
UT8	-.020	-.053	.312**	.060	**.540****	.270**	.061	-.055	.116	.035	.080
UT9	.036	.105	.202*	.052	**.474****	.319**	.100	.091	-.008	.141	.144
UT10	.088	.138	.198*	.154	**.588****	.193	.257**	.185	.392**	.273**	.319**
POC1	.075	.282**	.292**	.324**	.010	**.838****	.173	.160	.006	.246*	.114
POC2	.113	.291**	.217*	.416**	.105	**.791****	.131	.035	.137	.210*	.060
POC3	.188	.044	.295**	.488**	.073	**.837****	.120	.146	.134	.158	.137
POC4	.004	.113	.360**	.379**	.137	**.540****	-.068	-.101	.006	.090	.086
POC5	.137	.135	.428**	.480**	.239*	**.682****	.006	.108	.132	.027	.111
POC6	.065	-.006	.373**	.436**	.270**	**.632****	.015	.058	.178	.079	.147
POC7	.181	.262**	.338**	.312**	.027	**.542****	.041	.089	-.096	.005	-.176
POC8	.099	.215*	.331**	.329**	.213*	**.664****	.157	.128	.045	.250*	.090
AT1	.521**	.043	-.180	-.162	.119	.035	**.572****	.227*	.391**	.381**	.391**
AT2	.286**	.250*	-.212*	.000	.162	.133	**.857****	.377**	.368**	.678**	.352**
AT3	.090	-.086	-.087	-.014	.116	.074	**.435****	.140	.262**	.173	.177
AT4	.233*	.124	-.255*	.127	.139	.069	**.756****	.420**	.270**	.594**	.265**
AT5	.109	.096	.082	.297**	.072	.300**	**.640****	.226*	.157	.374**	.075
SU1	.428**	.243*	-.173	.097	.081	.325**	.402**	**.840****	.249*	.348**	.165
SU2	.362**	.245*	-.083	.119	.200*	.070	.408**	**.917****	.158	.318**	.161
SU3	.212*	.063	-.081	.105	.092	.093	.357**	**.651****	.200*	.186	.304**
PBC1	.194*	.106	-.134	.086	.066	.114	.108	.145	**.388****	.187	.277**
PBC2	.379**	.250*	-.137	.074	.212*	.086	.377**	.193	**.745****	.330**	.383**
PBC3	.301**	.285**	-.191	-.020	.231*	-.001	.405**	.159	**.714****	.315**	.403**
PBC4	.400**	.299**	-.119	-.038	.454**	.111	.231*	.211*	**.703****	.242*	.325**
PBC5	.196*	.284**	-.061	-.053	.116	.024	.067	.160	**.467****	.098	.237*
PBC6	.012	.131	.115	.215*	-.293	.093	-.113	.039	**392****	-.167	-.293**

IN1	.262**	.056	-.291*	.019	.015	.121	.587**	.447**	.257**	**.695****	.355**
IN2	.264**	.005	-.275*	-.028	.094	.275**	.503**	.428**	.378**	**.656****	.384**
IN3	.344**	.046	-.292*	.073	.116	.150	.628**	.526**	.402**	**.741****	.390**
IN4	.234*	.022	-.041	.212*	.056	.327**	.457**	.406**	.322**	**.552****	.382**
IN5	.229*	-.021	-.042	.187	.086	.315**	.605**	.502**	.253**	**.651****	.362**
KSB1	.226*	.015	-.249*	-.075	.077	.003	.304**	.252*	.413**	.346**	**.783****
KSB2	.115	.047	-.054	-.127	.137	.259**	.153	.140	.374**	.197*	**.597****
KSB3	.080	-.038	-.134	-.075	.068	-.053	.237*	.163	.236*	.330**	**.648****
KSB4	.255**	.090	-.098	.032	.313**	.091	.390**	.211*	.425**	.536**	**.842****
KSB5	.018	-.007	.035	-.074	.192	.210*	.147	.017	.241*	.246*	**.594****
KSB6	.269**	.030	-.236*	-.026	.199*	.072	.458**	.179	.492**	.629**	**.803****
KSB7	.230*	.019	.165	.229*	.251*	.253**	.295**	.209*	.326**	.450**	**.763****

Table 3.7 presents the analysis of average variance extracted (AVE). As can be seen, the square root of AVE values range from 0.559 to 0.916 exceeding 0.5 recommended value. (Fornell and Larcker, 1981) That is all constructs share greater variance with their own measures than with other constructs in the model, thus establishing discriminant validity.

Table 3.7: The analysis of average variance extracted

	Average Variance(AVE)	SQRT :AVE
SN	0.578	0.760
SG	0.787	0.887
LK	0.839	0.916
IB	0.839	0.916
UT	0.313	0.559
OC	0.438	0.662
ATT	0.656	0.810
SNK	0.749	0.865
PBC	0.453	0.673
INS	0.680	0.825
KSB	0.674	0.821

3.9.2 ASSESSMENT OF THE CONCEPTUAL MODEL

After weighing and identifying the adequacy of measurement model the next step will be the Assessment of the Conceptual Model .The conceptual/structural model indicates the causal relationships among the latent constructs in the research model. Assessment of structural model was done first by determining the predictive power of the model and second by analyzing the hypothesized relationships among the latent constructs proposed in the research model. The R-square value of the dependent variables determine the predictive power of the research model and the path coefficients evaluate the strength of the hypothesized relationships.

Validation of structural model was accomplished with academic version of PLS-Graph 3.0.The model was setup in PLS as per the guidelines given in the PLS-Graph Users Guide (Chin, 2001). See [Fig: 3.3]

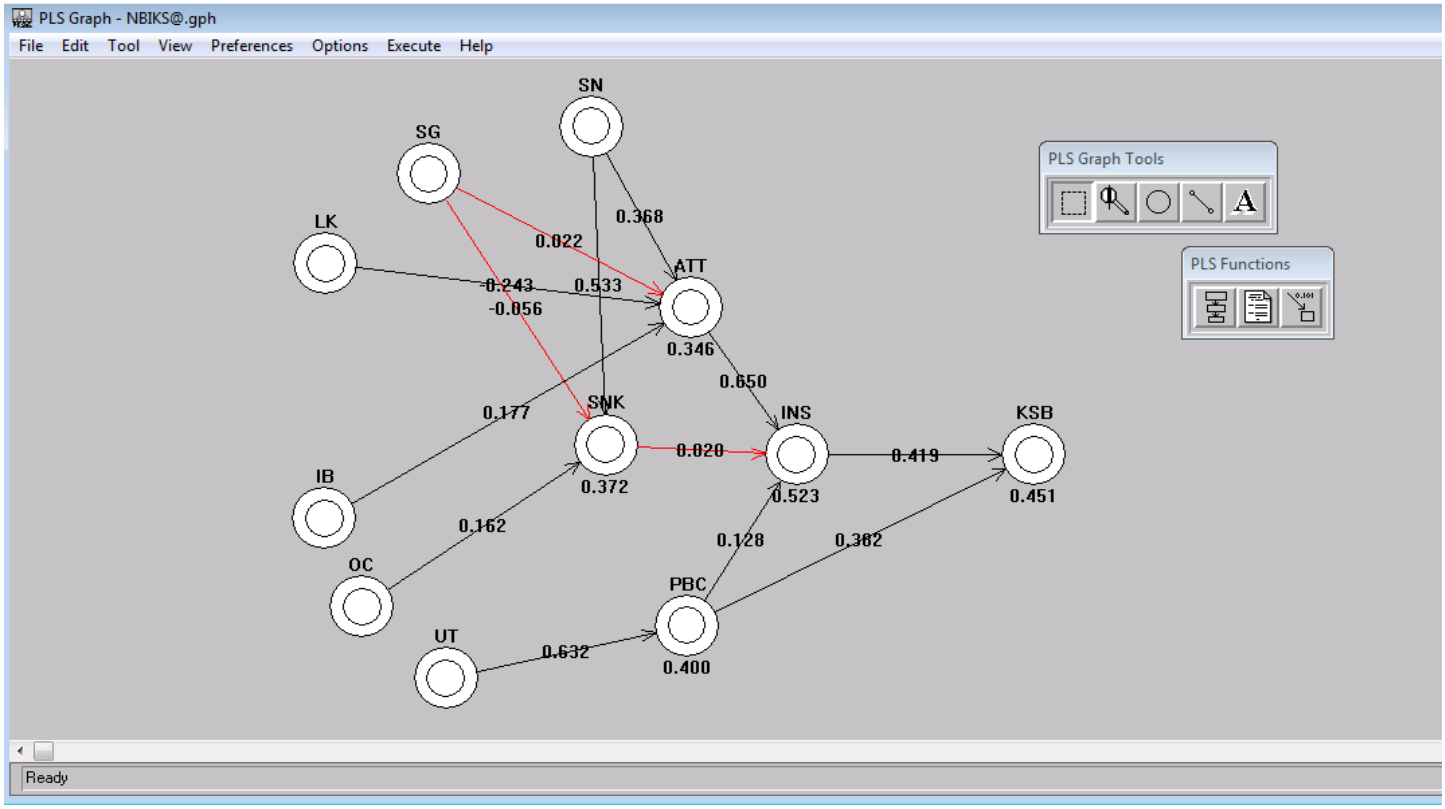


Fig 3.3: Displaying the conceptual research model constructed on PLS-Graph.

Path in red shows non-significant/Weak paths

The results of PLS-Graph and statistical analysis using SPSS and Excel (to calculate the P-value) of the conceptual model is summarized on the table 3.8 below.

Table 3.8: Summary of R-Square, Path Coefficients and Significance Levels.

Construct	R-Square	Beta Coefficient	t-Value	P-value
KSB	0.45			
INS		0.42	5.24	< 0.01
PBC		0.38	5.07	< 0.01
INS	0.52			
ATT		0.65	9.66	< 0.01
***SNK		0.12	0.22	**> 0.50**
PBC		0.13	1.86	< 0.05
ATT	0.35			
SN		0.37	4.08	< 0.01
***SG		0.02	0.24	**> 0.10**
LK		-0.24	2.23	< 0.05
IB		0.18	2.03	< 0.05
SNK	0.34			
***SG		-0.06	0.41	**> 0.10**
OC		0.16	2.25	< 0.05
SN		0.53	5.67	< 0.01
PBC	0.4			
UT		0.63	11.56	< 0.01

*** *Non-significant Path*

As is evident from table 3.8, the model has high predictive power. It explains approximately 45% of the variance in the actual knowledge sharing (KSB) and 52% of the variance in the intention to share knowledge (INS). The attitude towards knowledge sharing (ATT), subjective norm (SNK) and perceived behavioral Control (PBC) respectively account for 35%, 34% and 40% of the variance. Additionally, 9 of the 12 paths were found to be statistically significant. The standardized path coefficients ranged from 0.02 to 0.65. The overall fit of the model was good.

3.9.2.1 TESTS OF HYPOTHESIS

The results of the hypothesis tests which support 9 of the 11 posited relationships presented below.

- **H1**: *A higher level of intention towards knowledge sharing will lead to greater sharing of knowledge.*
  Supported, β= 0.42, t > 5.24, $p < 0.01$.
- **H2:** *A more favorable attitude toward knowledge sharing will lead to greater intention to share knowledge.*
  Supported, β= 0.65, t > 9.66, $p < 0.01$.
- **H3**: *A higher level of subjective norm supportive of knowledge sharing will lead to greater intention to share knowledge.*
  Not-Supported, β= 0.12, t < 0.22, $p >0.50$.
- **H4:** *A higher level of behavioral control towards knowledge sharing will lead to greater intention to share knowledge.*
  Supported, β= 0.13, t > 1.86, $p < 0.05$.
- **H5:** *A higher level of behavioral control towards knowledge sharing will lead to greater sharing of knowledge.* Supported, β= 0.38, t > 5.07, $p < 0.01$.
- **H6:** *The greater the social network and trust among organizational members, the more favorable will be the attitude and subjective norm toward knowledge sharing.* : Supported.

Towards ATT: β= 0.37, t > 4.81, $p < 0.01$
Towards SNK: β= 0.53, t > 5.67, $p < 0.01$

- **H7:** *The greater the shared goals among organizational members, the more favorable will be the attitude and subjective norm toward knowledge sharing.* Not-Supported.
  Towards ATT: β= 0.02, t <0.25, $p > 0.1$
  Towards SNK: β= -0.06, t < 0.42.67, $p > 0.1$
- **H8:** *Perceived loss of knowledge power has a negative effect on the knowledge worker's attitude towards knowledge sharing.* Supported, β= 0.38, t > 5.07, $p < 0.01$
- **H9:** *Perceived Organizational Incentives and benefits have positive effect on the knowledge worker's attitude towards knowledge sharing.*
  Supported, β= 0.18, t >2.03, $p < 0.05$
- **H10:** *Tools and Technology have a positive effect on knowledge worker's perceived behavioral control towards knowledge sharing.*
  Supported, β= 0.63, t >11.5, $p < 0.01$
- **H11:** *A higher level of perceived organizational climate characterized by fairness, innovativeness and affiliation will lead to greater subjective norm to share knowledge.*

Supported, β= 0.16, t >2.25, $p < 0.05$

Table 3.9 summarizes the results of the hypothesis testing.

Table 3.9: Summery of hypothesis testing results.

	Hypothesis	Result
H1	A higher level of intention towards knowledge sharing will lead to greater sharing of knowledge	**Supported**
H2	A more favorable attitude toward knowledge sharing will lead to greater intention to share knowledge	**Supported**
H3	A higher level of subjective norm supportive of knowledge sharing will lead to greater intention to share knowledge	**Not-Supported**
H4	A higher level of behavioral control towards knowledge sharing will lead to greater intention to share knowledge	**Supported**
H5	A higher level of behavioral control towards knowledge sharing will lead to greater sharing of knowledge.	**Supported**
H6	The greater the social network and trust among organizational members, the more favorable will be the attitude and subjective norm toward knowledge sharing	**Supported**
H7	The greater the shared goals among organizational members, the more favorable will be the attitude and subjective norm toward knowledge sharing. Not-Supported	**Not-Supported**
H8	Perceived loss of knowledge power has a negative effect on the knowledge worker's attitude towards knowledge sharing	**Supported**
H9	Perceived Organizational Incentives and benefits have positive effect on the knowledge worker's attitude towards knowledge sharing	**Supported**
H10	Tools and Technology have a positive effect on knowledge worker's perceived behavioral control towards knowledge sharing	**Supported**
H11	A higher level of perceived organizational climate characterized by fairness, innovativeness and affiliation will lead to greater subjective norm to share knowledge	**Supported**

3.9.3 ANALYSIS PROCEDURE OF QUALITATIVE DATA

The study employed a line-by-line open codding technique for the analysis of qualitative data, which was gathered to find some valuable information's to support findings from the quantitative data analysis or the proposed conceptual research model of the study. According to Bulmer H (1969); Denise F. Polit, Cheryl, Tatano Beck (2004) open coding technique consists of three parts: noticing, collecting and thinking about interesting things. Noticing refers to taking notes based on observation, recording events or interviews, gathering documents etc. , In the analysis phase, when you are going through the data you often mark important sections and add descriptive name or 'code' to it and it is called open codding. And finally the coded data is gathered or collected and used to reach in to some kind of conclusion. Even though line-by-line coding is a very time consuming, recursive and tedious work it helped to build structured conceptual data that supported findings during this explorative research study. Figure 3.4 presented workflow of qualitative data analysis technique used.

