Knowledge Discovery System

by

SITI FARAHAH HASSAN

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

JANUARY 2006

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CERTIFICATION OF APPROVAL

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Approved by,

_____

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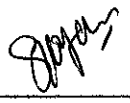
CERTIFICATION OF ORIGINALITY

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.



SITI FARAHAH HASSAN

ABSTRACT

Information and Knowledge are critical assets that organizations strive to obtain particularly from their competitors. However, they sometimes overlooked the important assets (information and knowledge) that lie inside the organization itself. The objective of the proposed project is to provide a means for organization to manage their intellectual capital via knowledge discovery system. In addition, this project focuses on developing a knowledge discovery system that aims to create a virtual workplace for people in organization where they can manage (upload, delete, download, edit, view and comment) their content and discover information and knowledge via automated categorized search features and peer reviews. These objectives aim to solve the problems that people within organizations usually have where they overlooked the experts resources they have, unable to find information resources when needed, and hard to communicate ideas or to share experience with people that have common interest. Waterfall model and Lotus Domino Designer 6 are used as the main methodology and tool to develop the proposed system. The developed project will provide a means of collecting, managing, sharing and locating information and discovery of knowledge within an organization.

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First and foremost, I would like to praise God Almighty who have helped and guided me through the tough times in completing my Final Year Project (FYP) in Universiti Teknologi PETRONAS (UTP). Without His blessing, I may not get to where I stand today.

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ABBREVIATIONS & NOMENCLATURES

Abbreviations

ESD	Engineering and Software Development
KDS	Knowledge Discovery System
KM	Knowledge management
IT	Information Technology
PETRONAS	Petroliam Nasional Bhd.

CHAPTER 1
INTRODUCTION

1.1 Background of Study

Globalization has introduces significant changes in the way business is being conducted. Thereafter, organizations focus swayed from low price product and services to producing quality products and going beyond meeting customers' expectation. Along the way, business firms realizes in order to sustain competitive advantage, they can no longer rely on physical assets solely. Consequently, managers began to promote innovations or birth of new ideas or knowledge in enhancing and designing products. Sveiby (1997) highlighted that "It is already realized that we have entered the knowledge era, a time when the economic value of knowledge has become greater than the value of physical products". The significant of the author's view is firms are indeed adopting strategies to manage (collect, disseminate and etc) intellectual capital or knowledge within an organization.

As a result, concept of knowledge management and knowledge discovery system practice came into picture. Knowledge Management is a management concept to manage knowledge capital by introducing into an organization a range of specific processes and practices for identifying and capturing knowledge, know-how, expertise and other intellectual capital, and for making such knowledge assets available for transfer and reuse across the organization. On the other hand, knowledge discovery is derived attribute or product of knowledge management which lay emphasize on managing a particular set of automated information and processes this information into extracted common pattern. Pohs, Pinder, Dougherty and White (2001) define information discovery as "a way to provide access to all the information that is relevant to a corporate environment without prior knowledge of its existence. Knowledge discovery system (KDS) will include all the elements of knowledge management, which is to enable knowledge sharing, capturing, disseminating and most important of all to enable a systematic search tool that will assist knowledge discovery process.

1.2 Problem Statement

1.2.1 Problem Identification

People are craving for information and knowledge that are core assets in gaining competitive advantage especially those in business environment. However, people or organizations sometimes overlook the information that they are looking for lies within the organization's boundary itself. Organization is build of people with knowledge and expertise in distinct fields. For instance, a senior programmer from the software development team or department might want to share his discovery or experience on programming tools and techniques that others do not know. Without having a virtual place where these ideas and experienced can be organized and archived, he or she might just have a chat with the colleagues sharing superb ideas which might ended as fruitless discussion. New sales staff that needs assistance in preparing his sales report not knowing to whom to refer to might waste hours asking around or flipping through files just to get a proper reference for his report. A marketing manager who is interested on the current marketing issues he read on a business journal found it critical for him to now what his other marketing colleagues have to say. Hence, from the three scenario described above, it is obvious that critical information and knowledge does exist in organizations waiting to be discovered. If these information and knowledge are not shared or managed properly, it would be a great waste to individuals and the organization itself. Even worst, we cannot retain good staffs forever and the ideas and expertise will be taken along as they leave the organization.

1.2.2 Significance of the Project

This project focuses on developing a prototype of the knowledge discovery system that intends to overcome the problems stated under Section 1.2.1. The target user for the KDS would be PETRONAS's staffs who have access to Lotus Domino server. The main intention of this system is to promote knowledge management practices via Knowledge Discovery System. Nevertheless, if the application is to be enhanced and used, organizations can enjoy various advantages regardless of their background whether they are from

business field or educational field. Among the advantages that will be gained are:

- Knowledge can be capture and manage

Ideas and expertise can be managed in a more systematic and automated approach. A web-based Knowledge Discovery system would enable knowledge aggregation and knowledge discovery or retrieval via the virtual workplace. This way, there will no longer be a fruitless discussion or unexpressed ideas since users can share their knowledge where it is stored together in the system's database.

