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Study on Human-Computer Interaction Design for Organizational Knowledge Management Portal

by

NUR HIDAYAH BT. MOHD ZAWNWI

SID: 11287

NRIC: 891002-05-5382

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Nur Hidayah binti Mohd Zawnwi

Dissertation submitted in partial fulfilment of
the requirements for the
Bachelor of Technology (Hons)
(Business Information System)

MAY 2011

Universiti Teknologi PETRONAS
Bandar Seri Iskandar
31750 Tronoh
Perak Darul Ridzuan

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

(NUR HIDAYAH MOHD ZAWNWI)

CERTIFICATION OF APPROVAL

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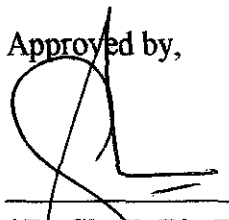
Approved by,



(Dr Shuib Bin Basri)

DR SHUIB BIN BASRI
Senior Lecturer
Universiti Teknologi PETRONAS
31750 Tronoh
Perak Darul Ridzuan, MALAYSIA
Phone: 605-368 7407
Email: shuib_basri@petronas.com.my

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ABSTRACT

Knowledge has been identified as the most crucial commodity in many organizations. To achieve competitive advantage among its competitors in the industries, an organization should take further step ahead to nurture strategies on how to manage knowledge assets as effective and as efficient as possible. However, though the knowledge management system is exist in an organization, it is not fully utilized by the end users due to many reasons like corporate culture, lack of motivation, technology issues, lack of user-friendly layout, etc. The aim of this project is to study the relationship between human-computer interaction and knowledge management system and how these two major elements work together to achieve knowledge management system objectives in a corporate environment. It explores the importance to satisfy user requirements to grant the success of knowledge management system. In addition, the aim is to obtain and shares the efficient and effective strategies on how to build the interactive and friendly user interface for the organizational knowledge management system.

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CHAPTER 1

1.0 INTRODUCTION

Lack of external resources and resources similarity for all organizations make internal resources as the only and the best way to achieve competency and competitive advantage. Organizational knowledge is considered as an internal resource of organization competition and a kind of strategic capital, the more the knowledge is being expanded in the organization, the more the capacity of competition. Increase of learning capability and organizational knowledge as internal resources is the best way for being survival and successful for a long run as well as answer to threats and use the opportunities imposed within the industry. For creating life-long learning, organizations must concentrate on their organizational learning. *Organizational learning is the only sustainable competitive advantage therefore the need for organizational learning has been recognized by many organization (Stata, 1989).*

Organizational learning has been defined in many interpretations. However, the following definition by Huber is quite appropriate and relevant for the perspective expressed in this project. *Organizational learning is nothing else than* ***knowledge acquisition*** *by units of organization and recognize that as useful potential and develop a unit interpretation of knowledge. Moreover,* ***knowledge sharing*** *leads to a new and broad organizational learning and organizational memory has an important role in organizational learning (Huber, 1991).*

From a past decade, the discipline of knowledge management, which is a dynamic process, has recently being one of the interest field in academia, among individual practitioners as well as corporate practice and has become one of the most frequently subject to be discussed in the business literature. There is no absolute definition for knowledge management due to its concept complexity and each researcher defines knowledge management base on his/her viewpoint. However, out of many definitions of knowledge management created, the definition by Dalkir is quite appropriate and relevant in this project. *Knowledge management is a systematic approach to acquire, organized, management, distribution of knowledge as well as convert the knowledge to be usable and practical form in order to reduce costly rework, work faster, efflorescence potential of individual, using employees skills, promoting ideas and innovations to create a more efficient and effective organization (Dalkir, 2005).*

Definitions of organizational learning and knowledge management confirm the close relationship between these concepts; however, it is not clear because these two elements are mixed together. *Organizational learning as a knowledge management capability and also point out that organizational learning enhance tendency to knowledge sharing and knowledge accumulation (Lie, 2009).*

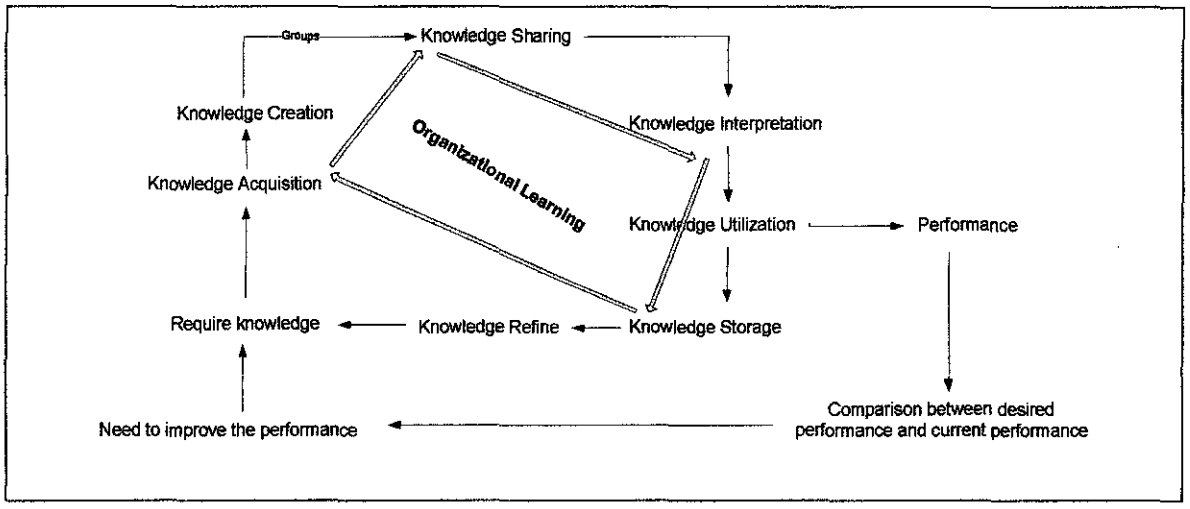

Figure 1: Model on relationship between Knowledge Management and Organizational Knowledge

Based on the above figure, the model shows that knowledge management and organizational learning are closely related and occur concurrently. Knowledge acquisition leads to creation of new knowledge. Employee will utilize the knowledge created and groups will utilize it after sharing knowledge. It can be said that these interactions will improve both and consequently improve organizational overall performance.

Additionally, knowledge management system quality plays an important role in sustaining competitive advantage because it helps the organizations to manage their most important strategic asset; Knowledge. There are many IT systems that can support effectively these knowledge flows. The right information system able to support these knowledge flows is the knowledge management system, which can enhance the creation, accumulating, and dissemination of organizational knowledge. Herein, knowledge management system is regarded as the technology that facilitates the carrying out of knowledge management.

However, it is not easy to grant the knowledge management success. Many considerations and influences have to take into account and considerations. A successful knowledge management system should perform the functions of knowledge creation, storage/retrieval, transfer and application well. However, other factors also can influence the knowledge management success. These include the focus of the system (who is the ultimate users), the quantity of knowledge to be captured and in what format, who are the filters what is captured, and what reliance or limitations are placed on the use of individual memories.

Malhotra and Galetta (2003) identified that user commitment and motivation towards the system plays the important success factor for knowledge management system. They found out using incentives did not guarantee a successful knowledge management system. Obtaining user commitment and motivation to apply the system into their daily work activities can done through many ways depends on the certain circumstances. One of the ways is to keep the user of the knowledge management

system on the forefront which means ensure that user will not only actively involved in the future refinement of the system, but also in the initial design and prototype stages.

Use preferences have to be taken into account for ensuring buy-in by the user community. Failure to gain users' buy-in can potentially lead to the lack of system acceptance. The knowledge management system has to be ensuring to be well intuitive to use. Effective interface design and user-friendly knowledge management system is one of the ways in order to achieve this objective. The interface layer of the system is the primary point of contact between the users and knowledge management system content. The top layer moves information in and out of the knowledge management system as well as provide to connect to the people who use this IT infrastructure to create, explicate, use, retrieve and share knowledge.