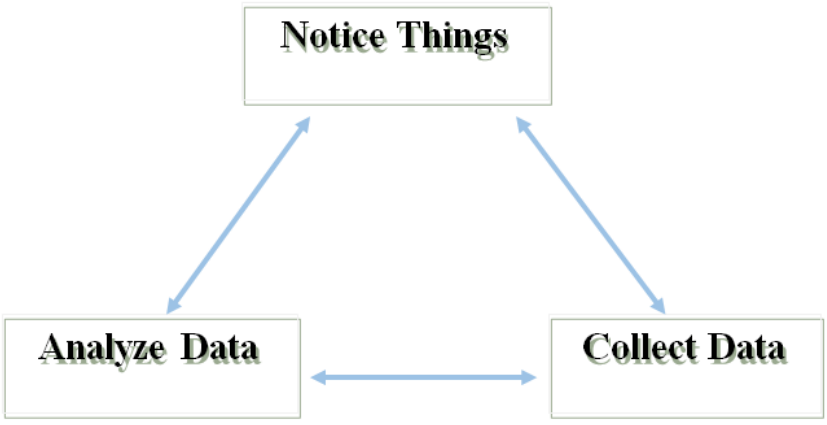


Figure 3.4: Workflow of Qualitative Data Analysis Technique used.

4 FINDINGS AND DISCUSSION OF RESULTS

This chapter discusses the results from the data analysis. First, the demographic characteristics of the survey respondents is presented. Second, the findings related to usage of tools and technology to share knowledge is reported. And finally, the results from the assessment of structural model and tests of hypothesis are analyzed and discussed.

4.1 DEMOGRAPHIC DISTRIBUTIONS OF RESPONDENTS

During the field study using survey methodology, the researcher observes from the title of the respondents that most of the respondents were knowledge worker. As Kelloway and Barling (2000) noted that knowledge work primarily "comprise the creation of knowledge, the application of knowledge, the transmission of knowledge and the acquisition of knowledge.in other words knowledge workers are those individuals who primarily deals with information or require developing and using knowledge to solve problems. Thus the researcher considers this observation as one of the strength of the study.

The respondents reported a wide range of position titles. Some of these include Regional Project Coordinator, Water Resources Engineer, Professor, Assistant Professor, national Focal Point, power engineer, Environmental Management specialist, Teaching Assistant, Monitoring & Evaluation expert, Senior Water Resources Specialist, Expert , Senior Water Resources Specialist , Professor of Hydraulics faculty , D/D for water resources management , Independent GIS Consultant, soil and water conservation zonal expert , M&E Officer , Program Manager, information systems specialist, Accountant, extension agent ,Head internal audit , Bi-lingual Secretary , NBI National Desk officer, director, national Focal Point, Program Manager, Accountant, support staff, hardware and network engineer, IT expert , Dean of College of Environmental Studies, hydrologist, Project and Programme coordinator, Intern, Senior Hydraulic Engineer, Ass.administration head ,and so on. In total, more than 40 unique position titles were reported.

The details of demographic findings, which includes gender distribution, Age distribution, educational categories and respondents organizational tenure is presented as follows.

4.1.1 GENDER DISTRIBUTION

Out of the 103 valid respondents, 87 (84%) were males and 16 (16%) were females. the gender distribution of the respondents is presented on the following fig: 4.1

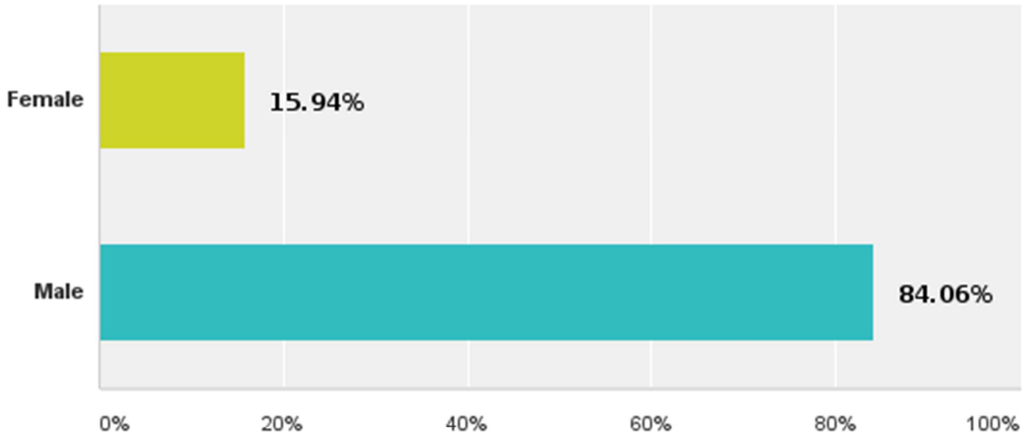


Fig: 4.1 Gender distribution of Respondents

4.1.2 AGE DISTRIBUTION

The respondent ages ranged from approximately 24 years to 65 years. 40 % were between the ages of 25 and 34; 34.85% were between ages of 35 and 44; 16.67% were between ages of 45-54 and 7.58% were between ages of 55-64. Examination

of age category indicates that the sample has slightly younger respondents. Figure 4.2 below shows a graphical depiction of the respondent age category distribution.

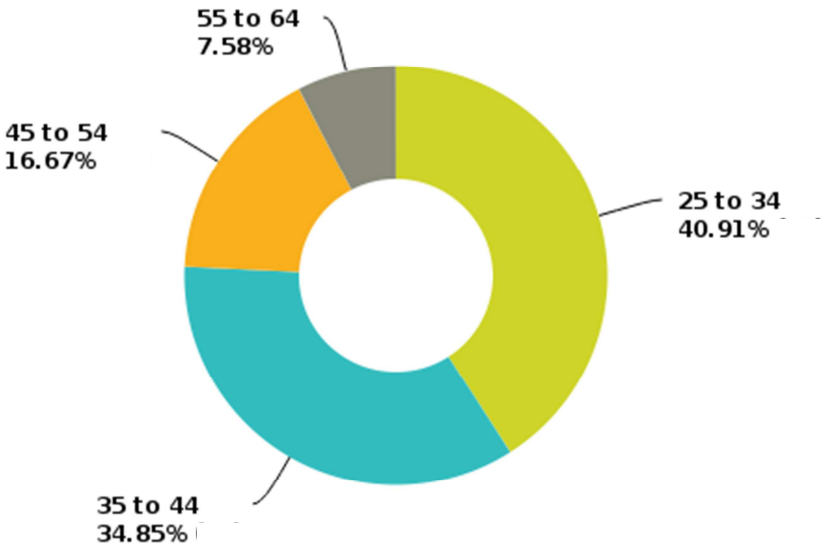


Fig: 4.2 Age distribution of respondents

4.1.3 RESPONDENTS EDUCATION LEVEL:

The majority of the respondents are well-educated .more than 60 % of respondents have Masters or doctoral degree. 38 (39 %) individuals had a bachelor's degree, 50 (45.45%) had a master's degree, 15(15.15%) had doctoral degree .Figure 4.3 below provides a graphical representation of the distribution of respondents education category.

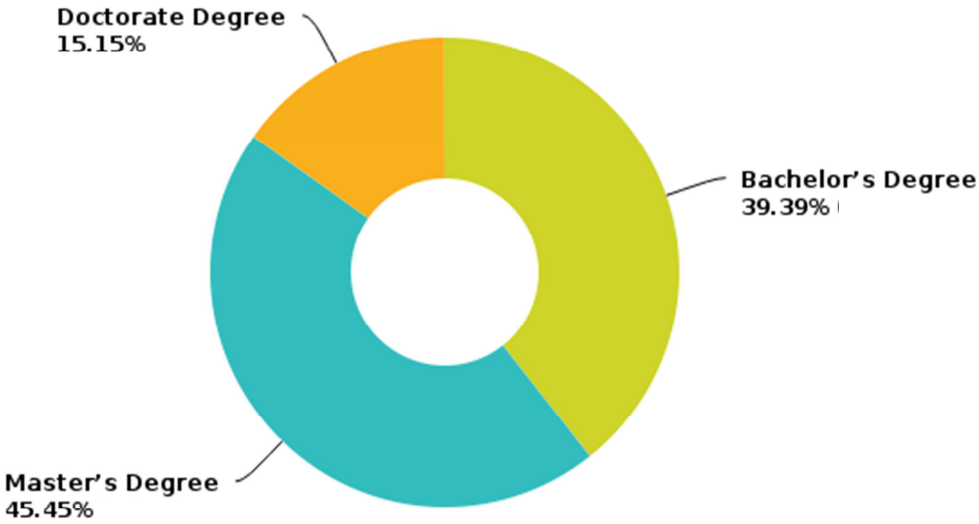


Fig: 4.3 Respondents Education by Category

4.1.4 RESPONDENTS ORGANIZATIONAL TENURE

Respondents was requested to answer for how long they work for or work with NBI and the reply ranged from less than 2 years to over 10 years.42 (43.75%)had been with the organization for 2 to 1 years , 35(35.94%) for 3 to 5 years, 16 (17.19 %) for 6 to 10 years, 2 (3.%) for over 11 years. Figure 4.4 shows respondents distribution for the organizational tenure category.

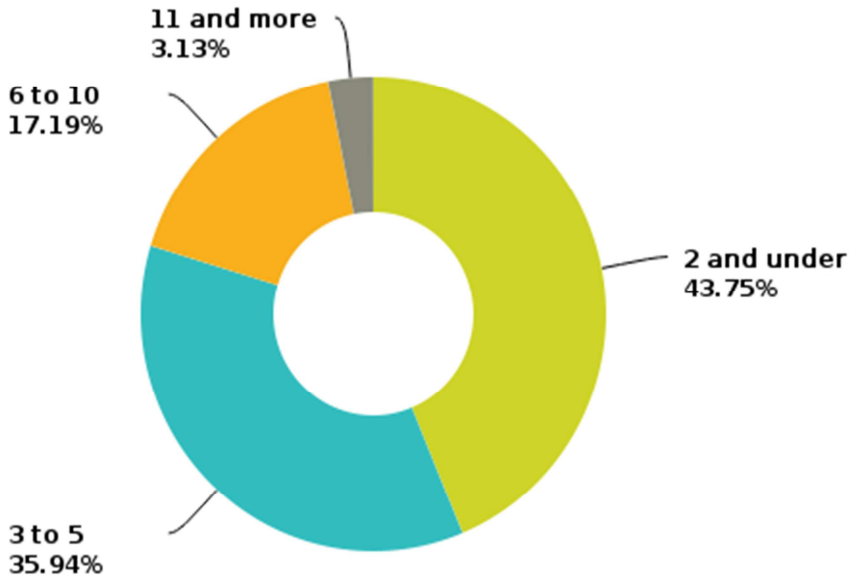


Fig: 4.4 respondents distribution for the organizational tenure category.

4.2 PRESENTATION OF THE FINDINGS

This section presents details of the findings of PLS-Graph 3.0 analysis and the findings during unstructured interviews and observations. The study identified three sets of critical factors based on the conceptual of the study: *psychological, organizational and technological* that are believed to influence the knowledge sharing behaviors. The study applied theory of planned behavior framework (TPB) (Ajzen, 1991) to investigate the impact of these factors on knowledge sharing behaviors.

- ***Psychological factors*:** Perceived organizational Incentives and benefits of knowledge sharing and perceived loss of knowledge power;
- ***Organizational factors*:** perceptions of organization's climate, social network and trust and shared goals;
- ***Technological factors:*** perceptions of organization's available tools and technology that facilitate knowledge sharing.

The findings exhibited that 9 of the 11 hypothesis theorized in the research model were supported indicating the significant predictors of knowledge sharing behaviors to be TPB components: intention towards knowledge sharing, attitude towards knowledge sharing, and perceived behavioral control towards knowledge except Subjective norms towards knowledge sharing which exhibited insignificant path towards intention of knowledge sharing when it was loading together with the other predicators.

The predictors explained about 52 percent of the variance in the behavioral intention to share knowledge and 42 percent variance in the actual knowledge sharing behavior. Fig 4.7 below presents the r-square and path coefficient value readings of the constructs and associated predicators from the PLS-Graph 3.0 analysis.

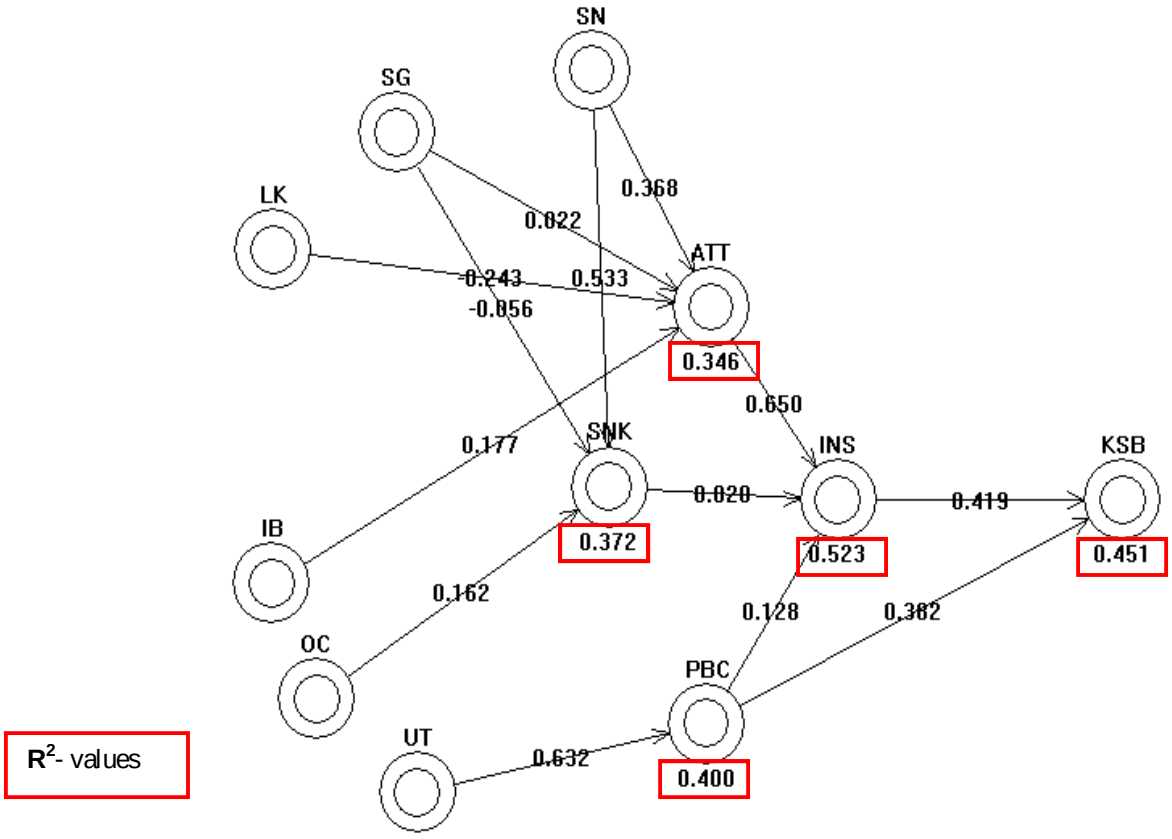


Fig 4.5: the r-square and path coefficient value readings from the PLS-Graph analysis.

The findings related to the individual predictors with respect to their hypothesized constructs are discussed in detail in the following sub sections.