- Reduced information retrieval process time via categorized search tool

Instead of asking around or wasting hours looking through manual filing system, it will be more efficient if articles and other informative material are stored together in a computerised system which is accessible via the company's intranet and internet. Plus, information discovery would be made easier to the user via automated search tool based on user preference (based on author, material type, topic and etc) that will speed up the retrieval process and eliminate the hassle to locate the required content.

- Personalized profile and content management

As mentioned earlier, firms are made of people with distinct skills and experience. It is impossible to know each and every staff even if they are working under one roof. By enabling users to edit their own profile stating their expertise and working experiences and background, locating an expert for a particular skill within the organization would not be a hassle anymore. Plus, the virtual workplace created will enable users to upload and share important information and customized their workspace. Users can share, update and review information of distinct multimedia materials that are classifies according to categories.

- Add values to content via peers comments

Sharing information is not enough to gain knowledge. Knowledge can only be gained when it is learnt via experience, or apprehending truth or fact through

reasoning, and intelligence. By incorporating the opinions and judgements of individuals that viewed our content, value will be added and knowledge can be gained as users evaluate those comments and improve their content.

1.3 Objectives and Scope of Study

1.3.1 The Relevancy of the Project

This project is developing primarily for assisting business firms to manage their intellectual capital via knowledge discovery within the organization compound. The value of the intellectual capital can be experienced by providing a means of sharing, exploring and discovery of knowledge within the organization. This application is just a prototype, which provides basic features to visualize how knowledge capital can be managed and how knowledge can be discovered within the organization compound via the proposed system. As a result from the development of this project, disseminating and discovery of knowledge in oneself or a common group will be made possible. The objectives of the proposed system are:

1. The main objective of the project is to provide a means to manage knowledge capital within an organization via knowledge discovery system. The application is just a prototype that will be built upon a virtually created company's environment. This is just to visualize how knowledge discovery system can provide a systematic way to manage information and knowledge discovery and sharing within the organization.

2. The second most important objective of is to developed knowledge discovery system that will create a virtual workplace where individuals can 'meet' and stay connected to each other by joining (upload/share, view, edit, comment and delete) forums and groups of common interest. Examples of group of common interest are sales and marketing, software development, and etc

3. To identify search criteria or categories of content to be classified as the search options.

4. The third objective is to build a search feature that will enable and enhance the knowledge discovery process. The search tool is the vital tool where it helps user to discover information easily by mapping the search criteria into significant common categories. For example, a user who wants to find article regarding new sales report format can just type in the term "sales report" and then further detailed the search by selecting one of the categories listed such as author, sales, experts and so forth.

5. The final objective of the project is to add value to content by incorporating individual's judgments/feedback.

CHAPTER 2
LITERATURE REVIEW

2.1 From Knowledge Management Concept

Flashing back the economic history, Law of diminishing returns in traditional economic theory contends that "the benefits to a company derived from each additional item it produces diminishes over time, since the company unable to make each additional item as efficiently as it could the initial items, due to high-quality input resources" (Koulopoulos and Frappaolo, 1999, p.30). What had been evidently predicted from this economic theory was the industrial sector of the west would stop growing as it production reaches the diminishing returns state. On the contrary, managers and entrepreneurs realize the existence core elements that introduce innovations – ideas. This is where the paradigm shift began as firms became more dependent on their intellectual capital rather than physical or tangible assets.

According to Koulopoulos and Frappaolo (1999),

> *Rather than encountering diminishing returns, those companies with best new ideas can expect increasing returns, as the costs of their products are invested in product design knowledge, which is amortized over the numbers of product sold. In addition, the more successful a knowledge-oriented company is, the more it is able to generate new knowledge, which begets even better products.*

According to Web content in Wikipedia.org

> *"Knowledge management (or KM) is an approach to improving organizational outcomes and organizational learning by introducing into an organization a range of specific processes and practices for identifying and capturing knowledge, know-how, expertise and other intellectual capital, and for making such knowledge assets available for transfer and reuse across the organization."*

Since the proposed system incorporates most of the elements of knowledge management concept describe above, it is clear that knowledge discovery system that will be developed is a derivative output of knowledge management and hence shall inherits its major criteria.