Here the need of effective and efficient human-computer interaction plays the vital role to ensure the success of knowledge management in the organization. The rapid high technology development has show that the direction of human-computer interaction design is leading to the great harmony interaction between man and machine. All the human-computer interaction design principles should be well applied in order to design and develop the friendly, easy-to use and easy-to-learn interface layer for knowledge management system since the interface layer must provide a channel for tacit and explicit knowledge flow across the organization.

The essential step in tacit knowledge transfer between people is the conversation of tacit knowledge to information and back to tacit knowledge. Whether this transfer happens through formal processes such as knowledge capture in databases or through informal mechanisms such as conversations, this intermediate steps is almost always involved. The implication of this **intermediacy** is that knowledge can be transferred through something as complex as an intranet or a discussion database or through something as straightforward like face-to-face conversation. Technology is not precursor to knowledge exchange but an enabler in situations that do not allow for face-to-face knowledge transfer.

1.1 PROBLEM STATEMENT

Knowledge Management Systems are systems designed to manage organizational knowledge as well as medium to enhance and support organizational learning. However, there are many key factors can affect the success of knowledge management system.

Nowadays, a lot of enterprises failed in implementing knowledge management system projects. Many reasons can be determined regards to this failure. One of the main reasons is that they failed to obtain full user commitment, motivation, as well as awareness to fully utilize the systems during daily working hours due to the poor interaction between the system and the user itself. Moreover, perhaps the knowledge management system does not satisfy their requirements very well and also the overall communication processes between the user and the machine do not reach their expectations. An efficient knowledge management system quality will support organizational learning capability by enhancing its ability to create, gather, organize and disseminate knowledge.

Thus, this project will be studied on the reasons of failure of knowledge management system in a company namely Company ABC. Currently, Company ABC is embarking its organizational learning through promoting and strengthening knowledge sharing culture within the organization. Company ABC plans to leverage their knowledge management portal system as a platform to enable knowledge sharing culture. However, on the first implementation of knowledge management system in this company, they failed to meet the objectives of the systems development due to many reasons. Among the reasons identified, the most critical part is the employees of this company did not fully utilize the systems and also they do not recognized the importance of knowledge sharing culture in the organizations.

Generally, the employees of Company ABC which are the ultimate user of the knowledge portal system, has listed a few reasons on why they are quite reluctant to use the system. The reasons are:

1. Access to the system is slow and they have to wait longer until the loading processes completely done due to much navigation and images on the system landing page.
2. Users feel not motivated to login into the system due to the unfriendly system interface layout hence resulting in the unsatisfied user experience while accessing it.
3. The system search engine did not satisfy the user's needs due to the knowledge hoarding that occurred in the organization.

1.2 OBJECTIVES

1. To study and gain understanding the correlation between knowledge management system and human-computer interaction and how each of these works together to ensure the success of organizational knowledge management.

2. To develop new user interface as the top layer of knowledge management system for Company ABC as a medium for knowledge sharing.

3. To provide preliminary recommendations based on the previous objectives for improving the Company ABC knowledge management system in terms of their user interface layer in order for the system to reach the ultimate user satisfaction.

1.3 SCOPE OF STUDY

This study focuses on:

- Study on how knowledge management can contribute to the organizational learning process.

- Study on how human-computer interaction principles and knowledge management system work together in order to grant the success of the knowledge management system.

- Understanding the criteria needed to develop the interface layer for knowledge management system that will satisfy the ultimate user satisfaction while having access to the system.

CHAPTER 2

2.0 LITERITURE REVIEW

Exploring the Perceptions of Knowledge Management and Knowledge Management Systems

There is no ultimate definition for knowledge management and the term can be interpreted in many ways based on the specific point of view. Knowledge management has been defined by Gray (2000, p.10) as the "organizational process for acquiring, organizing, and communicating both tacit and explicit knowledge so that others may use the knowledge to be more effective and productive". Knowledge management is also define by Civi (2000, p.169) as the "acquisition, sharing and use of knowledge within organizations, including learning processes and management information systems". Whereas Darroch (2003, p.41) has also define knowledge management as the "process that creates or locates knowledge and manages the dissemination and use of knowledge within and between organizations". Moreover, knowledge management is important because it is the force and strength of collective understanding and knowledge to enhance innovation and responsiveness in one particular environment. Knowledge management also brings its own objective which is aimed at influencing and designing processes of knowledge integration and creation, involving the processes of knowledge sharing. Slagter (2007) stated that knowledge management focuses on ways of sharing, storing and maintaining knowledge, as a mean to improve efficiency, speed, and competency of individuals within in organizations therefore increasing the profitability, flexibility and adaptability.

Meanwhile, knowledge management system is technical infrastructure that will support/enhance the processes of knowledge creation, knowledge sharing, knowledge storage, knowledge retrieval as well as the application. The main goal of knowledge management system is to support knowledge or organizational memory. *Knowledge management system is simply way of allowing employees to access the information they need instantly (Sasson and Douglas, 2006).* Knowledge management systems are necessary and important for organizations seeking development and competitive advantage.

Assessing Organizational Learning and Knowledge Management for Improving Performance

In the uncertainty environment with rapid changes in the knowledge economy, organizations should try harder and put more effort for survival and remain competitive. Learning and adapting faster than competitors is one the best ways to remain the conditions for organizations. The dynamic process of acquiring, evaluating, integrating, deploying and exploiting knowledge is critical to the efficient management of decision making and organizational learning capabilities and realization of competitive advantage. In the literature, innumerous definitions about organizational learning have been presented. Organizational learning can be summarized as the way of organization acquire knowledge through the years of experience gained, how the knowledge being stored and shared across the organization and therefore recognized it as one of the important intangible asset that need to be enhanced in order to give the positive impact to organizational performance. The factors that improved organizational learning are; supporting the personal relationship between experts and knowledge users, providing incentives to motivate users to learns from experience and to gain benefit from knowledge management system, providing distribute databases to store knowledge and pointers to knowledge, providing work processes for users to convert personal experience gained into organizational learning and lastly providing direction to what knowledge the organization needs to capture to produce learning.

Based on the previous section on the knowledge management definition, there are close relation between these concepts however it is not clear since these two elements are mixed together. Organizational learning prepares the necessary opportunities and conditions for knowledge management implementation. In order to embed knowledge management into one organization, the organizational learning culture needs to be promoted among the employees in order to urge them to share the knowledge among each other as a new way to improve decision making quality and competitive advantages requirements. An efficient knowledge management system quality will support organizational learning capability very well by enhancing its ability to create, gather, and organize and to disseminate knowledge across the organization. Thus, the benefits of using knowledge management systems are highly recognized because they include the ability of the organization to be flexible and to respond more quickly to rapid changing market conditions, and the ability to be more innovative as well as improving the productivity.

As discussed former, organizational learning promotes all types of organizational performance, regarding to the relation between organizational learning and knowledge management, performance will be affected positively by knowledge management. On the other words, it can be said that the interaction between organizational learning and knowledge management will improve both and consequently improve organizational performance to gain competitive advantage in the industry. The conclusion is improving organizational learning increased the likelihood of knowledge management success.

Background studies and main issues of human-computer interaction

The effective human-computer interaction has been recognized as a very promising and challenging area for both research and applications. The objective of an interface is to adapt system responses to the user effectively in a complex computer based task. In the context of human-computer interaction, the relationship between a human and a computer involves many factors such as the computing environment, the nature of the tasks to be performed as well as various characteristics of users. The effectiveness of a human-computer interaction interface is influenced greatly by its ability to adapt to these factors. According to Hutchins (2009), an interface can be seen as mediating structure or representation both internal and external, which changes the way a certain task can be carried out. On the other hand, it shows that webpage human-computer interaction closely related to the information exchange efficiency and user's experience. It also highlighted that webpage interface design becomes one of the important fields in human-computer interaction among others [13].