4.2.1 DETERMINANTS OF KNOWLEDGE SHARING BEHAVIOR (KSB)

Following TPB, the study theorized the knowledge sharing behaviors of individuals to be collectively determined by intention towards knowledge sharing and perceived behavioral control. As theorized, intention towards knowledge sharing and perceived behavioral control emerged as a significant predictors of actual knowledge sharing behaviors. Intention towards knowledge sharing presented a significant effect on knowledge sharing behavior with a path coefficient of 0.42. Perceived behavioral control also exhibited a substantial effect on knowledge sharing behavior at 0.36 path coefficient. Collectively, intentions towards knowledge sharing and perceived behavioral control explained about 45 percent of the variance in knowledge sharing behavior of the study population examined.

4.2.2 DETERMINANTS OF KNOWLEDGE SHARING INTENTION. (INS)

According to the theory of planned behavior, the study hypothesized the predictors of knowledge sharing intention to be attitude towards knowledge sharing, subjective norm and perceived behavioral control. As hypothesized, while ATT and PBC emerged as significant predictors of intention towards knowledge sharing, which is consistent with previous TPB related research (Taylor and Todd, 1995, Bock et al., 2005), subjective norm towards knowledge sharing emerged as weak or insignificant predictors of intention towards knowledge sharing when all the factors were included in the analysis. Collectively, all the three factors explained about 52 percent of the variance in Knowledge Sharing Intention of the respondents.

Attitude towards knowledge sharing had a strong effect on the behavioral intention to share knowledge with a path coefficient of 0.65. Perceived behavioral control was also found to have significant but moderate effect on behavioral intention towards knowledge sharing with path coefficient of 0.127 and when we come to subjective norm, examination of

path analysis obtained using PLS graph show interesting results. As hypothesized, Subjective norm had a significant effect on INS while it is loading independently, with path coefficient of 0.375. However, the independent contribution of subjective norm towards intention was washed out when other Factors, attitude towards knowledge sharing and perceived behavioral control, were included in the analysis. Exhibiting weak positive effect with path coefficient of 0.02.

4.2.3 DETERMINANTS OF KNOWLEDGE SHARING ATTITUDE (ATT)

The study applied four motivational drivers, social network and trust, shared goals, perceived loss of knowledge power and perceived organizational Incentives and benefits, towards knowledge sharing attitude. Of these antecedents three of them emerged as significant predictors. Which were social network and trust, perceived loss of knowledge power and perceived organizational Incentives &benefits, collectively explaining about 35 percent of the variance in attitude towards knowledge sharing. Shared goal was found not to have a substantial impact on individual's knowledge sharing attitude.

4.2.3.1 PERCEIVED ORGANIZATIONAL INCENTIVES AND BENEFITS (IB)

The study hypothesized a positive relationship between perceived organizational incentives and individuals attitude towards knowledge sharing. As hypothesized, perceived organizational incentives and benefits presented significant but moderate effect on attitude towards knowledge sharing with path coefficient of 0.177 when all the factors were included in the analysis. But when it is loading independently gives stronger effect with path coefficient of 0.345.

4.2.3.2 SOCIAL NETWORK AND TRUST (SN)

The study hypothesized a positive relationship between social network and trust and individuals attitude towards knowledge sharing. As hypothesized, social network and trust presented strong significant effect on individual's attitude towards knowledge sharing with path coefficient of 0.438.

4.2.3.3 PERCEIVED LOSS OF KNOWLEDGE POWER (LK)

The study hypothesized a negative relationship between individual's perceived loss of knowledge power and attitude towards knowledge sharing. As hypothesized, perceived loss of knowledge power had significant negative effect on individual's attitude towards knowledge sharing with path coefficient of -0.243.

4.2.3.4 SHARED GOALS (SG)

The study hypothesized a positive relationship between individuals shared goal and attitude towards knowledge sharing. Against the hypothesis shared goal between individuals exhibited insignificant or weak effect on individual's attitude towards knowledge sharing with path coefficient reading of 0.022.

4.2.4 DETERMINANTS OF SUBJECTIVE NORMS (SNK)

The study applied three motivational drivers, which were social network & trust, shared goals and perceived organizational climate .Of these hypothesized factors while shared goal emerged as insignificant predictor of subjective norm towards knowledge sharing the other two emerged as significant predictors, collectively explaining about 37 percent of the variance in subjective norm towards knowledge sharing.

4.2.4.1 SOCIAL NETWORK & TRUST (SN)

The study hypothesized a positive relationship between social network & trust and subjective norm towards knowledge sharing. As hypothesized, social network and trust presented significant effect on individual's attitude towards knowledge sharing with path coefficient of 0.533.

4.2.4.2 PERCEIVED ORGANIZATIONAL CLIMATE (OC)

Similar to Bock et al., (2005), the study hypothesized a positive relationship between organizational climate and subjective norm towards knowledge sharing. As hypothesized perceived organizational climate emerged having positive effect on individual's perceived subjective norm towards KS presenting positive but moderate significant path coefficient of

0.162.In addition path analysis of this predicator obtained using PLS graph shows perceived organizational climate had much stronger significance while it is loading independently from social network and trust predicator, with path coefficient of 0.388.

4.2.4.3 SHARED GOALS (SG)

The study hypothesized a positive relationship between individuals shared goal and perceived subjective norms towards KS. Against the hypothesis, similar to its effect towards individuals attitude towards KS, presented weak or insignificant effect on subjective norm towards knowledge sharing with the reading of path coefficient of 0.090.

4.2.5 DETERMINANTS OF PERCEIVED BEHAVIORAL CONTROL

The study applied the usage of tools and technology for knowledge sharing as motivational factor of perceived behavioral control towards knowledge sharing. As hypothesized PBC was emerged as strong predicator, explaining about 40 percent of the variance in perceived behavioral controls.

4.2.5.1 THE USAGE OF TOOLS AND TECHNOLOGY

The study hypothesized a positive relationship between individual's usage of tools and technology for knowledge sharing and perceived behavioral control. As hypothesized usage of tools and technology presented a strong and significant effect, with path coefficient of 0.632.

Respondents usage of tools and technology to share knowledge with coworkers was measured in terms of e-mail, discussion forum (using tools like electronic bulletin board, chat room etc), knowledge repository/company databases (containing existing expertise, lessons learned, best practices etc.), intranet (including corporate portal), videoconferencing, teleconferencing and so forth. Responses were recorded along a five point frequency of usage scale ranging from 1 "Very infrequently" to 3 "Moderate Frequency (Few times per month)" to 5"Very Frequently(Many times/daily)". The mean values for the usage of various tools and technologies shows that moderate or less frequency usage except emails and face to face KS techniques. Fig 4.5. Below reports the result in detail.

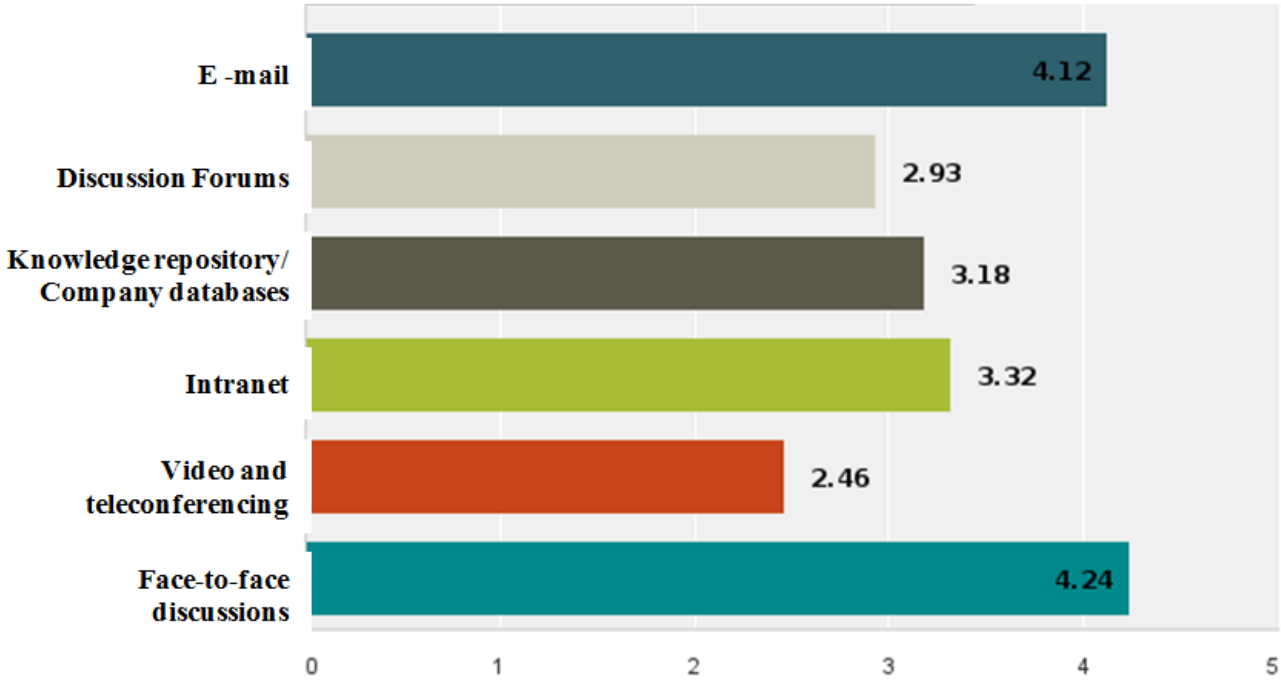


Fig: 4.6 Respondent's usage of tools and technology.

4.2.5.2 THE AVAILABILITY, ACCESSIBILITY AND USERS SATISFACTION

The availability, accessibility, and respondents satisfaction of the available ICT tools and technology was also measured using a five point degree of measure ranging from 1=Strongly Disagree, 3 = Moderate, 5= Strongly Agree. More than 70% of the respondents agreed on the easy access to the tools and technologies at moderate and above level, 41% of them replied the existence of ICT tools and techniques customizable to their needs at a moderate level, 45 % of them are also are satisfied with the available tools and techniques above moderate level and 45 % again replied that they hesitate to use tools and technologies on the fear of making mistakes at moderate and above level. The serious of histograms below on fig 4.6 reports the details of the results.

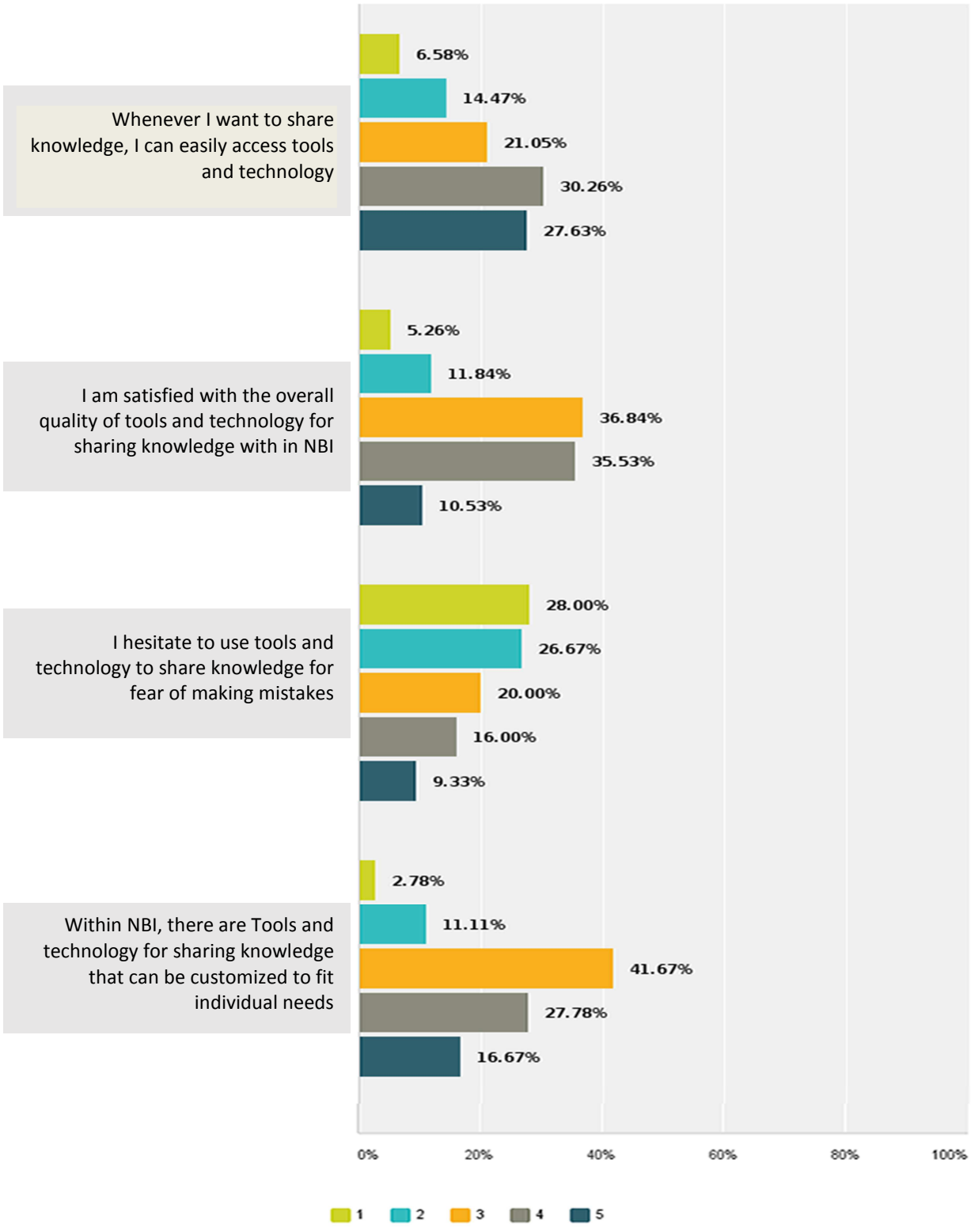


Fig: 4.7 Measurement of ICT availability, accessibility and respondents satisfaction

4.2.6 FINDINGS DURING UNSTRUCTURED INTERVIEWS, OBSERVATIONS AND DOCUMENT ANALYSIS.

The study gathered qualitative data using unstructured interviews, observations and document analysis to collect relevant information's that support findings and the conceptual model of the study. A line-by-line open codding technique and check lists was used for the analysis and the findings are summarized on table 4.1 below.

Table 4.1: Summary of findings during unstructured interviews and observations.