2.2 From sample Application Case Study

The Lotus Knowledge Discovery System from IBM

Lotus Development Corporation has been venturing into development of knowledge management suite for the past few years and on 2001, the development team have decided that knowledge management software should provide:

> *"Virtual places" where users can organize information, services, and tools to support their particular needs, while at the same time maintaining and updating information in a more general context"* (Pohs, Pinder, Dougherty, White,2001)

As a result from the above concept, Lotus has developed a knowledge management suite called The Lotus Knowledge Discovery System. To further support the concept, they identified two distinct components of knowledge management: knowledge aggregation and information discovery. The team determined two principles that drive knowledge aggregation:

> *(1) Individuals and teams need virtual places to work, make decisions, and act.*
>
> *(2) Virtual* places should include applications, collaboration services, and personal *services.* ((Pohs, Pinder, Dougherty, White,2001)

From the components identified above, they supported the first and second objective of the proposed project that is to provide a means of knowledge management solution and to create a virtual place for people to work together in the process of achieving knowledge.

Sometimes, just talking to an expert is the best way to learn. Information discovery is a way to provide access to all the information that is relevant in a corporate environment without prior knowledge of its existence.

The development team decided that an information discovery server should:

- *Automatically find, organize, and map disparate content*

- *Build a network to locate subject matter experts*
- *Add value to content by maintaining its context and by incorporating the opinions and judgments of individuals (Pohs, Pinder, Dougherty, White,2001)*

However, according to the web definition in Wikipedia.org

> *"Knowledge discovery is the process of finding novel, interesting, and useful patterns in data. Data mining is a subset of knowledge discovery. It lets the data suggest new hypotheses to test."*

From the statement above, knowledge discovery system has evidently been developed in the real life to manage knowledge assets in organizations. Though the web definition has given a different perspective of knowledge discovery, what significantly similar is both definitions from the web and by Lotus Corporation stressed on providing method to retrieve, search or discover the knowledge from a given set of data or information. Hence, the system that will be developed shall include similar elements as described in the Lotus Knowledge Management System.

CHAPTER 3
METHODOLOGY

3.1 Procedure Identification

The methodology that is used for this project is the waterfall model that is divided into six main phases as shown in the figure below. Identifying the right methodology for a short development cycle is important to ensure project completion. These six phases are as described below:

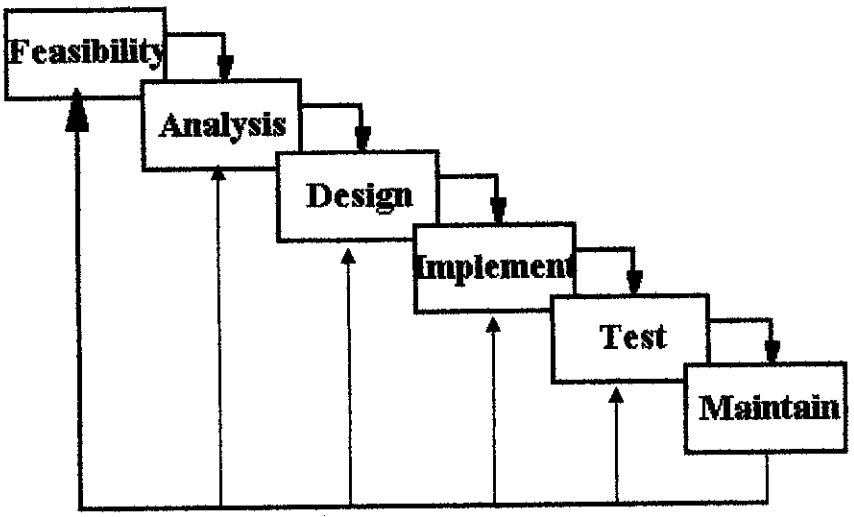


Figure 3.1 Waterfall model

Source: http://www.startvbdotnet.com/sdlc/sdlc.aspx

Advantages of using this Model:

- Testing is inherit in every stages of the Waterfall Model, hence
- It is an enforced disciplines approach
- It can fall back at any stage if required

The Waterfall model illustrated above consists of 6 phases as described below:

1. Feasibility Phase:

   This phase involve the preparation of proposal for the project title. A proposal has been submitted and approved by the FYP committee.

2. Requirement Analysis Phase.

   The next phase is dedicated primarily for conducting research about the project. This is also where the problems statements are identified. Research has been done thoroughly to identify the standard or basic elements and functions of the proposed system. During completion of the research, analysis has been done to extract important and useful information (system specification) that could help in the design and development phases.

3. Design Phase.

   Information that is obtained from the previous phase is used to aid the third phase of the project, which is the design phase. At this phase, system and software architecture, interface representation via story boarding and hardware requirement has been identified. Storyboard and system architecture have been developed at this stage.