In addition, for the last few decades, human-computer interaction interface design based on the 'computer-center' and people at that time is forcefully to adapt and learn the machine interface and languages. Obviously, it was really harsh but people had no choice but using the computer applications with highly computer literate and properly trained until somewhere in 1980s [18], they started to think and realized the human limitation. Hence, the problem arise was about on how to create technologies so that human can exploit and maximize their potentialities and easily help humans to accomplish different kind of task in their daily activities [17].

Interface Design: An Embedded Process for Human Computer Interactivity

Incorporating human interactivity and screen design requires deep understanding of the user and their behavior which is not part of the traditional tasks of most designers and programmers. Initially, many human factors did not play a major role in user interface design. Individuals involved in human behavior factors were brought into the projects in the middle or later until they were no longer needed. However, currently, the direction has been moving into incorporating the behavioral domain of the user interaction developer that is responsible for class definitions, interaction design, and human factors engineering. Increasing interactivity is a major goal of every software design, which requires mirroring user behavior. Nevertheless, we do not know how the user of the system will react to the system therefore designers must develop requirements that reflect the intended user or target audience. Several tasks may be performed concurrently for designers who want to reach user expectations; task analysis, user and audience analysis, market analysis and cultural analysis.

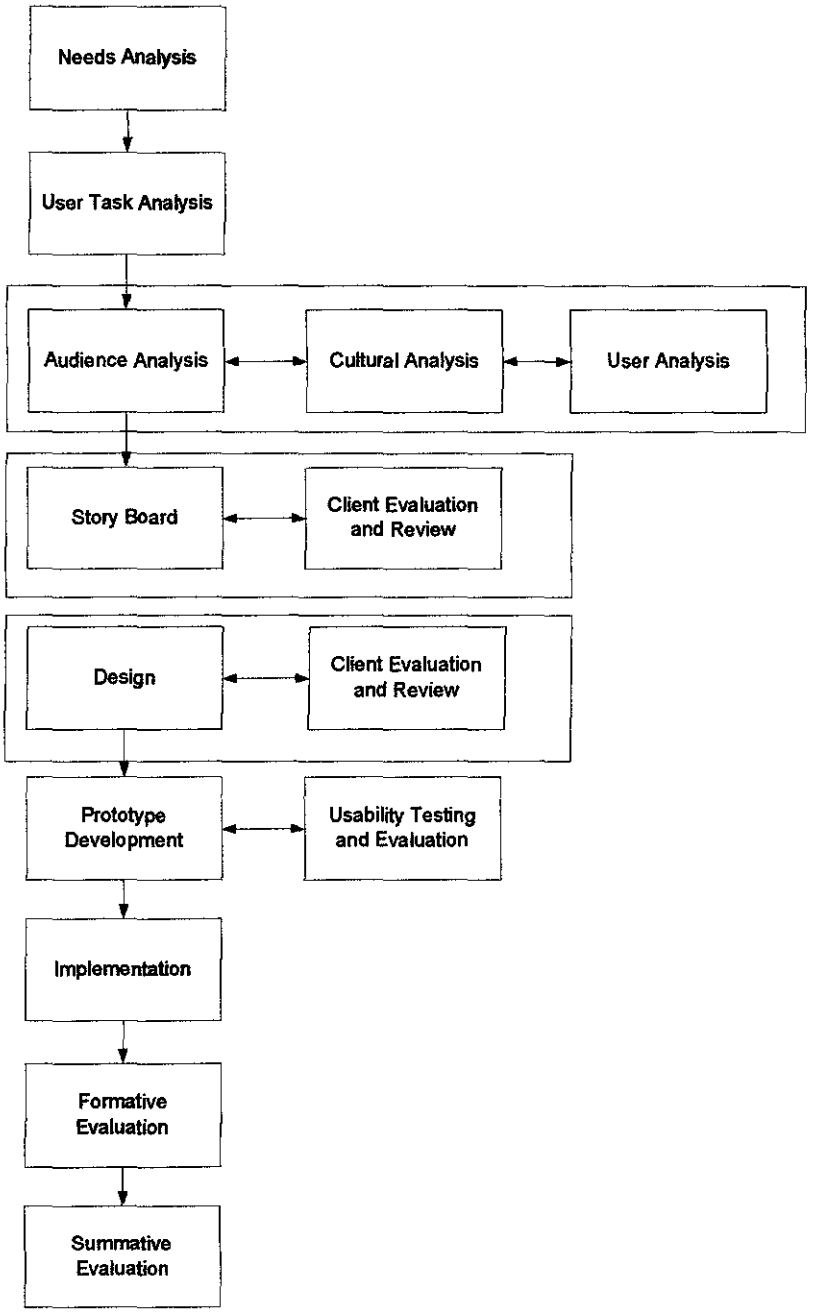

Figure 2: User interactive design process

Figure 2 describes the processes of computer user interactive design process that would be embedded as part of the system development project. Based on the figure above, task analysis is about communicating with end users on their tasks or job functions paint a picture of their role during interactivity. It is not enough to address the user's perception for the systems and interactivity based simply on tasks that the software must provide but designers must look beyond the nature of what the systems

should do or provide for the end user. Next, the audience analysis is all about to investigate and gather the end user information background and skill level in order to understand the user very well. One of the essential ways is through interview techniques though the cost factor is time however doing right the first time can create the project on budget and on time. The audience is the ultimate customer, getting buy-in form customer is important. Meanwhile, culture analysis is about gathering and evaluating cultural information in an organization. Cultural diversify can exist in an organization where the companies employ many individuals from various cultures who may use the system that is to be developed. Culture diversify is a serious issue in interface design due to the fact that different cultural group may react to features such as design and color of the interface itself differently. Initially, including potential audience is an advantage that allows them to be part of the processes as well as provide the user with the sense of ownership regards to the project. There is no limit to the number of evaluations a designer should implement since the more data gathered the greater success of the screen design.

User Interface Development throughout the System Development Lifecycle

The user interface is a primary aspect of the system: the user interface defines how users interact with and how they perceive a system. The implication is that because the user interface is of primary concern to the users of a system, the people that a system is built for, that the development approach taken by the builders of a system should reflect this fact. *Pointing out that user interface development should be started as early as the requirement phases (Raskin, 2000).*

A common principle of software development is that requirements should be analyzed to better understand them. Hence, because there are user interface aspects to the requirements process, therefore it must be well analyzed by the designer. It then follows that user interface development must be an important aspect of design, a concept borne out by the plethora of excellent user interface design books on the market, as well as the implementation. It is clear that user interface development spans the entire system

development process, from requirements up to delivery phase. For the software process to truly reflect the needs of real-world development in must include user interface development as one of its integral aspects.

Knowledge Engineering in Adaptive Interface and User Modeling

Generally, an adaptive interface should be able should be able to offer an effective interaction and allocate tasks dynamically between the user and the computer system. A well-designed interface can provide much more helpful information in a more appropriate manner during the interaction period, especially for those users who have limited experiences. It is not unusual that users are frequently confronted with an overwhelming amount of information in interacting with computers. In these situations, it has been found that users do not usually perform optimally due to the lack necessary information to adjust their behavior. The adaptability of an interface is helpful for users to increase user proficiency with a new system and allow novice users and experts to use the system equally. User modeling, a process of establishing a collection of the system's beliefs about various user characteristics, has become an important component in adaptive user interface. Generally, an adaptive user interface has the advantages; the system knows what the next optimal response should be to help the user perform the specific task, be able to provide the basis of explanation of the solutions to the user hence the system become more acceptable to the user, and the system also will be more effective and efficient to use in terms of both quality and cost of the performance.

Knowledge acquisition and representation in user modeling play a vital role in order to incorporate knowledge about the users and their tasks in a structured way. There are three approaches for establishing a user model; classify the users from novice to experts based on their operational proficiency, compare the user knowledge against the expert's knowledge and finally characterize users by a set of stereotypical traits. In the user modeling process, consistency is a major concern in this process. The acquired knowledge should be incorporated into the existing user model without causing any contradiction. Usually default reasoning and evidential reasoning are utilized.

Guidelines and Principles of Interface Design

In many systems, there is a grand opportunity to improve the user interface. Bad experience such as inadequate functionality, cluttered display, etc while going through a system can generate deliberating stress and anxiety. These experiences can lead to poor performance and all contributing to job dissatisfaction and user frustration.