Code	Results	Summary of Findings
Knowledge management /Knowledge sharing activities (Achievements)	• KM/KS awareness' and activities are getting stronger and framed with international practice. • Substantial socio-economic, environmental, water resources, hydro-meteorological, data generation-management. • Development of various water resources and optimization Models and toolkits. • Development of efficient information systems (decision support system), knowledge portals, NBI websites. • Development a spatial and non-spatial data base (at single center) on which various data collected under the previous project can be organized for easy access to the user. • Partnership with eastern nile universities, Internship programs.	• The importance of knowledge management as well as knowledge sharing is clear for NBI and accordingly there are several efforts have been taken but those efforts are not centrally managed in other words there is a luck of a central point of contact to manage or make the public audience and stake holders to have access to those substantial data/information developed or generated. • There is a huge volume of essential information or knowledge available and developed but available on the hand of center specific projects.
Suggestions to strengthen KM/KS activities	• NBI has to develop all inclusive KM/KS strategy to promote knowledge sharing as well as knowledge management in the NBI countries and institutions. • More work on improving Availability of adequate and reliable data. • More work need to be done in relation to quality assurance of all existing data. • Importance of efficient ICT tool to support this activities and the need to train users on those tools to enable them full engage in.	• There is a need to develop an all-inclusive strategy of knowledge management as well as knowledge sharing to improve the availability, reliability and quality of the existing valuable information or knowledge. • NBI should give more attention on making the knowledge resources available for all through integrating the available ICT tools, training users and making those tools accessible for public domain of the NBI region.
Knowledge management/Knowledge sharing challenges	• Lack of quality assurance of all the existing data. • Lack of primary water resources, socio-economic and environmental data. • Lack of efficient dissemination of the developed and existing water resources, socio-economic and environmental data. • The available knowledge is scattered throughout the region. • Lack of essential tool that integrates all the available knowledge resources.	• Lack of primary water resources, socio-economic and environmental data is believed to be the major challenge. In addition the absence of tool or Technology to integrate the available knowledge scattered throughout the region as well as disseminate to the wider public. Furthermore quality assurance of all the existing data was found to be as another challenge of knowledge sharing.
Activities to strengthen social ties, trust and to reach out to its stakeholders.	• There are initiatives to develop an information system that enables to support stakeholder's social ties and access to the available knowledge resources. (To regularly engage and inform its Stakeholders.) • Social ties with stakeholders are maintained through networking with those civil societies (e.g. Nile Basin Discourse) and professional organizations (e.g. Nile Media Network) that have been partnering with us (e.g. NBD, NMN, Development partners, parliamentarians, women etc.). • Mode of contact includes: annual Nile Day Celebrations; Project-specific launch events including consultations, Donor Open House events, Project Disclosure, News Letters, Annual Report distributions and knowledge dissemination workshop. • Social network forum on the face book, for interns to share their experience/knowledge.	• Generally the strength of social ties found to be week due to different factors such as, institutional arrangement and Nile political interference in the system and others. With-in NBI social ties and trust is maintained through networks with civil societies, professional organizations and development partners. • And the major mode of contacts are :annual Nile Day Celebrations; Project-specific launch events including consultations, Donor Open House events, Project Disclosure, News Letters, Annual Report distributions and knowledge dissemination workshop.

Existence and use KM/KS related document or guideline	• NBI Stakeholder Involvement and Communication Strategic document. • KM strategic document for NelSAPCU and ENTRO stared to develop Knowledge Management Strategy. • Document sharing strategic document. • There is no NBI wide ,KM/KS strategic document	• There is **NO** NBI wide KM/KS strategic document but there are other documents such as: NBI Stakeholder Involvement and Communication Strategic document, Center specific KM strategic document for NelSAPCU and ENTRO, Document sharing strategic document and others which are currently being used to spells out key communication and outreach strategies to engage stakeholders, keep them informed and guide KM/KS activities.
Usage of ICT for KM/KS	• The widespread adoption and use of ICT in NBI, especially as a means to engage and stakeholders is at the incipient stage and is promising, if leveraged well. • Depends also on how the ICT/media climate in NB countries evolves. For example in some countries the internet connectivity is not reliable. . • There are ICT facilities such as internet, teleconferencing, fiber communications, web page where information's for public domain is displayed Decision support systems and ENTRO has developed a web portal but Limited group have the knowledge and access to the knowledge product available on the existing ICT tools.	• The degree of individual's usage of, access to and availability of existing tools and technologies are not well developed, but there are significant efforts. • There are different facilities (ICT) but Limited group have the knowledge and access to the knowledge product available on those tools more over individuals usage of those tools highly depends on how the ICT/media climate in NB countries.
Organizational learning activities	• Happens thru internal task group meetings, collaborative work and program planning and budgeting, committee meetings, sub-basin and NBI Strategic planning sessions, the biannual Nile Basin Development Forum, etc. • Several trainings and participating in consultation workshops to exchange knowledge and build individuals efficiency but it lucks inclusiveness of all because the sessions are more center or project specific.	• There are different organizational learning activities with in NBI through trainings, meetings, committee and group meetings, consultation workshops, sub-basin and NBI Strategic planning sessions, and others but with limited inclusiveness or awareness of the wider public of NBI.

In addition during the analysis of existing KM related documents findings pointed out that most of these documents are center or project specific and lacks to clearly set NBI wide standards to guide the overall KM activities which includes the capturing ,codification and sharing as well as standards to maintain the quality of primary information or knowledge.

4.3 SUMMERY

Based on the findings the study like to underline the need to carefully understand and study those determinant of the actual knowledge sharing behavior identified during the survey study and relevant information's captured during interviews ,observations and document analysis. Once those factors are clearly studied the identification technical and non-technical solutions will be at ease because the information we gather while studying those factors will allow as to clearly visualize the gap that needed to be filled to enhance KS as well as KM activities. For example, Factors affecting individuals KS behavior such as week social network, large physical distance, perceived loss of knowledge power, lack of ease availability and accessibility of quality primary information, and so on can be minimized with the implementation of organization wide knowledge portal which provides a means for easy collaboration, capturing, codifying and sharing standard information/knowledge, virtual space for easy communication/organizational learning etc.

Accordingly, based on the findings the study presented a technical solution (Knowledge portal) in the next section, Chapter 5, followed by recommendations for practice and summary /conclusions to strengthen our collective understanding on the factors affecting individual's actual knowledge sharing behavior on the last section, Chapter 6.

5 PROPOSED PROTOTYPE KNOWLEDGE PORTAL

5.1 OVERVIEW

Recent developments have witnessed the emergence of a new economy where knowledge has become a valuable resource and asset. The dynamism of the new economy requires us to not only quickly create knowledge, but also to acquire and apply knowledge quickly. One possible way to do so is to share our knowledge effectively, where technology playing an

important mediating role in knowledge sharing. The intervention of information technology (IT) is inevitably important as a tool for a successful knowledge management implementation (Bhatt, 2001; Kim, Suh, and Hwang, 2003). However, ICT functions as a platform for knowledge sharing is by itself insufficient to encourage knowledge sharing as suggested by Hendricks (1999): "The role of ICT for knowledge sharing can only be fully understood if it is related to the motivation for knowledge sharing…" On top of the motivation for knowledge sharing, Braselton and Gorry (2003) had also exposed the idea that technology alone may not effectively encourage knowledge sharing activities. Kim and Jarvenpaa (2008) had supported the importance of the. Knowledge activities.

A fundamental aspect of knowledge management is capturing knowledge and expertise created by knowledge workers as they go about their work and making it available to a larger community of colleagues. Technology can support these goals, and knowledge portals have emerged as a key tool for supporting knowledge work. Knowledge portals are single-point-access software systems intended to provide easy and timely access to information and to support communities of knowledge workers who share common goals. In other words, the success of knowledge exchange depends on the organizational KM systems social and technological attributes (Holsthouse, 1998). Identifying the enabling technologies for knowledge sharing such as knowledge portal with all the essential components and integrating it to organizational KM system is important to address KM as well as knowledge share limitations of organizations. Such as:

- Narrows the physical gap that exists between individuals scattered with in a broad organizational environment such as NBI.
- Provides a platform for individuals to improve social relations and develop trust.
- Provides an ease platform to capture, codify and share different forms of valuable organizational knowledge resources, Explicit vs. tacit.
- Provides a common interface and easy navigations to access valuable organizational knowledge resources etc.

Therefore a capable knowledge portal with all the essential functionalities is important for organizations functioning in a broad work environment, such as Nile Basin Initiative (NBI). In relation to the findings of this study the integration of technological solution is important to support KM/KS activities by providing a single-point, easy and timely access to information/knowledge as well as facilitating the necessary tools and techniques to ease interaction of communities of knowledge workers. In addition such a solution could help to efficiently capture, codify and share the vast volume of information or knowledge generated in different activities.

Accordingly, this research study develop a prototype, knowledge portal, which can support the overall knowledge management as well as knowledge sharing initiatives. The proposed prototype is anticipated to provide a single-point-access to all NBI knowledge resources and information systems. Furthermore it is intended to deliver a common virtual platform to strengthen social ties and trust through providing tools of the modern technology to support collaboration and knowledge sharing between NBI staffs and stakeholders scattered throughout the region.

5.2 DEFINITION OF TODAY'S PORTALS

Traditionally, a portal denotes a gate, a door, or entrance. In the context of the World Wide Web, it is the next logical step in the evolution to a digital culture. Web pages are not completely self-referential anymore, but allow for personalization, workflow, notification, knowledge management and groupware, infrastructure functionality, and integration of information and applications. The idea of a portal is to collect information from different sources and create a single point of access to information - a library of categorized and personalized content. It is very much the idea of a personalized filter into the web.

Portals are often the first page the web browser loads when users get connected to the Web or that users tend to visit as an anchor site. They offer users a surplus value of service based on the features of classic search engines. Thus, the traditional virtual roadhouses -the search engines- become feel-good entrance halls, a gateways to the internet, easy, one-stop embarkation points for the daily Web-surfing sessions. The hope behind the idea of a portal: surfer start their voyage into the web in a modern entrance hall, and preferably find their way back to the starting point without major difficulty.

Table 5.1 Summary of portal predicates,

What a portal does	Key features of portals	What a portal is NOT
• Enables universal login • Handles both structured and unstructured data • Facilitates multi-channel consistency • Facilitates messaging and notification • Automated tuning: pervasive content can be tuned based on personalization, location, browser, etc. • Integration to other systems	• Security • Access different data • Transactions • Search • Publish Content • Personal Content	• It is not just a Website (which is usually characterized by static information) • It is not just a personalized intranet • It is not just a personalized extranet • It is not just a personalized front end for business applications • It is not just groupware • It is not just a personalized knowledge management solution • It is not just a sophisticated search engine **Instead, a portal is nothing less than just one personalizable, browser based user interface to all the components mentioned above**.

***Source**: own-survey*

5.3 THE MAJOR FUNCTIONALITIES OF KNOWLEDGE PORTAL

Based on the Ovum (2000), analyst and consulting company, the following eight functionality areas are identified:

- **Search and navigation**: This functionality forms the basis for most of the successful public web portals meaning that a successful portal should support its users in an efficient search for contents.
- **Information integration (content management):** A portal should warrant the integration of information from disparate sources. Moreover, the user should also be able to optimally use this information.
- **Personalization:** Personalization is vital to the delivery of appropriate information to portal users: each user gets only the information which is specifically tailored to his/her needs. Personalization should be based on user roles, as well as user preferences.
- **Notification (push technology):** Notification (push technology) is referred to as a system in which a user receives information automatically from a network server. Push technologies are designed to send information and software directly to a user's desktop without the user actively requesting it. Thus, the user has the opportunity to subscribe to active information sources (such as newsfeeds and periodically updated reports) and ask to be alerted when documents are updated**.**
- **Task management and workflow:** Portals providing task management services can help users take part in and/or manage formally defined business processes.
- **Collaboration and groupware:** Knowledge management and groupware ensure that the required information is stored in the right place and in the right mode. By this means the right persons are brought together with the right information. Groupware software assists in less formal collaboration than workflow tools.
- **Integration of applications and business intelligence:** In addition to the already mentioned functionalities, a portal can integrate and support a specific application types, for example: an application service provider (ASP) application, business intelligence (BI) functionality, support for e-commerce etc.
- **Infrastructure functionality:** The infrastructure functionality constitutes the fundament for the work environment - the other 7 functionalities mentioned above build up on this one. The runtime infrastructure associated with the portal will have a primary effect on manageability, scalability, security and availability.
- **Knowledge Mapping**: Provides guide to, or inventory of, an organization's internal or external repositories or sources of information or knowledge. These sources may include documents, files, and databases, recordings of best practices or activities, or webpages.

Although most of the functionality is not new, what is new is the idea that the business value of the whole is considerably more than the sum of its parts. Thus, a successful portal does not only consist of either a good collaboration support or a good integration of the information sources. Rather it is a well-integrated mixture of the basic portal functionalities.

5.4 REQUIREMENTS OF THE PROPOSED KP

Initially identifying the major purposes of the proposed knowledge portal, together with important portal functionalities which is basically intended to overcome Knowledge sharing as well as knowledge management factors, this study like address the following requirements that the proposed portal shall fulfill.

5.4.1 ACCESS TO KNOWLEDGE/INFORMATION

The proposed portal should provide access to different knowledge from internal and external sources and those knowledge products should be in different forms such as spreadsheets, charts, spital and non-spital data, multimedia files and etc. The sources for this knowledge's or information's that meets need could be:

- Document/content management systems (website, NBI and other web portal, Nile-IS, e-library etc.)
- Spatial and non-spatial data repositories,
- Through aggregating content from different sources (repositories, external knowledge systems) and search engines to retrieve information from all underlying knowledge repositories or systems.
- Social networking functionalities and community of practice portals.
- Multimedia applications such as videos, animations, images, sound etc.
- The global search facility to retrieve information from all underlying integrated repository or knowledge system (i.e. search within the knowledge portal itself, underlying systems and internal/external repositories).

5.4.2 KNOWLEDGE SHARING/COLLABORATION

The proposed portal should provide all NBI staffs and related stakeholders A tool that facilitate collaboration, team building and knowledge sharing.in other words the proposed portal should provide users a virtual workspace where they can easily communicate, strengthen social ties or trust and work together despite the broad NBI organizational environment with efficient functionalities like groupware, workflows, discussion forums, chat rooms etc.

5.4.3 EASE/USER FRIENDLINESS

The portal should have consistent and uniform user interface with friendly and easy to navigate design. Such as

- Provides a common platform or interface that lead to all NBI knowledge resources (Centralized interface).
- Consistent and uniform presentation of knowledge resources.
- Personalization functionality to provide user with information which is specifically tailored to his/her needs based on user roles, as well as user preferences.
- Notifications to allow users to subscribe to active information sources and get notifications and updates furthermore to push essential software or plugin to users' desktop.
- Interactive/Dynamic functionalities to present data and the ability to categorize and perform multilevel classification of knowledge resources using controlled vocabulary, taxonomy or ontology.
- Ability to present information in a multi lingual interface.
- The ability to manage/operate the system with minimal or no programing experience.

5.4.4 INFRASTRUCTURE REQUIREMENTS

The proposed portal should go along with the associated runtime infrastructure or work environment and meet requirements related to manageability, scalability, security and availability.

- **Security:** The ability to enforcement security across all knowledge/information resources with multiple level of access. Single sign-on to access knowledge resources in underlying integrated knowledge resources.
- **Scalability:** the ability to support large number of concurrent users and process large volume of data or information. Moreover integrating geographically dispersed servers and user community.
- **Availability:** the design of the portal should consider unplanned outage provide solution measures like failover clustering to provide maximum availability, in addition the portal should open with different browsers and common internet connectivity. Furthermore it should have feature to open from mobile machines like phones, IPad etc**.**

- **Manageability**: the portal should have efficient/easy functionality to ease the task of system administrators with customized error messages (404) and system statistics, such us usage statistics, which the web master can generate and utilize.
- **Expandability:** should incorporate open standards and have the capability for integrating existing and future KM systems and advances in information technology.

5.5 USE CASE DIAGRAM OF THE KNOWLEDGE PORTAL.

Use Case diagram helps to define the interaction between external actors and the system to attain a particular goals. In other words it helps in defining the interaction between a role (actor) and a system. Figure 5.1 below presents the use case model of the prototype knowledge portal.