   Unified Modeling Language (UML) Use Case Diagram

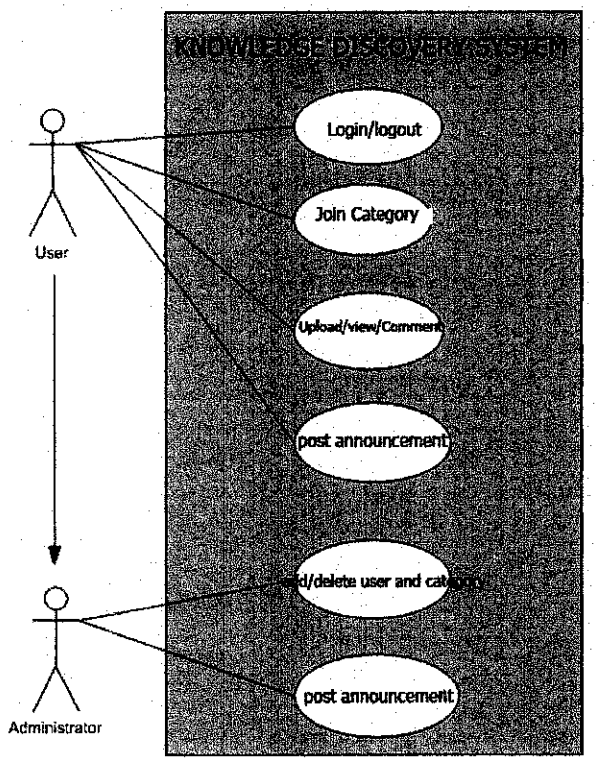


Figure 3.2: UML Use Case Diagram

The use case shows interactions between the users and the system. This explicitly represents the main functionalities of the system serves to users.

Below are the basic layout and storyboard of the proposed system.

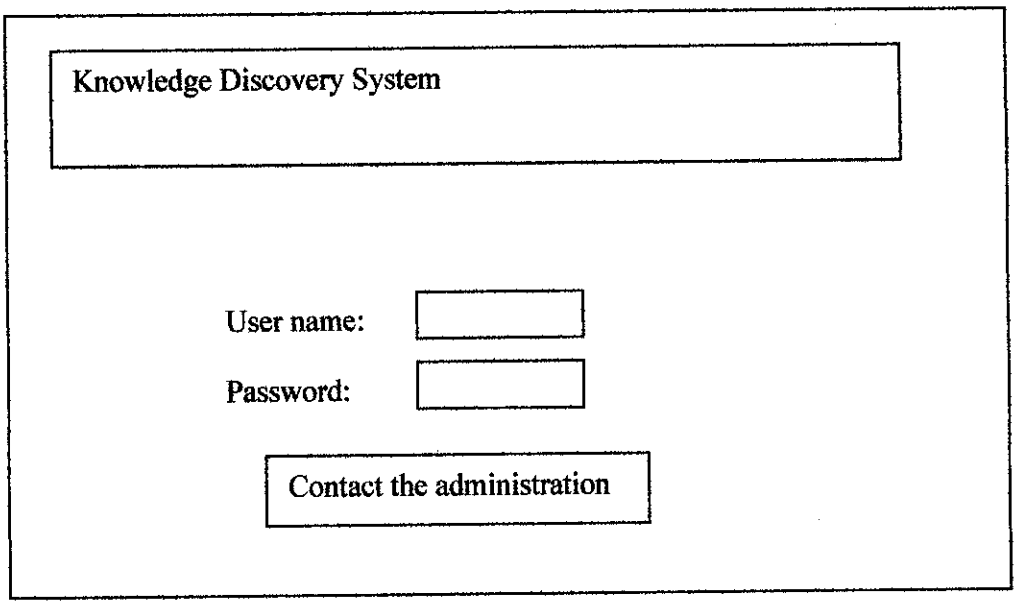


Figure 3.3: Login Page

This is the login page where only authorized users of the organization can have accessed to the system. User is required to insert their user name and password, which will be provided by the system administrators personally.