Guidelines document helps by developing a shared language and promoting consistency among various interface designers in terminology, appearance and action sequence. For the interface navigation, there are useful guidelines and advice regards to the taste of their style; use unique and descriptive headings, use checkbox for binary choices, use thumbnail images to preview larger images, etc. Meanwhile, display design offers a few guidelines; consistency of data display, efficient information assimilation by the user, minimal memory loads on the user, etc. In addition, there are also several techniques for getting user's attention; choices of fonts, color, audio, intensity, etc. While guidelines are narrowly focused, principles tend to be more fundamental, widely applicable, and enduring. Few fundamental principles, beginning with accommodating user skill level, profiling tasks and user needs, choose the appropriate interaction style, use the eight golden rules of interface design, prevent errors from occur and integrating automation while preserving human control.

Design principles and guidelines are emerging from practical experience and empirical studies. A guidelines document aids the application of tools for user interface building, facilitate training of new designers meanwhile established principles have become widely accepted but require fresh interpretation as technology and application evolve over time.

2.1 FINDINGS FROM LITERATURE REVIEW

As a result, the findings from the literature review has been illustrated in one conceptual framework proven that there is a strong positive relationship between the effective and efficient knowledge management implementation and human-computer interaction user interface and serve as a platform in order to enhance organizational learning hence to enhance organizational profitability, productivity, decision making quality and competitive advantage.

Conceptual Framework

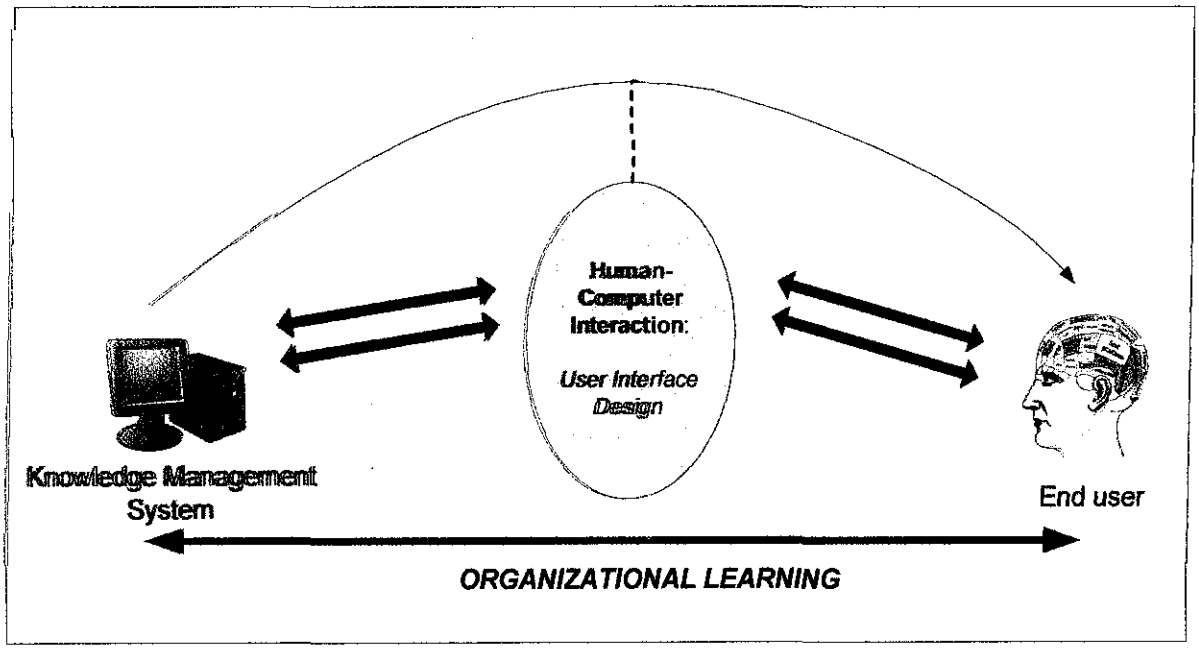

Figure 3: Conceptual Framework

CHAPTER 3

3.0 RESEARCH METHODOLOGY

3.1 PROJECT METHODOLOGY

Initially, the project methodology is depicted in Figure 4, which shows four high level steps that will be performed in this project:

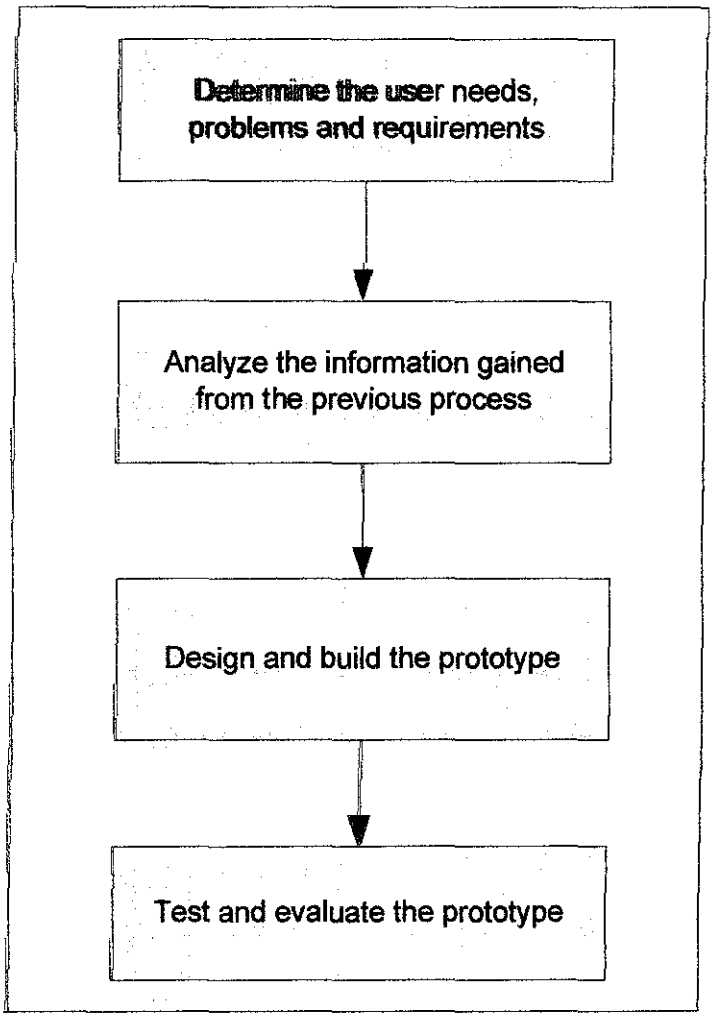

Figure 4: The iterative steps of project methodology

This four high level methodology, several activities and processes will be performed iteratively in each steps until the system is complete.

Step 1: Determine user needs, requirements and problems

As for the first step, it covers information gathering from the target user of the knowledge management portal system which is the employees of Company ABC. The main method used is questionnaire as well as interview in order to collect the relevant information for the project analysis.

Questionnaire

Questionnaire is a simple and faster way to retrieve information needed because the responses gained from the respective respondents are gathered in a standardized way yet required least cost. The main objective of having questionnaire in this project is to conduct knowledge audit analysis, identifying the problems regard to current knowledge management portal, and to determine user's needs and requirement from the current system from the main user point of view. The questionnaires are distributed to the representatives of each division. All the representatives will be briefed on what are the objectives of having the questionnaire session as well as on how to fill in the questionnaire in order to be more usable for the analysis.

The questionnaire is designed in the table form therefore it will be more understandable by the respondents. The question is separated into two sections; capturing of all knowledge produced (knowledge inventory in terms of softcopy and hardcopy), and identifying the knowledge needed and gaps that is faced by the respondents. The type of question used is mixture of close-ended question as well as open-ended question. The method used for the questions is depending on the analysis requirements. For instance, for the first section, the close-ended question type is used meanwhile the open-ended question is more suitable in the second section.