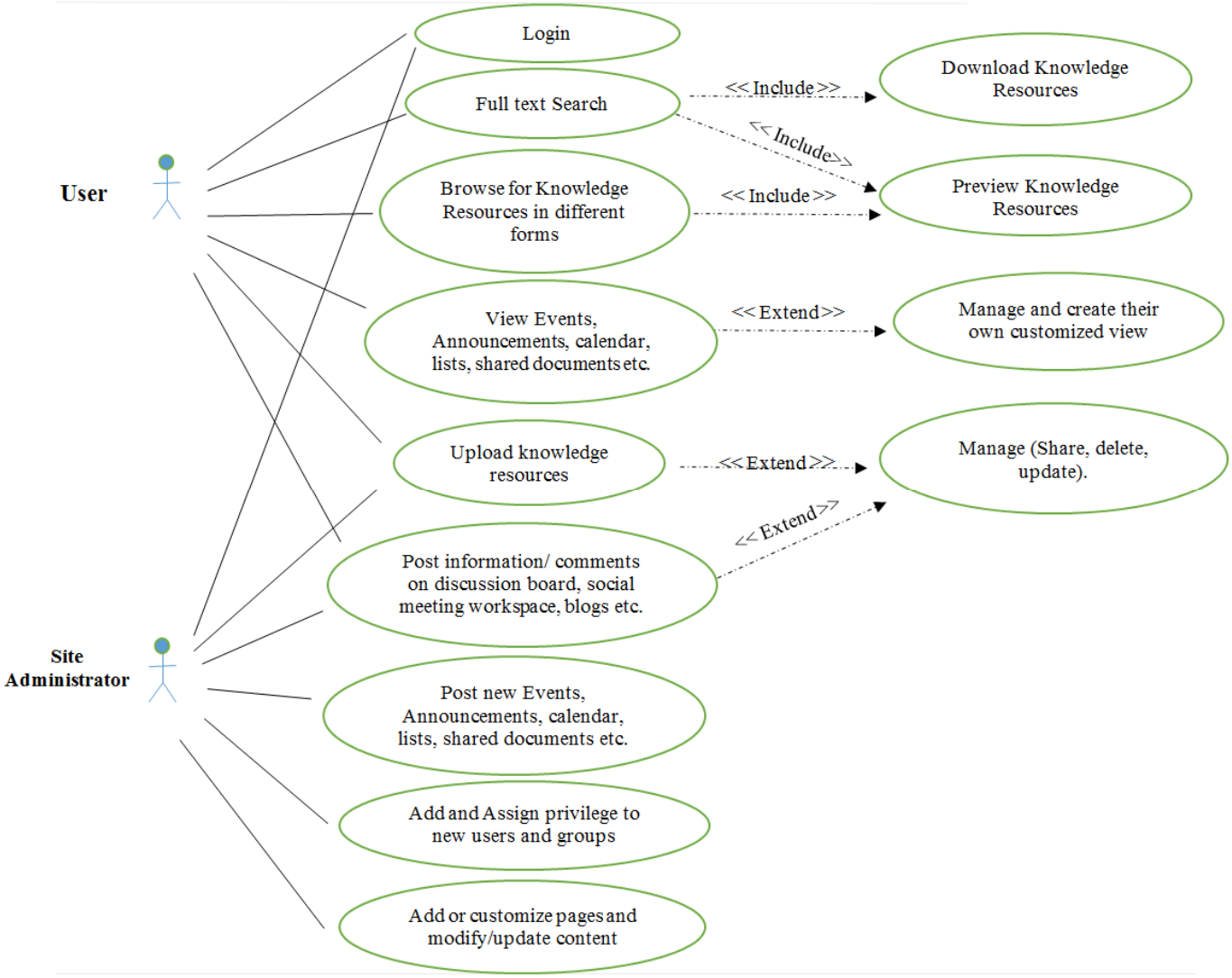


Fig 5.1: The Use Case model of the proposed knowledge portal.

Source: own-survey

5.6 IMPLEMENTATION DETAILS

After identifying the basic portal functionalities imperative to make a given portal complete together with the intended purpose or high level requirements of the proposed web portal, which could aid the process of undertaking measures to overcome KM/KS challenges, sharePoint2013 is proposed for the implementation of the proposed knowledge portal development. The study recommend SharePoint2013 for implementation due to the fact that SharePoint Server has quite a

number of built-in applications and features that satisfy most of the portal functionalities as well as requirements mentioned above, which could significantly help in address Knowledge sharing challenges identified during this study.

The major capabilities that makes SharePoint2013 the best alternative for the development of the proposed knowledge portal are described below in table 5.2 below.

Table 5.2: Descriptions of SharePoint capabilities

SharePoint Capability	Description
Easy to create and administration of collaborative sites.	• Minimal technical skill requirements: m-windows, m-office, familiar with web browsing. • Easy to define relevant access and information/knowledge sharing. • Once deployed appropriately doesn't have to deal with updating content, defining privileges, maintaining a document repository
Efficient information management	• Tools to centralize and manage info like, schedule, documents, change requests, risk /issue log, Budget. • Document management feature such us information storage, check-in/check-out, version control, central approval
Facilitate team collaboration	• Document collaboration, document workspaces to jointly develop requirement documents, reports, templets, etc. • Tools: wiki to document lessons learned, discussion board for offline communication, meeting workspace to support meetings etc.
Enhanced communication mechanisms	• The right information for the right person at the right time such as tasks, schedules, reports, dashboard etc. • Relevant information access can be defined based on needs.
Automation of business processes	• Common project work flows such as change control, expense reimbursements, Vacation requests, purchase and procurement requests, etc. • SharePoint workflows such as custom workflows.
Relevant Report Generation	• Project reports such as interactive summary of projects, project task information, automated alerts, etc. • Dashboards can be created using web parts containing information like status (Red ,Amber ,Green),key performance indicators, charts ,etc.
Easy integration with existing systems	• Integration with SQL based data, web services,XML • Integration with non-Microsoft enterprise systems such as SRM ,reporting tools ,etc.
Components, features, and functionality to content delivery	• Core content structures. • Web applications, site collections, sites, lists, libraries. • Services to render content • Multiple browsers • Mobile browsers • Accessibility standards (WCAG 2.0) • Rich Web experience • Ribbon user interface (UI): Familiar Office UI • Web Edit: Rich content editing • Interfaces for rich and offline client experiences • Office client applications • SharePoint Workspace • Office Web Applications

5.7 HARDWARE /SOFTWARE REQUIREMENTS FOR DEPLOYMENT OF SHAREPOINT 2013

The following hardware and software requirements for SharePoint deployment are extracted from Microsoft website and the content was last updated on 2014-01-09.

5.7.1 HARDWARE REQUIREMENTS

For web servers, application servers, and single server installations.

Table 5.3: Descriptions of SharePoint Hardware Requirements

Installation Scenario	Deployment type and scale	RAM	Processor	Hard disk space
Single server with a built-in database or single server that uses SQL Server	Development or evaluation installation of SharePoint Server 2013 or SharePoint Foundation 2013 with the minimum recommended services for development environments.	8 GB	64-bit, 4 cores	80 GB for system drive
Single server with a built-in database or single server that uses SQL Server	Development or evaluation installation of SharePoint Server 2013 or SharePoint Foundation 2013 running Visual Studio 2012 and the minimum recommended services for development environments.	10 GB	64-bit, 4 cores	80 GB for system drive
Single server with a built-in database or single server that uses SQL Server	Development or evaluation installation of SharePoint Server 2013 running all available services.	24 GB	64-bit, 4 cores	80 GB for system drive
Web server or application server in a three-tier farm	Pilot, user acceptance test, or production deployment of SharePoint Server 2013 or SharePoint Foundation 2013.	12 GB	64-bit, 4 cores	80 GB for system drive

Hardware requirements—database servers

Component	Minimum requirement
Processor	• 64-bit, 4 cores for small deployments (fewer than 1,000 users) • 64-bit, 8 cores for medium deployments (between 1,000 to 10,000 users)
RAM	• 8 GB for small deployments (fewer than 1,000 users) • 16 GB for medium deployments (between 1,000 to 10,000 users)
Hard disk	80 GB for system drive Hard disk space depends on how much content that you have in your deployment.

5.7.2 SOFTWARE REQUIREMENTS

This section provides minimum software requirements for each server in the farm.

1. Minimum requirements for a database server in a farm:

- One of the following:
  - The 64-bit edition of Microsoft SQL Server 2012.
  - The 64-bit edition of SQL Server 2008 R2 Service Pack 1
- The 64-bit edition of Windows Server 2008 R2 Service Pack 1 (SP1) Standard, Enterprise, or Datacenter or the 64-bit edition of Windows Server 2012 Standard or Datacenter
- The SharePoint parsing process crashes in Windows Server 2008 R2 (KB 2554876)
- FIX: IIS 7.5 configurations are not updated when you use the Server Manager class to commit configuration changes (KB 2708075)
- Hotfix: ASP.NET (SharePoint) race condition in .NET 4.5 RTM:
  - Windows Server 2008 R2 SP1 (KB 2759112)
  - Windows Server 2012 (KB 2765317)
- Microsoft .NET Framework version 4.5

2. Minimum requirements for a single server with built-in database:

- The 64-bit edition of Windows Server 2008 R2 Service Pack 1 (SP1) Standard, Enterprise, or Datacenter or the 64-bit edition of Windows Server 2012 Standard or Datacenter
- The SharePoint parsing process crashes in Windows Server 2008 R2 (KB 2554876)

- FIX: IIS 7.5 configurations are not updated when you use the Server Manager class to commit configuration changes (KB 2708075)
- Hotfix: ASP.NET (SharePoint) race condition in .NET 4.5 RTM:
  - Windows Server 2008 R2 SP1 (KB 2759112)
  - Windows Server 2012 (KB 2765317)
- The Setup program installs the following prerequisite for a single server with built-in database:
  - Microsoft SQL Server 2008 R2 SP1 - Express Edition
- The Microsoft SharePoint Products Preparation Tool installs the following prerequisites for a single server with built-in database:
  - Web Server (IIS) role
  - Application Server role
  - Microsoft .NET Framework version 4.5
  - SQL Server 2008 R2 SP1 Native Client
  - Microsoft WCF Data Services 5.0
  - Microsoft Information Protection and Control Client (MSIPC)
  - Microsoft Sync Framework Runtime v1.0 SP1 (x64)
  - Windows Management Framework 3.0 which includes Windows PowerShell 3.0
  - Windows Identity Foundation (WIF) 1.0 and Microsoft Identity Extensions (previously named WIF 1.1)
  - Windows Server AppFabric
  - Cumulative Update Package 1 for Microsoft AppFabric 1.1 for Windows Server (KB 2671763)

3. Minimum requirements for front-end web servers and application servers in a farm:

- The 64-bit edition of Windows Server 2008 R2 Service Pack 1 (SP1) Standard, Enterprise, or Datacenter or the 64-bit edition of Windows Server 2012 Standard or Datacenter.
- The SharePoint parsing process crashes in Windows Server 2008 R2 (KB 2554876)
- FIX: IIS 7.5 configurations are not updated when you use the Server Manager class to commit configuration changes (KB 2708075)
- Hotfix: ASP.NET (SharePoint) race condition in .NET 4.5 RTM:
  - Windows Server 2008 R2 SP1 (KB 2759112)
  - Windows Server 2012 (KB 2765317)
- The Microsoft SharePoint Products Preparation Tool installs the following prerequisites for front-end web servers and application servers in a farm:
  - Web Server (IIS) role
  - Application Server role
  - Microsoft .NET Framework version 4.5
  - SQL Server 2008 R2 SP1 Native Client
  - Microsoft WCF Data Services 5.0
  - Microsoft Information Protection and Control Client (MSIPC)
  - Microsoft Sync Framework Runtime v1.0 SP1 (x64)
  - Windows Management Framework 3.0 which includes Windows PowerShell 3.0
  - Windows Identity Foundation (WIF) 1.0 and Microsoft Identity Extensions (previously named WIF 1.1)
  - Windows Server AppFabric
  - Cumulative Update Package 1 for Microsoft AppFabric 1.1 for Windows Server (KB 2671763)

5.7.3 SHAREPOINT 2013 PREREQUISITE

The SharePoint 2013 prerequisite installer (prerequisiteinstaller.exe) installs the following software, if it has not already been installed on the target server, in this order:

1. Microsoft .NET Framework version 4.5
2. Windows Management Framework 3.0
3. Application Server Role, Web Server (IIS) Role
4. Microsoft SQL Server 2008 R2 SP1 Native Client
5. Windows Identity Foundation (KB974405)
6. Microsoft Sync Framework Runtime v1.0 SP1 (x64)

7. Windows Identity Extensions
8. Microsoft Information Protection and Control Client
9. Microsoft WCF Data Services 5.0
10. Windows Server AppFabric

5.8 STRUCTURAL REPRESENTATION FOR THE DEVELOPED PROTOTYPE KNOWLEDGE PORTAL

Fig 5.2 shows the flowchart depicting the organizational design for the developed prototype knowledge portal. Again, this represented a critical element (high level abstraction) in the design and navigability of the site.

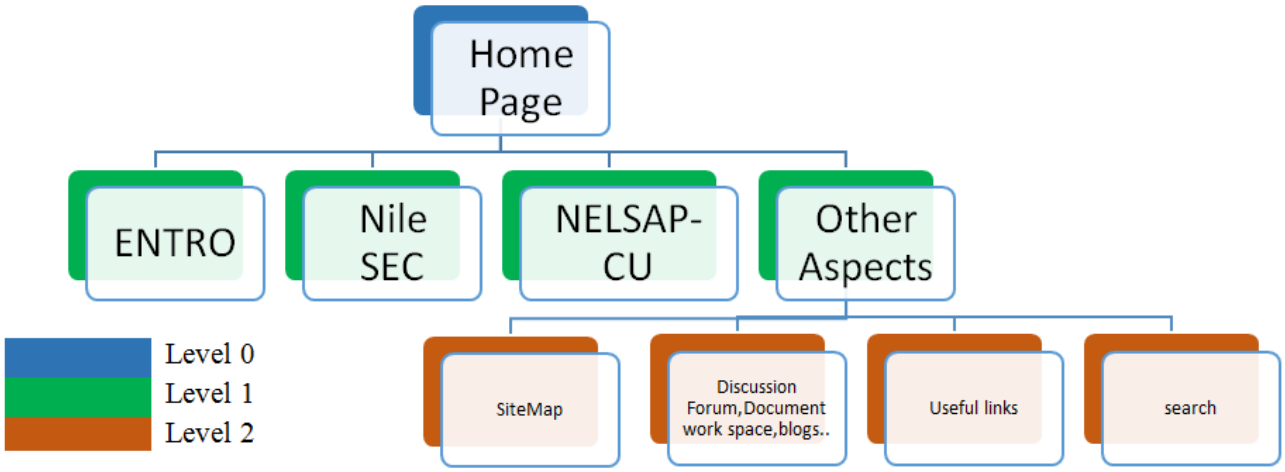


Fig 5.2: High level structural representation for the proposed prototype knowledge portal

5.9 PROTOTYPE OF THE KNOWLEDGE PORTAL

Prototyping was used to provide with an incomplete model of the proposed full-featured knowledge portal and to propose a technical solution that address research findings. Furthermore the developed prototype knowledge portal enables to visualize the basic functionalities, to have initial prototype to review system requirements with users, revise and enhance functionalities in the development of the fully featured knowledge portal.

The prototype Knowledge portal was developed on VMWARE, virtualization and cloud computing software provider for 32 bit (x86) compatible computers. Windows server 2008 environment was created with the necessary Active directory, DNS and other essential prerequisites for SharePoint deployment and the same virtual server was also used as Database server, SQL server 2005 .Finally SharePoint free version is configured to develop the prototype of the proposed technical solution ,Knowledge portal. Figures below presents, the screen shot of the major interfaces of the developed prototype knowledge portal.