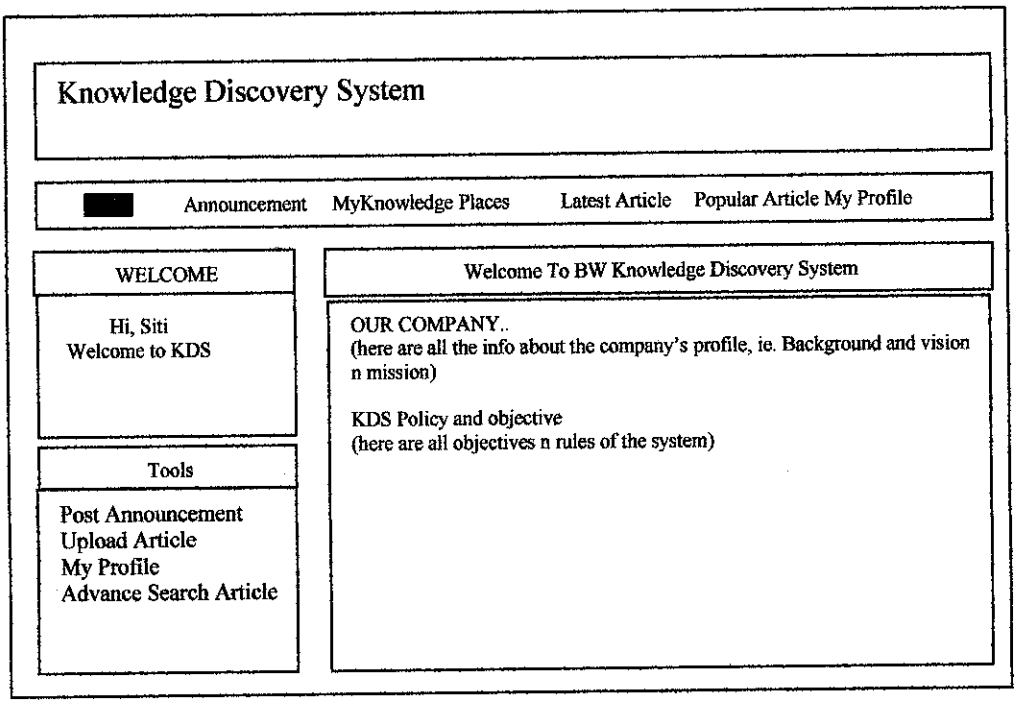


Figure 3.4: Main Menu or Home Page

After successful login, user will arrived at the main menu page. The home page contains Menus or links that can help user to navigate the system. MyKnowledge

Places contains links that user can join in when clicked which will bring user to that particular category's or link's page as shown below.

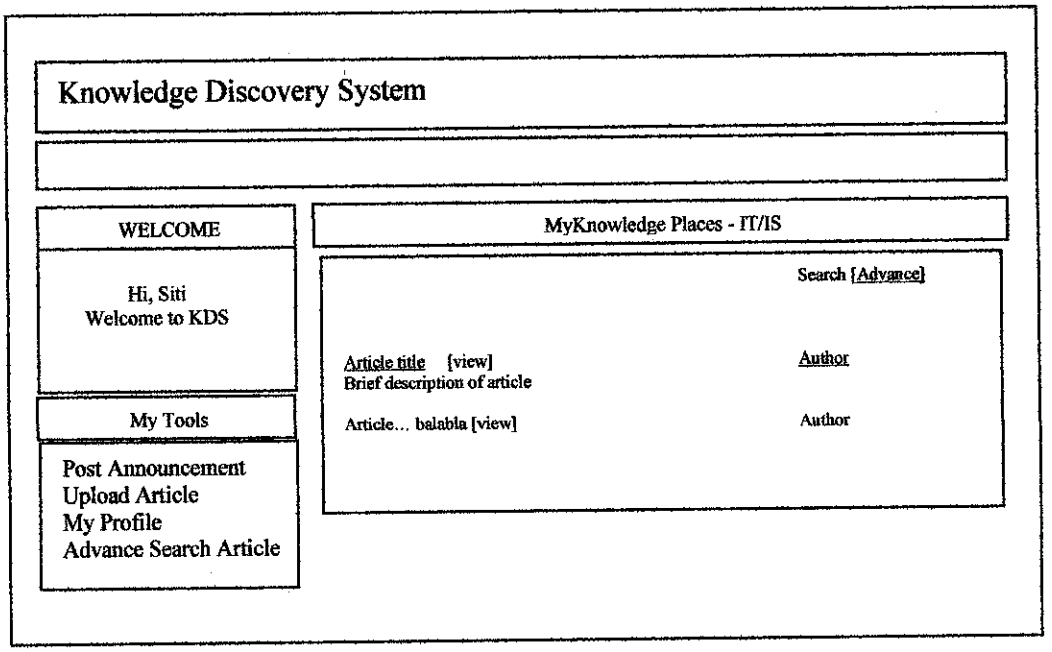


Figure 3.5: Category's Page

This page displays list of articles with short descriptions about the article that have been submitted by other users. User can view, download and comments on the article links contain in the particular category by clicking on the desired article title's link.