In the first section, respondents are asked to list down their knowledge inventory that resides in the company based on their division. For instance, "what is the current knowledge used in your division?", "please specify the knowledge producer and consumer", "what is the frequency of the knowledge produced?" etc.

In the second section, the respondents are asked to list down their knowledge needed, knowledge gap as well as the recommendations based on their division. For instance, "what are some of the improvements you would like to see in a new system?", "why you do need that knowledge", "what are some of the improvements you would like to see in a new system?" etc.

Interview

An interview is the most commonly used requirements-gathering technique. The main objective to conduct the interview is to seek information validity from each of the head of division regards to the information gained from the questionnaire session. After all the questionnaires are obtained from each division, the result will be sorted and depicted in the diagram before it will be presented to the head of division (HOD) during the interview session.

The interviews are conducted one-on-one due to the difficulties to put all the people on one schedule. Besides, one-on-one interview is more appropriate in this project in order to urge the respective HOD to share some of the confidentialities comfortably. During the interview, each of head division will be asked and seek for their comments about the information that has been given by their staffs. The knowledge flow of each division will be showed to the HOD whether it is correct or whether the flow needs some improvement or adjustment regards to the current situation. After the interview session, all the result will be analyzed and concluded in order to be used during the system design and implementation.

Step 2: Analyzed the information gained from the previous process

Information gathered from both interview and questionnaire must be audit which the result will be use in the design and development of the knowledge management portal. The data must be carefully assessed in order to determine the weaknesses and problems of the existing knowledge management portal. However, not all the system weaknesses will be covered in this project. The focus would be on how to improve the existing system graphical user interface and user interface designing work will be done to make the knowledge management portal more interactive, user-friendly and informative enough.

The walkthrough has been done to have the short glance of the existing system especially in terms of the user interface design and how the interface interacts and response to the user. Based on the screenshots, all the screenshot will be analyzed based on comments and problems provide by the user in order to identify the improvement opportunities in terms of user interface design.

Step 3: Design and build the prototype

As for this step, the system is named as KM-Portal which is stand for Knowledge Management Portal. A lot of research and literature review are conducted in order to seek reliable information regards the human-computer interaction current issues and on how to optimize knowledge management portal performance by having an interactive and informative user interface. This portal alive on domain name ***http://localhost/KM-Portal***

Step 4: Implement and evaluate the prototype

After a version of the user interface knowledge management portal is built, it needs to be evaluated and tested by the user to verify it meets their needs as well as to show the improvements compared to the existing system. This is to ensure the system effectiveness and of it meets the requirements.

3.2 RESEARCH CONTEXT

The research will be targeted on the one Company ABC employees who consist of six divisions:

1. Investment division
2. Finance division
3. SHCM division
4. KRIS division
5. CSS division
6. MDO division

On each division, there will be several sub-units within it. However, only the Investment division will be most applicable as the co-pilot for this project.

3.3 TOOLS

Among the technology software and hardware used in the development of the knowledge portal interface are:

Software	Hardware
1. Web content management system (WebCMS) Joomla 1.6 2. XAMPP Serve consisting mainly of the Apache HTTP Server, MySQL database, and interpreters for scripts written in the PHP and Perl Programming languages.	1. Inte; Centrino Duo, Core 2 Duo processor T5500 1.66GHz 2. 512 MB DDR2 3. 160 GB HDD

Table 1: Software/Hardware used

CHAPTER 4

4.0 RESULTS AND DISCUSSIONS

For result and discussion chapter, it will be separated into two parts; pre-result and post-result. Pre-result will discussed the result of the data gained from respondents through questionnaire, interview and walkthrough of the existing system session. Meanwhile, post-result would be the new user interface design of the new system.

4.1 PRE-RESULT DISCUSSION

Questionnaire

Questionnaire has been distributed among the 10 representatives from each division. The main purpose of the questionnaire is to conduct the knowledge audit within the Company ABC as well as to identify the knowledge gap and weaknesses of existing system. These are also made to seek recommendations from the user point of view to ensure the effectiveness of the new system in the future.

4.1.1 Knowledge inventory Analysis

A knowledge inventory is a kind of stock-take to identify and locate knowledge assets or resources throughout the organization. This involves counting, categorizing, and indexing of corporate tacit and explicit knowledge. Based from the questionnaire and interviews conducted, it is further discovered that there are up to 5 levels of knowledge inventory that currently resides in the company. These levels are identified based on the knowledge flow and looks how the knowledge resources move around in the organization, from where it is to where it is needed. However, not all the Knowledge Levels are being captured in the system. The level of the knowledge inventory is as follows:

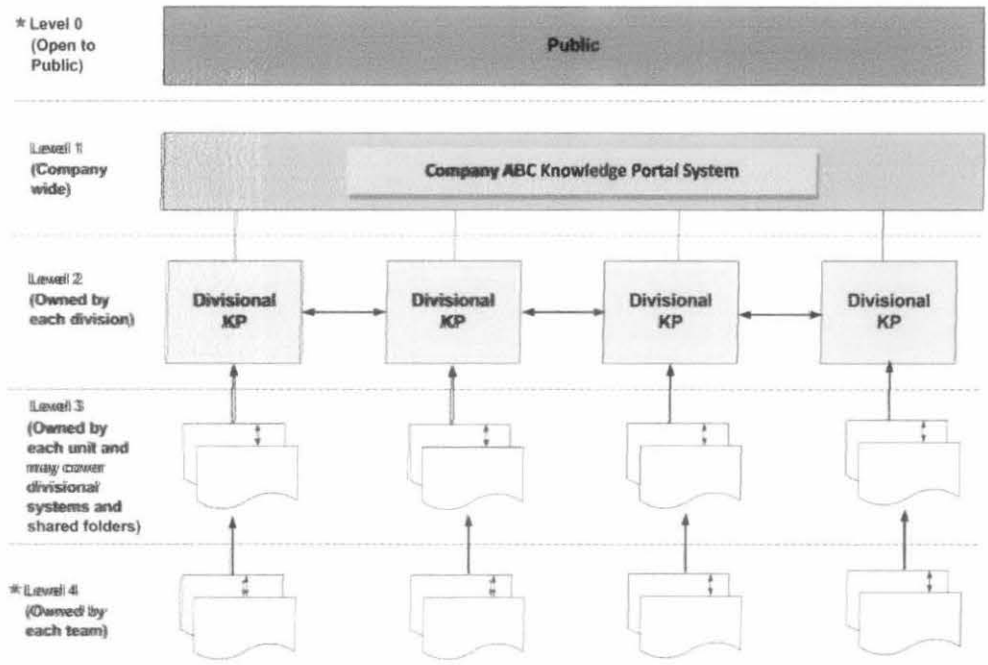

Figure 5: Classification of knowledge inventory

1. Knowledge Level 0

Company ABC shares with public their non-confidential information which is labeled Level 0. The external documents are designed with main consumer is the general public. Apart from the general public, Company ABC other stakeholders, (i.e. Ministry of Finance, Parliament) would elicit some information from this organization hence the documents produced is labeled at Level 0 as the knowledge consumers are outside the Company ABC.

2. Knowledge Level 1

Knowledge at Level 1 is currently stored in current knowledge portal system for easy access for all the employees. Although the knowledge is readily available on the existing system, most of the consumers of the knowledge are functional users who need the knowledge to perform their work. Example of knowledge that resides in this level is research materials provided by research division, templates, media clippings, press release, etc.

3. Knowledge Level 2

The knowledge produced at Level 2 is restricted thus the consumers of this knowledge are specific divisions that have work inter-linkage between two or more divisions (i.e. Financial reports from Finance division are consumed by Managing Director Office division). Besides, the knowledge produced at this level tends to be more specific (i.e. management report documents).

4. Knowledge Level 3

The bulk of knowledge in Company ABC resides at Level 3 where the knowledge is for the benefits or usage of the units that produced them. The knowledge produced also relevant to the users in the same division or unit. Example of knowledge that resides is consultant reports, division meetings minutes, K3P, etc.