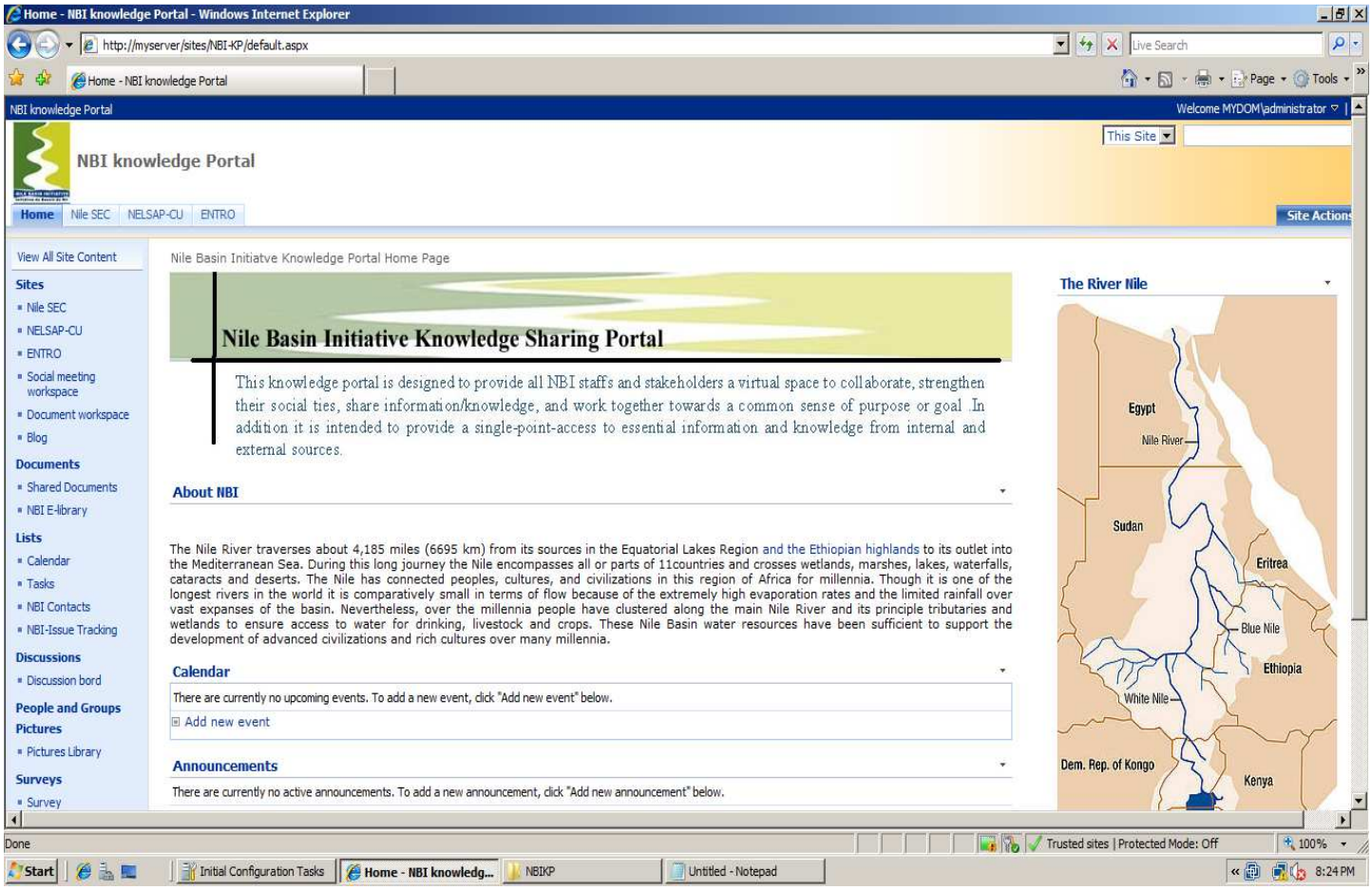


Fig 5.3 Screen shot of the prototype home page –Level 0

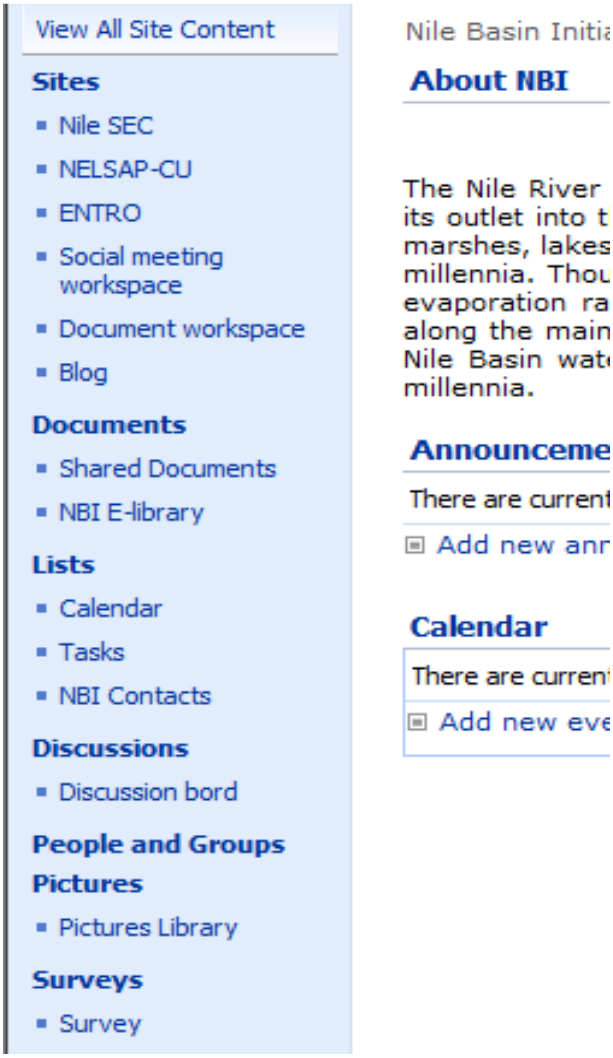


Fig 5.4 Screen shot of the left navigation of the portal

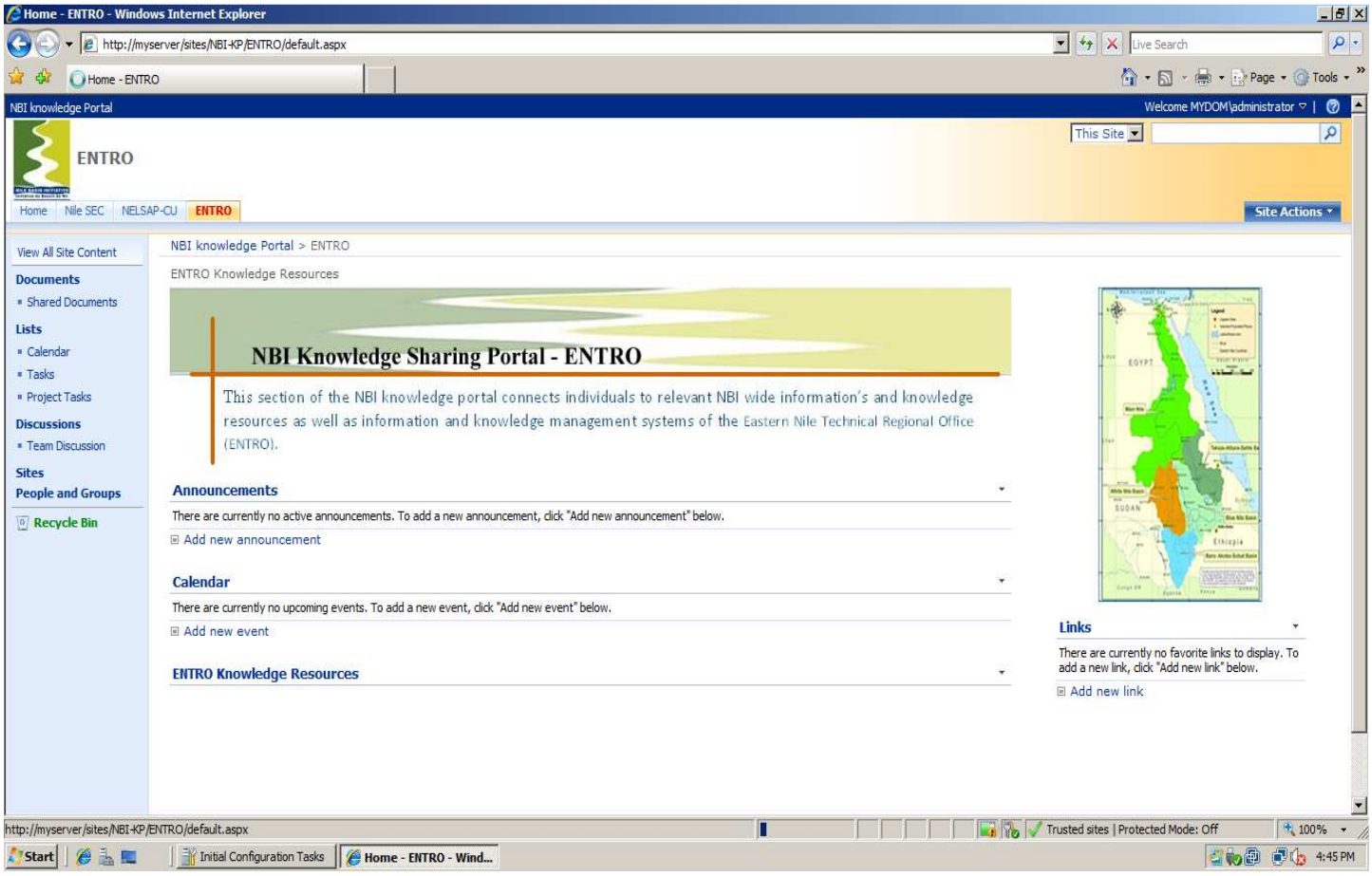


Fig 5.5 Screen shot of the Level 1 – Sub site

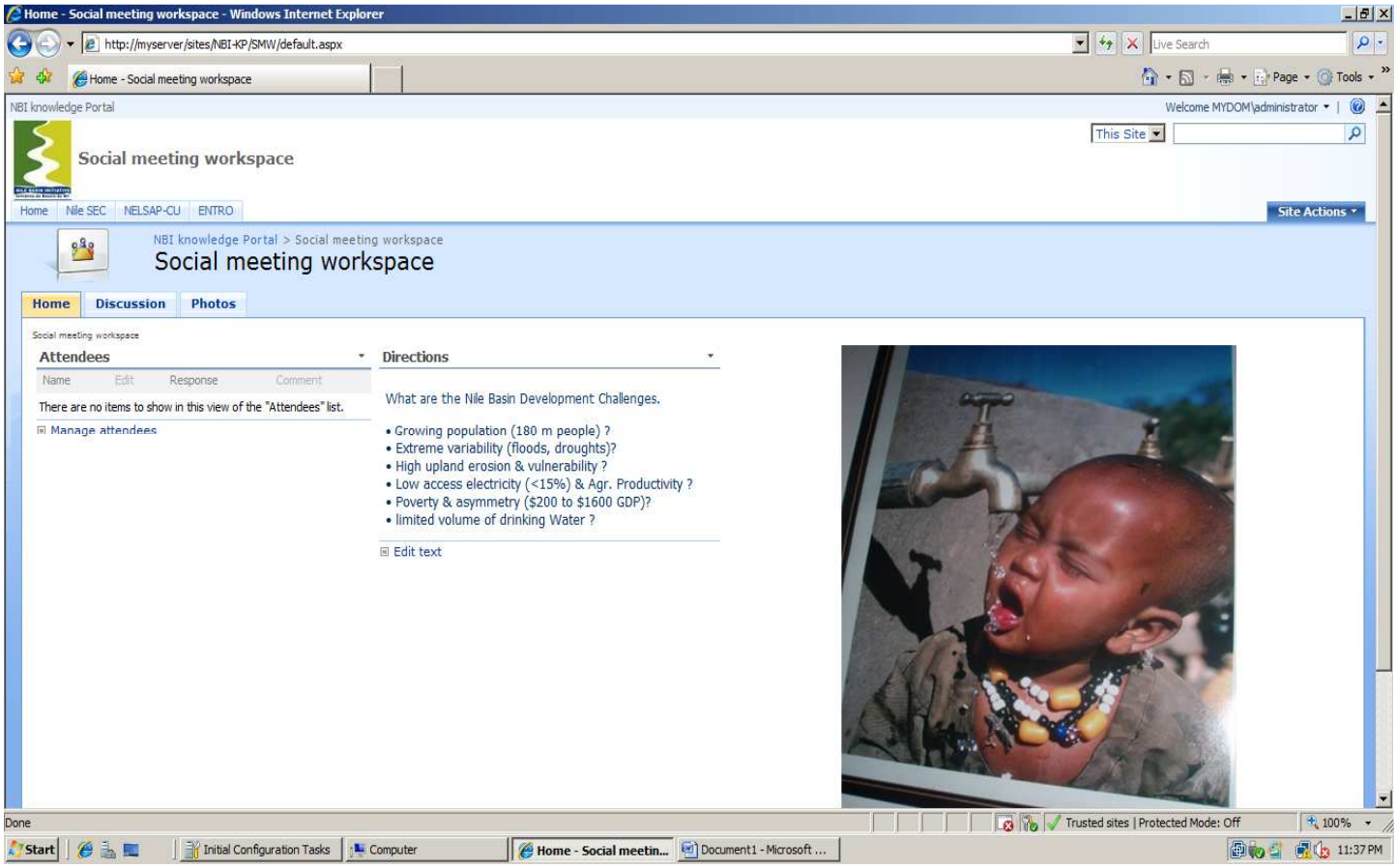


Fig 5.6 Screen shot of the Level 2 – Sub site (Social meeting work space).