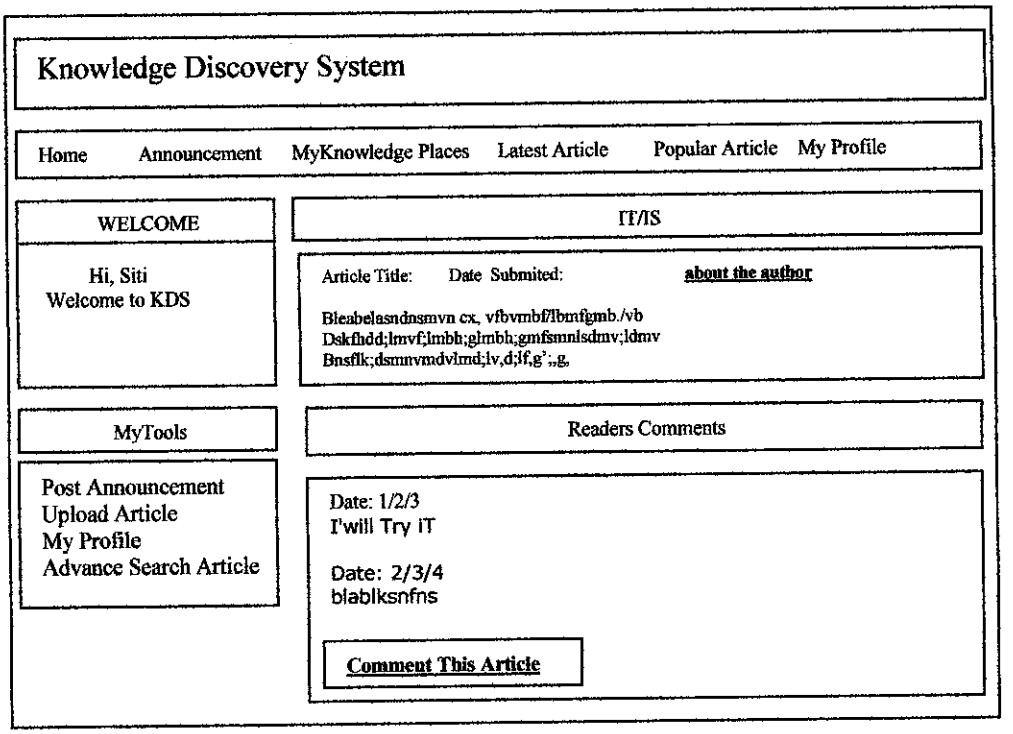


Figure 3.6: Article viewing page

At the end of the readers comment section, there is a button that enable user to submit their comment after reading the article. Apart from these functions, the links on the main menus bar (Home, Announcement, MyKnowledge Places, Upload and etc) will enable user to navigate the whole system and also allow user to upload their own article, edit their personal profile, and view popular articles and many other functions that will be discussed in detail in Chapter 5.

4. Implementation Phase. This phase, which bound to be the longest and most crucial phase of the project will focus on constructing a prototype based on the proposed design. The prototype should be able to comply with all objectives of the project.

5. Testing Phase.

   Testing is done at all time during the design and implementation phase. The testing done at the implementation phase is to identify and solve any errors encountered and to ensure that the system meets its specification. These involve module test, integration test and full system test (based on the parts describe above). A full system test is done by selected potential users among

several final years' students to ensure that the output complied with the project objectives.

6. The final phase is maintenance phase. During this phase, further modification of the system should be minimized to avoid uncontrollable changes that would affect the system.

3.2 Tools

There are many tools used to develop this project. However, the author has used Lotus Domino Designer 6.0 as the main development tool. The main reason for selecting Lotus Domino was because the University Technology of PETRONAS itself is a subsidiary company of PETRONAS Bhd. who subscribed to Lotus Notes products. By utilizing readily available software, there would be no licensing and technical support issues. Plus, developing the KDS using Lotus Domino Design has numerous advantages besides inheriting the good nature of Lotus Notes. The advantages of using Lotus Notes and Domino are discussed in detail in section 4.2 under Chapter 4 of this report.

3.2.1 Software

The major tools that were used extensively for this project are as follows:

1. Lotus Notes Domino Designer 6.0 is used to develop the KDS interface and its major components or functions.
2. Adobe Photoshop CS (Creative Suite). This tool is used to design images and graphics that have been used in the system.
3. Domino Server. This server technology transforms Lotus Notes into Internet Server, allowing any web browser to access and interact with Notes applications.

For the purpose of development work, Microsoft Windows XP Professional Edition is chosen because the platform offers more stability and reliability over other Windows platforms. The chosen operating system also supports most of today's software, which includes the above listed tools that will be used for the development.

3.2.2 Hardware

Apart from software, a development machine is vital for the purpose of web hosting, database storage, system development, testing and simulation. A complete desktop personal computer with specifications below is used for the project:

- Pentium IV 2.0 GHz
- 256MB RAM
- 20 GB of hard disk space for operating system, development software, web server software and so on
- 10/100 MBPS network card with LAN connectivity available

Since the desktop personal computer is used for almost all activities (development, web server hosting, database server), it is very resource consuming to the system, thus it is important to make constant backups. Backups are done manually by storing important files into other location, either into different hard disk, different media or different location. The period of backing up files varies between each development cycles.

CHAPTER 4
RESULTS AND DISCUSSION

There are two sections in this chapter, which are Findings and Discussions phase. For the purpose of the documentation, the first section, which is Findings, will focus on the progress of the activities regarding the project, and the Discussions section will discuss of what have been done to meet criteria of developing an automated Self Directed Search.

4.1 Findings

4.1.1 Research

Research has been conducted in order to determine the components of the Knowledge Discovery System.