5. Knowledge Level 4

Every division, consist a few units and a few teams. Hence, knowledge produced at Level 4 is relevant only to particular teams and won't be exposed easily though under the same division. This is due to the confidential reasons.

4.1.2 Knowledge Needed Analysis

The major goals of knowledge needed analysis is to identify what knowledge the organization, and its people possess currently and what knowledge they would require in the future to meet their goals and objectives. Besides, knowledge needed analysis is vital for company to develop its future strategy. Apart from collecting information on knowledge inventory residing in Company ABC, knowledge that the professionals needed to perform work is also asked. The most common requests for knowledge are listed as follows:

- Latest Organization Chart
- Limit of Authority
- Other division's policy and procedure
- Reports from Investment division
- Copy of submission from Investment Project Team

In the questionnaire, they highlighted that it is difficult for them to get hold of organization chart. According to the management, they classified that as confidential hence only authorized personnel are granted access. Those who want to get hold of organization chart need to follow the proper procedure assign by the management team.

Besides, the matter of difficulty in getting access to Limit of Authority (LOA) is an issue that has been brought by many respondents. However, the management team of Company ABC informed that there is distribution system to disseminate the LOA where only authorized and relevant individuals would be supplied with a hardcopy of the document. According to management, this is part of their risk management practice. Therefore, it would not be an issue if the users follow the proper procedure as defined in their respective K3P in each division.

Moreover, there are a few staffs mentioned the difficulties getting information on other unit's or division's K3P (Policy, Process, and Procedure). Based from interview conducted among the HOD, each division's K3P will remain confidential even though those HODs believe there is nothing confidential regards the policy of their respective units or divisions.

4.1.3 Knowledge Gap Analysis

Knowledge gap is what the company should possibly know and what it does know in order to support the competitive position that it has adopted. Meanwhile, gap analysis is basically the process of matching and comparing the knowledge that currently resides in the organization against those that they need for future role and competitive advantage. Those gaps must be aligned and must feed into each other to bridge the existing gaps. Regards to this project, it is imperative to understand and perform a current knowledge management assessment to provide better understand of current practices as well as key challenges that deter the development of knowledge management portal in Company ABC. It is also crucial to address the gaps to ensure that learning organization initiative's vision in achieving the future knowledge portal scenario will be achieved.

The assessment of the gap analysis for Company ABC knowledge management portal is based on three key focus areas namely People, Process, and Technology. People encompasses matters that are related to governance, culture, and competency while Process topics ranging from Ownership, Change Management to complexity of getting approval meanwhile Technology covers issues related to system performance, features, ease of use and others. However, for this project purposes, the key focus areas would be solely on Technology that regards to the current system performance and how the system meet the user's needs and requirements. Several key findings highlighted by the user under Technology key focus is as follows:

- Access system is slow especially on system landing page.
- Lack of user-friendly system layout.
- Lack of simple ways to download documents from the system.
- Lack of powerful search features.

Apart from highlighting the issues, user also mentioned several recommendations that may take into consideration while developing the new knowledge management portal system is as follows:

- The slow system performance can be attributed to many images and videos that contain in the system. Improving the speed of knowledge management portal system would promote increase use of the system by the ultimate user.
- Current layout is not user friendly. It needs to be changed to provide user with better experience while going through the system.

To obtain document from the system, user just need to use workflow system to get the document and knowledge manager will take the necessary actions to get approval to share the knowledge across the company.

4.1.4 Current Landscape

The figure below illustrates the look and feel of the current knowledge portal system.

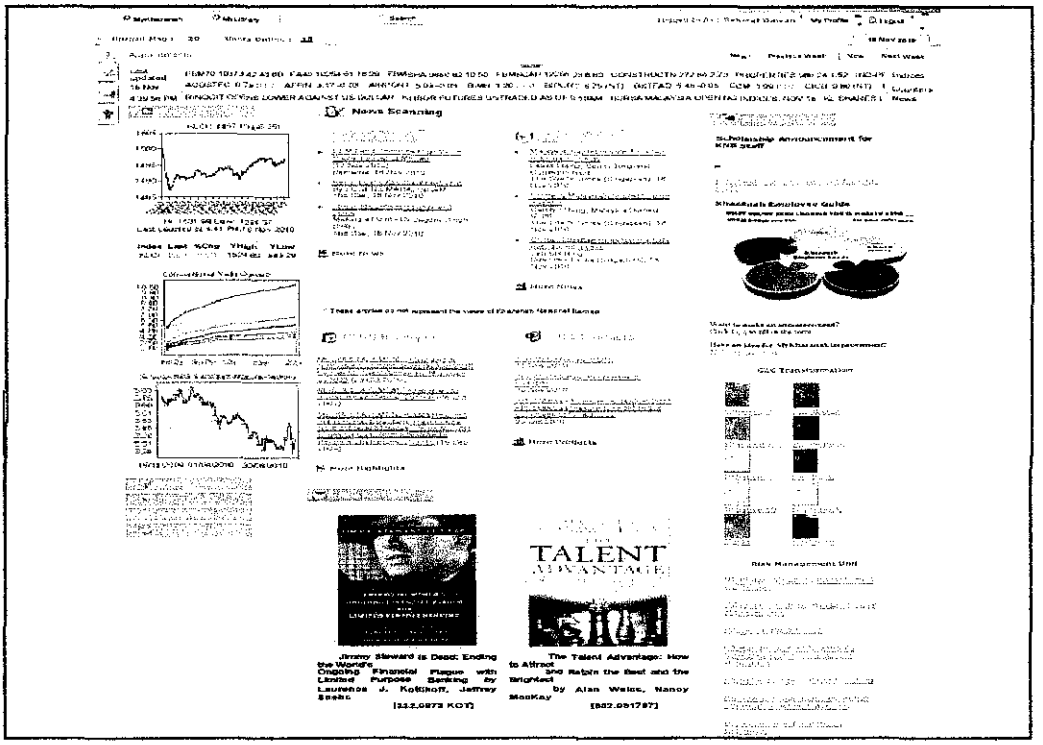

Figure 6: The current system landscape

Company ABC has leveraged on its intranet portal, to be used as platform to foster knowledge sharing between its going workforces. The interface design of current system is dated and it has not been able to keep up with its ever growing need to capture, retain, disseminate and apply new knowledge that staffs have been producing. Moreover, based on the screenshot on the current system, there are a few issues arise from the users with regards to the layout of the portal screen. The comments and issues arise as follows:

- When the user login into the system, they *do not know how to use the system.* The navigation structure not design based on their preferences. User unable to recognize the specific button functions quickly. Based on the feedback given, the current system did not provide the ease of use experience to the user.

- Most the information displayed on the homepage do not relevant enough to the user of the system. The information does not facilitate much in their daily tasks and also the user has no interest to read all the information that appears on the homepage interface. Besides, most of the knowledge does not stored properly in the knowledge portal due to the information hoarding and lack of interest to use the current system.
- The layout so unpleasant due to the situation which is too much information packed into a too-small space. From the user point of view, it is hard for them to focus or highlight to the specific information therefore the webpage is not effective for them.
- Due to the many elements compress in one layout, the loading process would be longer and take much time. Since the user have many tasks in their job, slow system performance provide them with unfavorable feeling and experience while using the system.