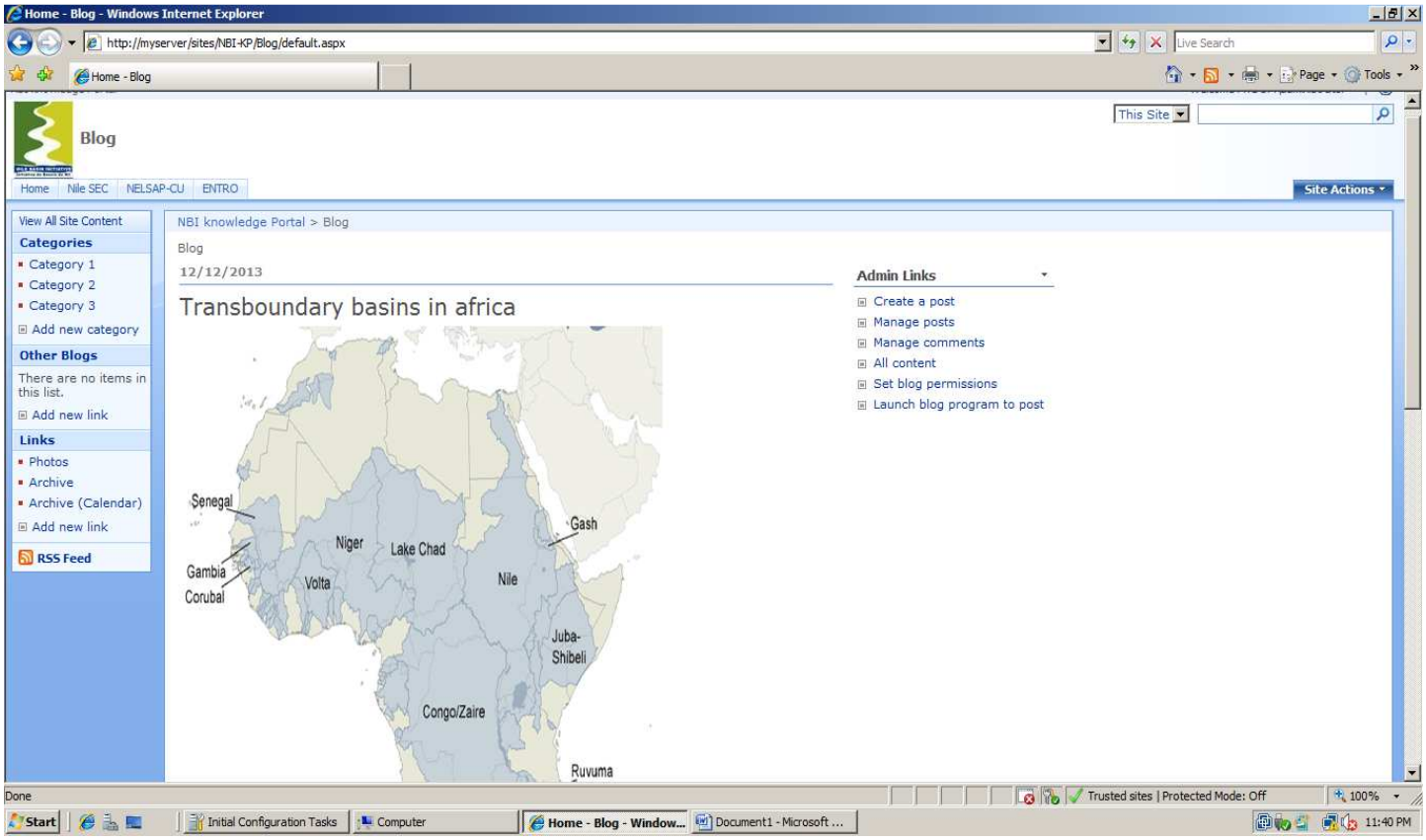


Fig 5.7 Screen shot of the Level 2 – Sub site (Blogs).

6 SUMMARY OF RESULTS, RECOMMENDATIONS AND CONCLUSIONS

6.1 SUMMARY OF RESULTS

The objective of this research study was to enhance our collective understanding of the factors affecting knowledge sharing behaviors of individuals in organizations with similar work environment context as NBI. The study drew upon theory and research from multiple streams of research such as social psychology, organizational learning, knowledge management, information systems and so forth and identified three sets of critical factors: psychological, organizational and technological that are believed to influence the knowledge sharing behaviors. The study applied theory of planned behavior framework (TPB) (Ajzen, 1991) to investigate the impact of these factors on knowledge sharing behaviors.

The results from the field survey of 103 valid respondents of NBI permanent staffs and related stake holders provide empirical support for the overall structure theorized in the research conceptual model. As supported by the findings of previous studies on knowledge sharing behaviors (Bock and Kim, 2002; Bock et al., 2005; Lin et al., 2004), the findings pointed out that the significant predictors of knowledge sharing behaviors to be TPB components: intention towards knowledge sharing, attitude towards knowledge sharing, and perceived behavioral control towards knowledge. Except subjective norms towards knowledge sharing which exhibited insignificant path towards intention of knowledge sharing when it was included in the analysis together with the other predicators. Based on findings the study like to underline the importance of applying technical solution ,knowledge portals ,as proposed on the previous chapter together with other non-technical solutions discussed in this chapter to minimize the effects of those factors and creating conducive environment for knowledge sharing.

In general, the prediction power of the hypothesized conceptual model was good explaining about 52 percent of the variance in the behavioral intention to share knowledge and 41 percent variance in the actual knowledge sharing behavior. The discussion of the results of the individual predictors with respect to the above TPB components and the summery of the findings during qualitative data analysis is presented below.

6.1.1 KNOWLEDGE SHARING BEHAVIOR

Perceived behavioral control and intentions towards knowledge sharing are found to be major determinant factors as hypothesized explaining 41 percent of the variance of the actual knowledge sharing behavior. Prior research has shown that the addition of perceived behavioral construct, increases the accounted variance in actual KS behavior by 2 to 12 percent over and above behavioral intention (Rivis and Sheeran, 2003; Armitage & Connor, 2001; Godin and Kok, 1996).

The significant impact of perceived behavioral control on knowledge sharing behavior showed in this study suggests that knowledge sharing is not largely under voluntary control. Individuals are prone to engage in knowledge sharing behaviors to the extent of their belief whether it is easy or difficult to engage in the knowledge sharing behavior. Therefore this study like to underline the importance of having the necessary organizational learning practices to improve individual's belief on the ease of involving in KS activists and perceived presence or absence of necessary resources and opportunities that may facilitate or impede actual behavior. Intention towards knowledge sharing was also found positively and significantly related to knowledge sharing behavior explaining the degree of one's belief that one will engage in Knowledge-sharing behavior determine the actual knowledge sharing behavior. Based on the findings related the above two factors the study underlines individuals are inclined to engage in knowledge sharing behaviors to the extent they have the time, resources and opportunities to do so.

6.1.2 INTENTIONS TOWARDS KNOWLEDGE SHARING

Consistent with the theory of planned behavior, the study hypothesized the predictors of knowledge sharing intention to be attitude towards knowledge sharing, subjective norm and perceived behavioral control. As hypothesized, the above three motivators collectively explained about 60 percent of the variance in the behavioral intention to share knowledge. While attitude and perceived behavioral control emerged as significant predictors of intention towards knowledge sharing, consistent with the findings of prior TPB related research (Taylor and Todd, 1995; Bock and Kim, 2002, Bock et al., 2005; Lin et al., 2004), subjective norm presented insignificant or weak effect .However the presented week effect of subjective norms increased significantly when the other two motivators are removed from the analysis. This finding suggests the degree of one's perceived social pressure from important others to share or not to share one's knowledge is not as an important factor as the other two, attitude and perceived behavioral control, for this study population.

The high contribution of attitude towards knowledge sharing suggests that individuals with favorable attitudinal disposition are more likely to engage in knowledge sharing. This finding highlights the importance of one's favorable or positive feeling about sharing one's knowledge. Even though the importance of subjective norm is not as important as the other two motivators of intention towards knowledge sharing for this study population, the finding highlights the importance of the social influence of top management and peer group in knowledge sharing. The impact of perceived behavioral control on the intention towards knowledge sharing indicates that knowledge workers are motivated to engage in knowledge sharing to the extent they believe they have the resources and opportunities to do so.

6.1.3 ATTITUDE TOWARDS KNOWLEDGE SHARING

Attitude towards knowledge sharing explains the degree of one's favorable or positive feeling about sharing one's knowledge and the findings of this study pointed out social network and trust as a strong determinant factor towards individual's attitude towards knowledge sharing. The finding highlights the importance of strong social contact, accessibility and willingness to take risk to the actions of other people for achieving the necessary positive individual's attitude towards knowledge sharing. In addition individual's perceived loss of knowledge power emerged as another significant determinant factor of attitudes towards knowledge sharing presenting a negative effect as hypothesized. Accordingly the study like to underline the importance of individuals having the right perception towards their knowledge power in order to have the right attitude towards knowledge sharing. On the other hand during PLS-graph analysis perceived organizational incentives and benefits presented strong effect when it is loading independently. However, the independent contribution was washed out when other motivators were included in the analysis which explains individuals perceptions of organizational incentives and benefits are not as important as the above two motivators of attitudes towards knowledge sharing for the study population of this study. The findings also highlights the trivial effect of having shared goal towards individual's attitude towards knowledge sharing for the study area examined.

6.1.4 SUBJECTIVE NORM TOWARDS KNOWLEDGE SHARING

Subjective Norm towards knowledge sharing defines the degree of one's perceived social pressure from important others to share or not to share one's knowledge. The study hypothesized three motivation factors: social network and trust, shared goals and organizational climate. As hypothesized while social network & trust and perceived organizational climate emerged as important predicators of individual's perceived subjective norms towards knowledge sharing shared goals presented a trivial effect similar to its effect towards individual's attitude towards knowledge sharing.

The high contribution of social network and trust towards individual's perceived subjective norms towards knowledge sharing suggests that if there is a higher degree contact, accessibility and willingness to vulnerable to the actions of other people, the more likely for individuals to have positive perceptions of subjective norms towards their knowledge sharing behavior. On the other hand the higher the perceptions of organizational climate to be conducive of knowledge sharing, the higher was the formation of subjective norm towards knowledge sharing. Organizational climate is characterized by the degree of organizational affiliation, innovation and fairness.

6.1.5 PERCEIVED BEHAVIORAL CONTROLS TOWARDS KNOWLEDGE SHARING

Perceived behavioral control defines degree of one's belief that it is easy or difficult to engage in the knowledge sharing behavior .The study hypothesized tools and technology that facilitate knowledge sharing to have a strong positive relationship with perceived behavioral control towards knowledge sharing .As hypothesized tools and technology presented a strong positive effect explaining 40 percent of the variance in the perceived behavioral control. This is a significant finding since organizations are investing heavily in the development and acquisition of information and communication technologies in the form of knowledge management systems.

Although the findings showed that more than 80 percent of the respondents are satisfied with the overall quality of tools and technology for sharing knowledge with in the study area (NBI) at moderate and above level, more than 40 percent also replied that they hesitate to use tools and technology to share knowledge for fear of making mistakes at moderate and above level. The finding suggests the level of understanding and knowledge of individuals on the available tools and technology significantly determine their perceived behavior towards knowledge sharing.in addition the finding also suggest that the usage of the available different tools and technologies for knowledge sharing, other that email and face to face communication, should be motivated and facilitated in order to improve individuals perceived behavioral control towards the actual knowledge sharing behavior.

6.1.6 FINDINGS DURING QUALITATIVE STUDY

During unstructured interviews and observations the study identified that NBI has taken significant efforts to advance its information systems, reinforce internally and externally focused knowledge management and knowledge sharing activities . Though the wide spread adoption and use of ICT as a means to collaborate, engage in social interaction or build trust, to deliver valuable and high quality knowledge resources throughout the region is at the incipient stage, but promising if leveraged well. The study like to underline the following critical points based on the findings during qualitative study.

- NBI should develop an all-inclusive KM/KS strategic document or guideline to improve the availability and reliability of the existing substantial socio-economic, environmental, water resources and hydro-meteorological data and information or knowledge as well as to capture and codify new one. In addition such a guide line could help in alleviating lack of quality assurance of the existing data by setting region wide common standards for the overall KM/KS practices, which includes the capturing, codification and sharing of knowledge resources.
- NBI should also give strong attention in creating a common medium for collaboration and strengthen social ties which is better than the current common practices which requires face-to-face communications most of the time or lacks a mechanism to provide a simple means to formal and informal engagements for individuals scattered in wider work environment. NBI should develop a virtual environment or community of practice (CoP) where individuals or stakeholders scattered throughout the region regularly meet, strengthen their social network/ ties, collaborate, build their team and share their knowledge. A virtual environment could be online discussion forms, chat rooms, work groups, blogs, a document work space where individuals can easily share their ideas and work together, a common social network etc.
- Even though there are significant efforts, NBI should also need to give more attention and priority to find a way to integrate the available information system, knowledge portals and websites to a single platform that provide a single point of access to the wealth of knowledge already available in different forms such as: spatial and non-spatial data bases,

various water resources and optimization Models and toolkits, Decision support systems, projects study finding etc. Furthermore such an integrated system could enable NBI to improve the lack of efficient dissemination mechanism for developed knowledge products as well as to effectively gather substantial primary knowledge resources scattered throughout the wide NBI region.

- Finally, NBI should also strengthen organizational learning activities with the support of the modern technology tools such as teleconferencing /videoconferencing to make those learning practices reachable to the wider public of the region. Which will enable the widely scattered individuals to improve their knowledge and capabilities towards the actual knowledge sharing practice as well as their use of the ICT tools.

6.2 CONCLUSION

Knowledge sharing has been identified as the key enabler of knowledge management. To leverage knowledge resources and to support knowledge sharing, organizations are employing various knowledge management systems. While knowledge management systems are important, practical implementations observed during this exploratory study have shown that the mere availability of technology does not guarantee that knowledge will be shared. Findings of this study pointed out that usage of tools and technology for knowledge sharing was positively associated with high levels of perceived behavioral control towards knowledge sharing. In other words, though the ease availability, accessibility and integration of valuable organizational knowledge resources can be achieved through deployment of efficient tools and technology for knowledge sharing as proposed knowledge portal in the previous chapter, the usage of those tools & technologies depends on individual's belief on whether it is easy or difficult to engage in the knowledge sharing behavior. In addition the study also pointed out other important factors that determine the knowledge sharing behavior of individuals with in NBI and other knowledge based organizations.

This exploratory research attempted to fill the gap in the extant research on knowledge sharing by investigating the factors that influence the knowledge sharing behaviors of individuals with in organizations such as NBI. Drawing from multiple streams of research including social psychology, organizational learning, knowledge management, information systems, this research developed an integrated theoretical model and unveiled three sets of critical factors: psychological, organizational and technological that are believed to affect the knowledge sharing behaviors.

Using a field survey of 103 individuals from Nile Basin Initiative the theoretical model was validated within the context of a single empirical study. The findings provided significant statistical support for the research model accounting for about 52 percent of the variance in the behavioral intention to share knowledge and 45 percent variance in the actual knowledge sharing behavior. 9 of the 11 hypothesized relationships were supported. Knowledge sharing behavior was predicted by the individual's intention towards knowledge sharing and perceived behavioral control. Knowledge sharing intention in turn was predicted by individual's attitude towards knowledge sharing, subjective norm and perceived behavioral control. The strength of social network and trust was found positively associated with both favorable attitude and subjective norm towards knowledge sharing. Individual's perceptions of organizational incentives & benefits and organizational climate were positively associated with favorable attitude and subjective norm towards knowledge sharing respectively. On the other hand the perceptions of loss of knowledge power exerted a negative effect on individual's attitude. Additionally, usage of tools and technology was positively associated with high levels of perceived behavioral control towards knowledge sharing.

In addition the findings of the qualitative study and review of different literatures also helps to point out critical issues related to the importance of KM/KS strategic document or guideline aligned with business strategies and the need to have an efficient ICT tool to integrate all the knowledge resource as well as to create a virtual space to strengthen social ties and collaboration for organizations like NBI where individuals are dispersed in wider region. In addition the findings underlined the importance of strengthening organizational learning practices by making it reachable for the wider public domain through the use of the modern information and communication technologies.

Based on the findings, the study discussed theoretical implications and practical recommendations for knowledge sharing in this research area work context. Furthermore it proposed a prototype knowledge portal. Overall, the results of the study advance prior research in the area of knowledge sharing by shedding light on the determinants of knowledge sharing behavior of individuals with in organizations like NBI. The research model deepens our collective understanding of the underlying psychological processes that induce knowledge sharing behaviors. In addition to contributing to theory, the findings of the study also yield insights for practice and a prototype technical solution. The insights could be used by NBI as well as by other knowledge based organizations to developing realistic environment conducive to knowledge sharing.

6.3 RECOMMENDATIONS

The results of the study have many implications for NBI and other organizations especially for those initiating or striving to promote knowledge sharing behaviors. Based on the results the study presented the following recommendations for practice.