As mentioned earlier, knowledge discovery is a subset of Knowledge Management. Therefore, the author tried to inherit as many criteria or key concepts of knowledge management. Realizing this fact, a review on several literatures has been made and the author concluded that the two main types of knowledge need to be identified in developing the system. They are explicit knowledge and implicit knowledge. Explicit knowledge is formal systematic knowledge that can be codified, written down and passed on to others in documents or general instruction. Tacit knowledge, on the other hand, is based on personal experience, rule of thumb, intuition and judgment. Tacit knowledge is often very difficult to put down into words. The history of knowledge management reveals that explicit systems were the first to evolve. The next phase of knowledge management was to focus on interactivity between people where the emphasis would be capturing, sharing and enhancing of context (Junnakar, 2000). Davenport and Prusak (1998) aptly coined organizational support for knowledge management orientation as:

"... a fluid of mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knower. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices and norms."
What can be conclude from the above literature review is the developed Knowledge discovery system has indeed incorporate the knowledge management features by allowing users to share their knowledge (explicit knowledge) via content sharing besides learning their mistakes via peer comments which will results in creating the implicit knowledge.

4.1.2 Surveys.

In order to identify the relevancy of this project and its significance to be of assistance to firms to manage the knowledge capital within its boundary, 50 copies of surveys has been sent out. The surveys were sent to various two main development departments in Robert Bosch (M) Sdn. Bhd. in Penang. The reason for choosing this company is because it is a well-known multinational company that the author familiar with plus the company do not have a specific system or tool when it comes to managing their knowledge capital. The aims of the survey were to gain feedback from cataloguers on what their perception of knowledge management is and how they perceive information and knowledge.

- ⇒ (In referring to Figure 4.1) The majority (60%) of the respondents claimed knowledge management to fall in the category of being the management process which enables the organization to use and re-use its staff's knowledge.
- ⇒ This would also give credence to the knowledge management definition mentioned plus strengthen the objectives of Knowledge Discovery System developed
- ⇒ Figure 4.2 show respondents understanding or perspective about Knowledge management which reflect that majority of the respondents