4.2 POST-RESULT DISCUSSION

4.2.1 Standard Layout

An example of a basic wireframe for Company ABC knowledge portal system's landing page for any visitor (with access) who logs into the system is depicted in the figure below:

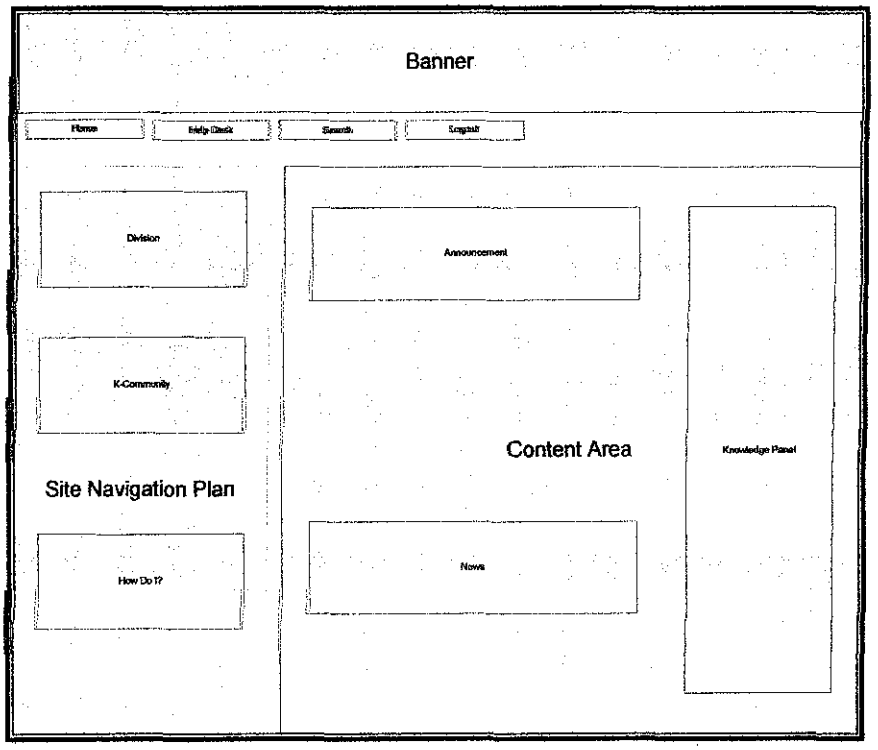

Figure 7: Landing Page Basic Wire Frame Layout

The different wireframe consists of the following components:

- ***Left Site Navigation Panel****: The left panel* is designed to be a permanent fixture for sites in portal to provide ease of site navigation. This is to ensure that the knowledge management portal system is presumed to be more users friendly as it contains links that is most relevant to the viewer. The three main sections under the Site Navigation Panel are:
    - Knowledge produced arranged by division.
    - Knowledge produced from organization community of practice.
    - Links to provide user guidelines regards to Company ABC.

- **Content Area**: The content area has the large portion of allocated space that is dedicated to provide valuable information to the users. Thus this area is the best used to display information that will be updated on regular basis to encourage users to visit the knowledge portal more frequently.

    - Knowledge Panel: The knowledge panel provides the viewer links to other knowledge at Level 1 arranged accordingly by divisions as the knowledge can be shared and disseminated across the organization.
    - Announcement: Announcement is allocated in the content area in order to provide the system administrator to communicate well with ultimate user.
    - News: Employee of Company ABC consume large amount of news on daily basis thus placing prominently on the content area would save users time to access to the news section. Having easy access to news would make user experience with the knowledge portal system better for the Company ABC professionals.

4.2.2 Design Approach

Initially, general approach to display knowledge level is depicted in the figure below:

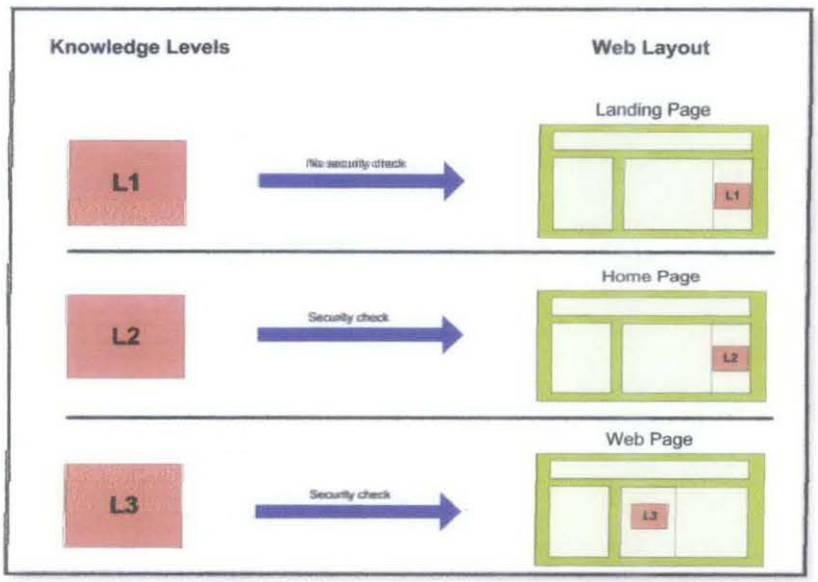

Figure 8: General design approach

4.2.3 The new interface design

Figure below illustrates the new homepage interface of Company ABC's knowledge portal system:

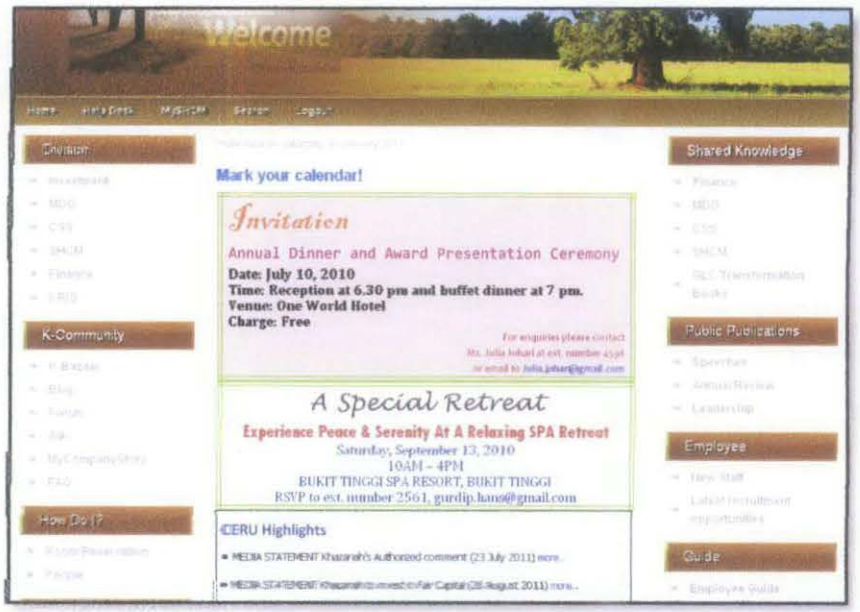

Figure 9: Knowledge Portal Homepage

- **Color identification**

  [23] Stated that color plays an important role in increasing accuracy of information identification and ensuring effectiveness and high-speed of human-computer interaction. Designers use many color to brighten up the information displayed to strike the viewer's eye. As above, the information links are placed in the high brightness background with bold; white with the black font color in order to make the user recognize and identify the information faster.

  Moreover, designer also put emphasis with color pairings. Poor combinations will appear to be more garish and difficult to read. As above, designer place black font on the soft pink background with the medium contrast level to reduce the challenge for the viewer to read the information.

- **Navigation design**

The navigation component of the interface enables the user to easily enter the commands to navigate through the system and perform actions to enter and access the information it contains. The main goal of navigation design is to make the system as simple as possible to use. All the command displayed is applicable and usable for user in order to execute some functions.

Menus For the navigation control, menu is the most common type used nowadays. For designer, menu-selection systems require careful task analysis to ensure that all functions are supported conveniently and that terminology is chosen carefully and used consistently. A menu presents a user list of choices that can be selected by clicking on an item with pointing device that takes minimal user effort. The menu is designated with broad and shallow on the left hand side of the interface. Broad and shallow menus enable the user with the most information initially therefore he or she can see many options yet with only few mouse clicks. In addition, menu items are written with familiar terminology and are organized in a convenient structure and sequence, users can select an item easily.

Regards to this project, pull down menu is applied because the simplicity thus reduce the learning curve for the user. Pull down menu is applicable which is clicking on a menu item brings more item; users can make selection by moving the pointing device over the menu items, which respond by highlighting, and clicking on the desired item. Moreover, pull down menu allows users to explore all the choices available for the system applications.