- **First**, prior to launching knowledge sharing initiatives, organizations should create an environment that is conducive to knowledge sharing. Organizations should develop and nurture cultural norms, practices and processes that build trust, collective cooperation and positive social interactions among knowledge workers. Work context exemplified by high levels of trust, collective cooperation, formal and informal networks, facilities of knowledge exchanges among individuals or knowledge workers. Organizations should have all inclusive KM strategic document which is essential to spell out key communications and outreach strategies to engage stakeholders, keep them informed and guide KM/KS activities.
- **Second**, the results of the study suggest that attitude towards knowledge sharing behavior affects intention and further the actual KS behavior of individuals. Organizations such as NBI should promote knowledge sharing behaviors by managing factors that influence knowledge workers attitude towards knowledge sharing. organizations should structure the knowledge sharing initiatives in such a way that strengthen social network and address social concerns of individuals have for such things as realizing reciprocal benefits, reputation enhancement, enjoyment in helping others, balance of power and so forth. The level of individual's perceptions of knowledge exchange in the organization should be raised by promoting knowledge centric culture and by encouraging workers to help their co-workers with the knowledge needs.
- **Third**, organizations such as NBI should employ knowledge management systems to help strengthen social ties, facilitate collaborative work or team building, to narrow the physical distance due to their wide work environment and provide single point of access to all the relevant organizational knowledge. The results of the study indicate that individual's perception of using tools and technology is an important factor in deciding to engage in knowledge sharing. Organizations should enhance the level of the individual's perception of using the available tools and technology by employing appropriate systems that are easy to access and available at time needed. Moreover promoting organizational learning activities are important to improve individual perceived behavioral control of using the available tools and technology for the actual knowledge sharing behavior as well as improve quality of data generated. The study proposed a prototype knowledge sharing portal for NBI, which attempted to address points mentioned above and other challenges of knowledge sharing.
- **Fourth**, organizations should address the knowledge workers fears about losing power in the organization. Individual's perceptions of the loss of knowledge power should be mitigated by reassuring their position, power and status in the organization.
- **Fifth**, management should demonstrate its support for knowledge sharing. Supportive organizational climate and intensified management commitment towards knowledge sharing promotes knowledge sharing behaviors for example having the appropriate KM strategic document could help in creating conducive organizational climate for knowledge management as well as knowledge sharing. The study findings indicate that individuals are likely to be influenced by the expectations of management and peer group in deciding to engage in knowledge sharing. So it may even be appropriate to exert some pressure on individuals to share knowledge through the social influence of top management and peer group.
- **Sixth**, knowledge sharing is time consuming. Organizations should ensure that workers have time, resources and opportunities to engage in knowledge sharing. Organizations should allocate time for engaging in knowledge sharing behaviors by integrating it into the work processes. Time needed to engage in knowledge exchanges should not be viewed as a cost factor.

6.4 FUTURE RESEARCH DIRECTIONS

The study would like to recommend the following research directions for future.

- This study findings are based on a sample size of 103 .Although PLS Graph handles small sample sizes and generates valid results, future research's should replicate the study findings with a larger sample and different analytical tool, will allow to add more statistical power on the findings.
- Future research should replicate the study's findings with different determinant factors of individuals knowledge sharing behavior within and outside the three unveiled sets of critical factors of this study ,psychological, organizational and

technological ,which are important for wider work environment context such as political factors , perceived ownership of knowledge, self-efficacy etc.

- Unlike this research study which uses cross-sectional data examination of NBI, which is "data collected by observing many subjects (such as individuals, firms or countries/regions) at the same point of time, or without regard to differences in time" (Wikipedia), to use longitudinal examination of those determinants of individuals knowledge sharing behaviors since such un examination would make findings more robust.
- Conclusions drawn in this study are based on a limited method – survey of a single set of respondents, only from NBI and qualitative data gathering –observation and interview of few officials. As such, it leaves open the possibility for the existence of bias. Future research should employ elaborate measures and multiple methodologies to analyze the study's findings as well as consider multiple organizations to maximize accuracy.

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LIST OF ACRONYMS

ASP	.....	Application service provider
ATT	.....	Attitude toward knowledge sharing
AVE	.....	Average variance extracted
BI	.....	Business intelligence
CFA	.....	Cooperative framework agreement
CoP	.....	Community of practice
DB	.....	Data Base
DSS	.....	Decision Support System
EKR	.....	Electronic knowledge repositories
ENTRO	.....	Eastern Nile Technical Regional Office
H1….11	.....	Hypothesis
IAR	.....	Instructional assessment resource
IB	.....	Perceived Organizational Incentives and benefits of KS.
INS	.....	Intention towards sharing knowledge
IT/ICT	.....	Information Technology/Information communication technology
IWRM	.....	Integrated water resource management
KM	.....	Knowledge Management
KMS	.....	knowledge management systems
KS	.....	Knowledge sharing
KSB	.....	Knowledge sharing behavior
LK	.....	Perceived Loss of Knowledge Power
NBI	.....	Nile Basin Initiative
NELSAP	.....	Equatorial Lakes Subsidiary Action Program
Nile-COM	.....	Nile Council of Ministers
Nile-IS	.....	Nile Information system
Nile-SEC	.....	Nile Secretariat
Nile-TAC	.....	Nile technical advisory committee
OC	.....	Perceived organizational climate
PBC	.....	Perceived Behavioral Control
PLS	.....	Partial Least Squares
PRC	.....	People's Republic of China
SAP	.....	subsidiary action program
SG	.....	Shared Goals
SN	.....	Social Network And Trust
SNK/SU	.....	Subjective norm about knowledge sharing
SQL	.....	Standard Query Language
SVP	.....	Shared vision program
SWOT	.....	Strength ,Weakness ,Opportunity and Threat
TPB	.....	Theory of planned Behavior
TRA	.....	Theory of Reasoned Action
URL	.....	Uniform resource locator
US	.....	United States
UTT	.....	Usage of tools and technology

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APPENDIXES

APPENDIX I – SURVEY QUESTIONNAIRES: DESIGNED AND DISTRIBUTED USING SURVEY MONKEY.

Introduction to the Survey

Welcome to the Knowledge Sharing Survey!

This survey has been designed to identify the major determinants of knowledge sharing in knowledge based organizations by taking the case of Nile Basin Initiative (NBI). With the intention to provide useful insights and proposed solutions which are not always relay on Information technology.

Knowledge sharing can be defined as "a set of behaviors that involve the exchange of information or assistance to other", Connelly and Kelloway (2003), Davenport and Prusak (1998) also define knowledge sharing as
"Process that involve exchanging knowledge between individuals and groups."

Note**: KNOWLEDGE** includes :

- Know-what (important factual information, acquired through a process of learning-by-using)
- Know-how (skill and procedures, acquired through a process of learning-by-doing or experience)
- Know-why (understanding cause and effect relationships, acquired through Learning-by-studding or education).

All the information you provide will be kept confidential.

Please don't forward the link of this survey to others since it uniquely linked to you or your email address.

Your assistance is highly appreciated,
Thank you for spending your valuable time to give you responses to this survey!

This survey questioner incorporates questions categorized in 11 constructs including social network and trust ,shared Goals ,attitudes ,subjective norms ,intention, usage of tools and technology, perceived loss of knowledge power, organizational incentives and benefits,behavioural Controls, organizational climate and knowledge sharing behavior.

Please indicate how strongly you agree or disagree with each statement by circling (selecting) a number. 1= Strongly Disagree, 5= Strongly Agree.

	Social Network And Trust					
SN1	In general, I have a very good relationship with my organizational members and related NBI stake holders	1	2	3	4	5
SN2.	In general, I am very close to my organizational members and related NBI stake holders.	1	2	3	4	5
SN3	I always hold a lengthy discussion with my organizational members and related NBI stake holders.	1	2	3	4	5
SN4.	I know my organizational members will always try and help me out if I get into difficulties	1	2	3	4	5
ST5	I can always trust my organizational members to lend me a hand if I need it	1	2	3	4	5
SN6	I can always rely on my organizational members to make my job easier	1	2	3	4	5
	Shared Goals					
SG1	My organizational members and I always agree on what is important at work,	1	2	3	4	5
SG2	My organizational members and I always share the same ambitions and vision at work.	1	2	3	4	5
SG3	My organizational members and I are always enthusiastic about pursing the collective goals and missions of the whole organization.	1	2	3	4	5

	Attitude toward knowledge sharing					
AT1	Sharing of my knowledge with organizational members is always good	1	2	3	4	5
AT2	Sharing of my knowledge with organizational members is always beneficial	1	2	3	4	5
AT3	Sharing of my knowledge with organizational members is always an enjoyable experience	1	2	3	4	5
AT4	Sharing of my knowledge with organizational members is always valuable to me	1	2	3	4	5
AT5	Sharing of my knowledge with organizational members is always a wise move	1	2	3	4	5
	Subjective norm about knowledge sharing					
SU1.	My chief executive officer (CEO) always thinks that I should share my knowledge with other members in the organization.	1	2	3	4	5
SU2	My boss always thinks that I should share my knowledge with other members in the organization.	1	2	3	4	5
SU3	My colleagues always think that I should share my knowledge with other members in the organization.	1	2	3	4	5
	Intention towards sharing knowledge					
IN1	I will share my work reports and official documents with my organizational members more frequently in the future.	1	2	3	4	5
IN2	I will always share my manuals, methodologies and models with my organizational members in the future.	1	2	3	4	5
IN3	I will always share my experience or know-how from work with my organizational members in the future.	1	2	3	4	5
IN4	I will always share my know-where or know-whom at the request of my organizational members.	1	2	3	4	5
IN5.	I will always try to share my expertise obtained from education and training with my organizational members in a more effective way.	1	2	3	4	5

Please indicate how strongly you agree or disagree with each statement by circling (selecting) a number. 1= Strongly Disagree, 5= Strongly Agree.

Or how frequently you use the tool or technology: 1 = Very Infrequently , 3= Moderate frequency (Few times per month), 5= Very Frequently (Many times daily)

	Usage of tools and technology					
UT1	Whenever I want to share knowledge, I can easily access tools and technology in our organization	1	2	3	4	5
UT2	In our organization, it is available and easy to use tools and technology to share knowledge.	1	2	3	4	5
UT3	I am satisfied with the overall quality of tools and technology for sharing knowledge in our organization	1	2	3	4	5
UT4	I hesitate to use tools and technology to share knowledge for fear of making mistakes	1	2	3	4	5
UT5	Tools and technology for sharing knowledge can be customized to fit individual needs	1	2	3	4	5
UT6	I use e-mail to share knowledge with my co-workers	1	2	3	4	5
UT7	I use discussion forum (using tools like electronic bulletin board, chat room etc.) to share knowledge with my co-workers	1	2	3	4	5
UT8	I share knowledge by inputting it into knowledge repository/company databases (containing existing expertise, lessons learned, best practices etc)	1	2	3	4	5
UT9	I use intranet (including corporate portal) to share knowledge with my co-workers	1	2	3	4	5
UT10	I use video and teleconferencing to share knowledge with my co-workers.	1	2	3	4	5
UT11	I share knowledge through face-to-face discussions with my coworkers	1	2	3	4	5
	Perceived Loss of Knowledge Power					
LK1	Sharing knowledge with my co-workers makes me lose my unique value in the organization.	1	2	3	4	5
LK2	Sharing knowledge with my co-workers makes me lose my power base in the	1	2	3	4	5

	organization.					
LK3	When I share knowledge with my co-workers, I believe I will lose my knowledge that no one else has.	1	2	3	4	5
LK4	Sharing knowledge with my co-workers makes me lose my knowledge that makes me stand out with respect to others.	1	2	3	4	5
	Perceived Organizational Incentives and benefits of knowledge sharing					
IB1	Sharing knowledge with my co-workers improves the likelihood of getting a better work assignment or promotion for me.	1	2	3	4	5
IB2	Sharing knowledge with my co-workers improves the likelihood of getting a higher salary or bonus for me.	1	2	3	4	5
IB3	I expect to get more job security when I share knowledge with my co-workers.	1	2	3	4	5
IB4	When I share knowledge with my co-workers, I believe that my queries for knowledge will be answered in the future.	1	2	3	4	5
	Perceived Behavioral Control					
PBC1	I have enough time available to share knowledge with my co-workers	1	2	3	4	5
PBC2	I have the necessary tools to share knowledge with my co-workers.	1	2	3	4	5
PBC3	I have the ability to share knowledge with my co-workers.	1	2	3	4	5
PBC4	Sharing knowledge with my co-workers is within my control.	1	2	3	4	5
PBC5	I am able to share knowledge with my co-workers easily.	1	2	3	4	5
PBC6	Even if I wanted to share, I do not have the means to share knowledge	1	2	3	4	5

Please indicate how frequently you shared work-related knowledge with your co-workers in the past year.
1 = Very Infrequently , 3= Moderate Frequency(Few times per month), 5= Very Frequently (Many times daily).

	Knowledge sharing behavior					
KSB1	I shared factual knowledge (know-what) from work with my coworkers.	1	2	3	4	5
KSB2	I shared business knowledge about the customers, products, suppliers and new technology with my co-workers.	1	2	3	4	5
KSB3	I shared internal reports and other official documents with my coworkers	1	2	3	4	5
KSB4	I shared work experiences with my co-workers.	1	2	3	4	5
KSB5	I shared know-how or tricks of the trade from work with my coworkers.	1	2	3	4	5
KSB6	I shared expertise from education or training with my co-workers.	1	2	3	4	5
KSB7	I shared know-why knowledge from work with my co-workers	1	2	3	4	5
	Perceived organizational climate.					
POC1	Members in our department keep close ties with each other.	1	2	3	4	5
POC2	Members in our department consider other members standpoint highly.	1	2	3	4	5
POC3	Our department encourages suggesting ideas for new opportunities.	1	2	3	4	5
POC4	Our department puts much value on taking risks even if that turns out to be a failure.	1	2	3	4	5
POC5	Our department encourages finding new methods to perform a task	1	2	3	4	5
POC6	In our department, objectives which are given to us are reasonable.	1	2	3	4	5
POC7	In our department, our boss doesn't show favoritism to anyone	1	2	3	4	5
POC8	Members in our department can trust department head's judgment to be good.	1	2	3	4	5

Demographics - Please check the category that is most appropriate.

Gender _____Male _____Female

Age Group _____18 to 21 years old
_____21 to 30 years old
_____31 to 40 years old
_____41 to 50 years old
_____51 to 60 years old
_____Above 60 years old

Level of education
_____Some High School
_____High School Degree
_____ Diploma/ Advance diploma
_____Associate's Degree
_____Bachelor's Degree
_____Master's Degree
_____Doctorate Degree
_____Other – Please Specify_____

Your job title _____

Total Years of work experience
_____Under 2 years
_____3 to 5 years
_____5 to 10 years
_____11 to 20 years
_____21 to 30 years
_____Above 30 years
_____Other – Please

Specify_____

Years closely work with/working for NBI
_____Under 2 years
_____3 to 5 years
_____5 to 10 years
_____More than 10 years
_____Other – Please

Specify_____

APPENDIX II – SAMPLE INTERVIEW QUESTIONS

Sample interview questions used.
1. Can you please describe or list the major KM/KS activities within NBI? What do you think are the major achievements so far? Any challenges? If yes, do you have any suggestion as solution to those challenges?
2. Can you please describe how NBI strengthens social ties to reach out to its stakeholders? Any suggestions for enhancing the current scope of these activities?
3. Is there clearly stated KM/KS related document or guideline for NBI that you have come across or used? Any suggestions in this regard.
4 Can you describe your experience in usage, access and availability of existing ICT tools within NBI? Do you believe the necessary tools are there for collaboration and knowledge sharing? Any suggestions for improvement?
5 From your experience, can you describe the organizational learning activities within NBI? Any suggestions.