- **User Aesthetics**

Aesthetics is one of the important keys while design the interface because it refers to designing the interfaces that are pleasing to the eye and to attract viewer's attention. For this project, the all the news, updates, and menus are arranged with simple and minimal words used yet understandable with the appropriate font size, type and color, spacing, and intensity in order to create the effectiveness and convenience for user while going through the system. Although the font size is quite small but they are still readable and identifiable. Based on the previous interface, it has too much information packed into a small space with too little with space. Therefore, the important information needed is difficult to identify and recognize.

- **Consistency**

Another key element that plays a crucial role in human-computer interaction interface design is consistency. It usually refers to the one part interface of the system, so that all parts of the same system work in the same manner. When the interfaces are consistent with one another, users can interact with one part of the system and then know how to interact with the rest because they can predict what will happen or what will be look like next after. For this project, the consistency is applied on the menu navigation controls, button arrangement, color, standardized abbreviations, layout, fonts, labeling used in the interface. Therefore, significantly it will reduce the learning curve of the knowledge portal system.

4.2.4 Investment Homepage Screen Shots

Based on the information collected during the project earlier phase, Investment division would be the Business Case Study in order to come up with a prototype. The prototype covers that system layout from the landing page up to the summary of deals webpage. The Investment division site map structure is depicted in the figure below:

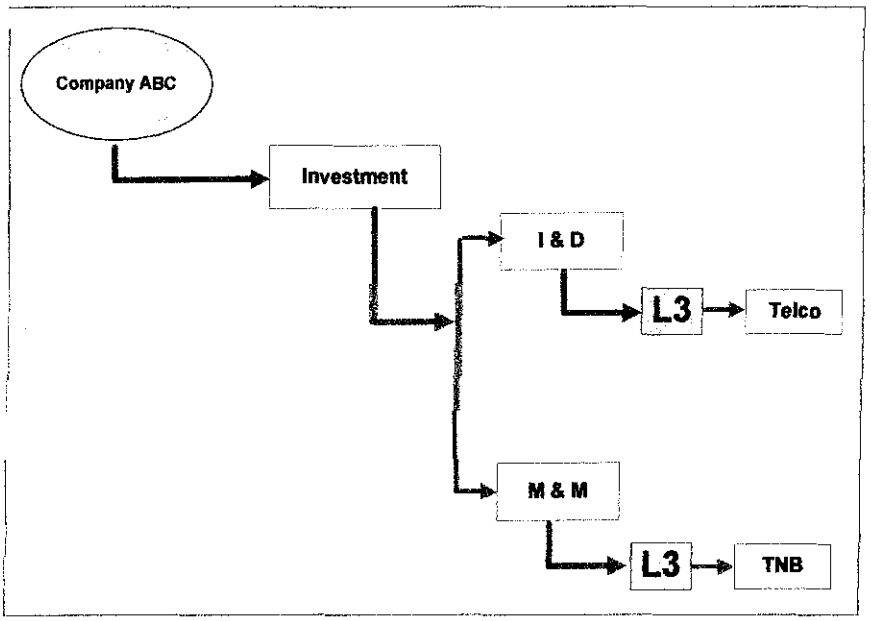

Figure 10: Site Map for knowledge portal system

Investment division consists of two units that operate concurrently namely Investment & Divestment (I&D) and Management & Monitoring (M&M). As stated, knowledge at Level 2 can be shared within the respective division and knowledge at Level 3 can be shared within the respective unit only. Based on the above figure, Telco is the type of deal summary that can be disseminated only within I&D unit and same goes with TNB that can be shared only within M&M unit.

Screen Shot 1

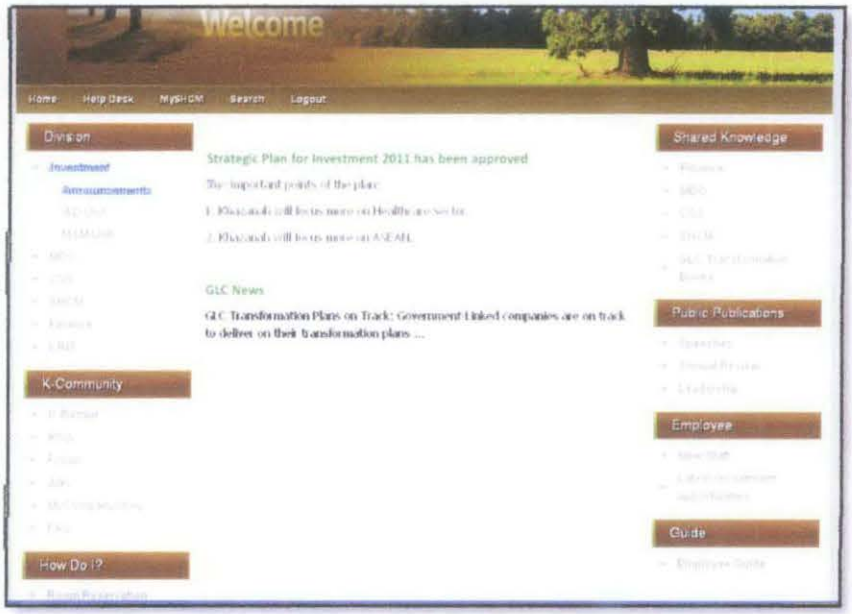

Figure 11: Homepage for Investment Division

From the landing page, Investment staff will arrive to Investment division homepage as shown in Figure 11. Space for the announcement that is relevant to Investment division would provide opportunity for Investment administrator to communicate directly to Investment staffs.

Screen Shot 2

Figure 12: I&D Webpage

Figure 13: Sample of I&D Deal Summary; Telco Corp.

From the Investment homepage, I&D staffs will arrive to their unit's homepage as shown in Figure 12 and Figure 13. They will be able to view the information that specifically related to I&D unit and allowed to download the document from the system.

Screen Shot 3

Figure 14: M&M Webpage

Figure 15: Sample of M&M Dashboard; TNB Board Papers

From the Investment homepage, M&M staffs will arrive to their unit's homepage as shown in Figure 14 and Figure 15. They will be able to view the information that specifically related to M&M unit and allowed to download the document from the system.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Knowledge management system plays a vital role to manage organizational internal asset; Knowledge in order to obtain competitive advantage in the industry. The implementation of knowledge portal as a platform and medium for the movement of knowledge in an organization will thus be seen as a core factor in the development of knowledge management. However, to ensure the success of knowledge management system, require commitment and motivation from the user to reach the system objectives.

One of the ways to encourage user to use the system is by producing the knowledge management system that contain interactive yet friendly user interface. User interface as the top layer of the system will enhance the interaction between the system and the user. The interface designed has to be interactive and well intuitive to enhance the usability of the knowledge management portal system. Identifying user needs and requirements is important to reach the user satisfaction. Fail to do so will cause the user to discard the system immediately. The interactive human-computer interaction as a intermediacy between the human and the machine shall be seen as core factor in development of knowledge management system.

User interface design should be recognized as the core factor that needs to be careful and well considered during the knowledge management system development process.

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APPENDICES

Project Timeline I

STAGES AND ACTIVITIES	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13
Title Selection/Proposal													
Construct the project plan													
Consultation with supervisor													
Research and literature review													
Consultation with supervisor													
Extended Proposal Submission													
Research and literature review													
Consultation with supervisor													
Proposal Defense and Progress Evaluation													
Interim Report													
Consultation with supervisor													

Project Timeline II

STAGES AND ACTIVITIES	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13
Registration for Final Year Project II													
Refine FYP I													
Post Mortem FYP I													
Interview/Questionnaire distribution													
Analyst System													
Design System													
Progress Reporting													
Develop System													
Pre Edx													
Dissertation													
Oral presentation													
Technical Report Submission													

Knowledge Needed

Business Function :	
Please list the knowledge that you need to carry out your work.	
Why do you need this knowledge?	
What is the source of this knowledge?	
Are you able to get this knowledge currently? If no, please specify why and recommend your solution?	

Knowledge Gaps

Business Function :		
Areas	**Gaps**	**Recommendation**
People -Governance -Culture -Competency -Others		
Process -Ownership -Change Management -Relevance -Others		
Technology -Responsiveness -Access -Features -Others		

Thank You