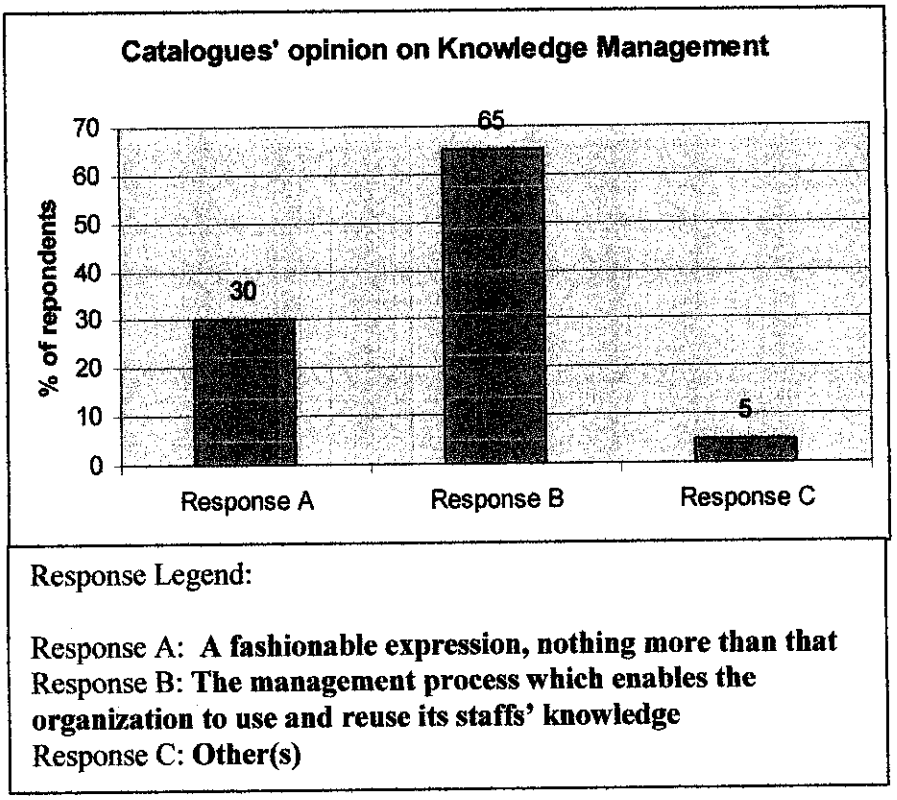


Figure 4.1: Catalogues' opinion on Knowledge Management

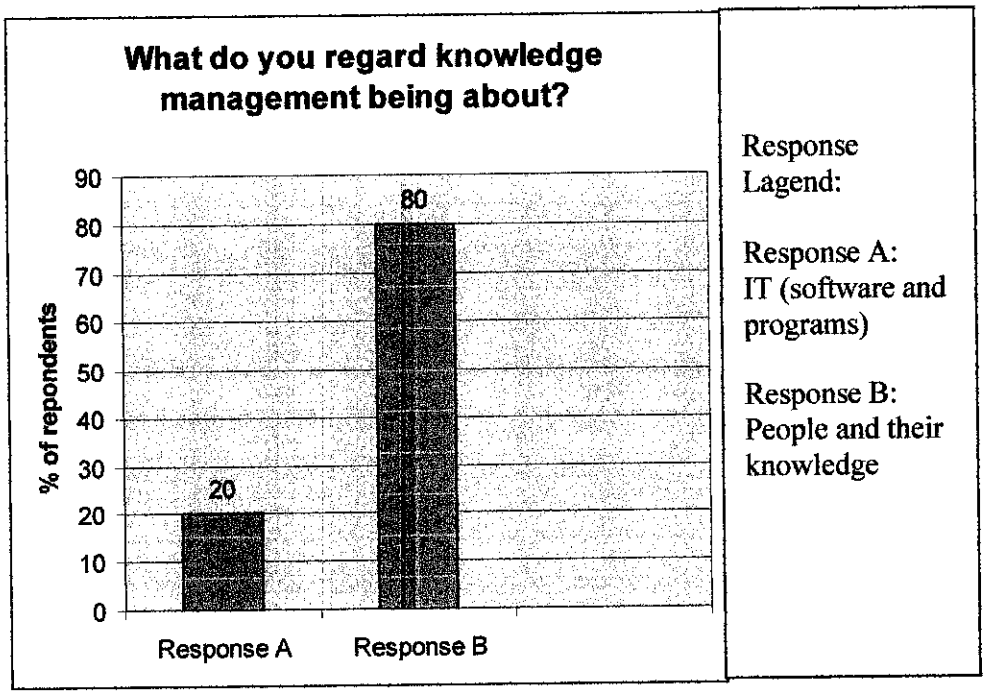


Figure 4.2: Catalogues' understanding about Knowledge Management

Apart from getting to know the users perceptions towards knowledge management, the author tried to capture the users need and requirements toward the proposed system. From the survey, it can be concluded that the majority of the candidates agreed that the development of this project will benefit them in sharing and obtaining knowledge which are essentials and must have components of a knowledge discovery system. Plus, via the survey, majority agreed that they need a place where they can share their thoughts and knowledge and discover the knowledge at their own expense. The sample survey questions have been included in the appendix.

4.1.3 Final Product Development.

Web page design – Front-end user interface

In order to attract the attention of users to use the system, colors coordination and multimedia elements used are very important. As for that, the author has chosen combination of bright brown, black and white. From the study of HCI done, the colors were chosen based on these reasons by Marta Eleniak (2003):

⇒ Black text on a white background is the safest combination and much more legible than white on black - white backgrounds also look more professional

⇒ High chroma (vivid) colours, for example, can be used as an additional tool to draw the fully sighted user's attention.

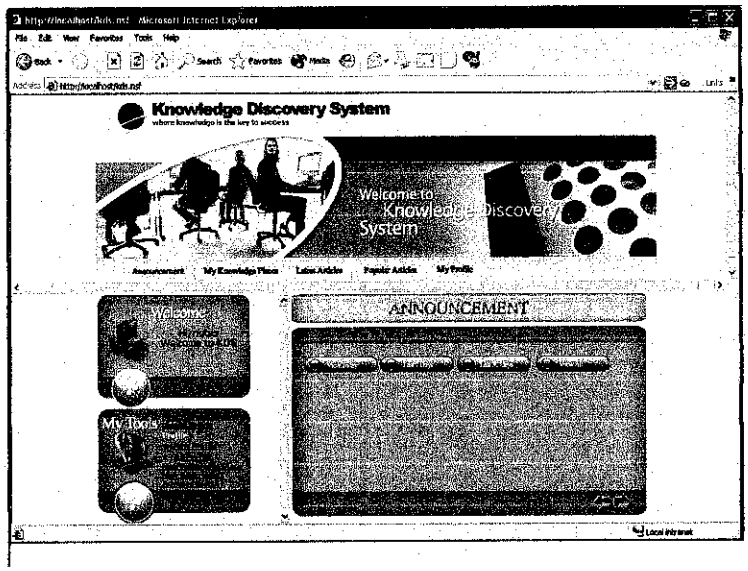


Figure 4.3: Administrator's Landing Page of the KDS

System contents and functions - database and search categorization

The figure below shows one of the sample output screens for viewing article chosen from a particular MyKnowledge Places (category) described before in chapter 3. The links buttons on top represents the functions that the users can do with the system. The MyTools section on the bottom left corner of the page shows available functions or tools that the user can use. These include viewing profiles of the system users; uploading comments and articles, creating new Knowledge Places and departments plus posting announcements and performing search on articles stored in the database. However, only those who connected or logged in as administrator can perform all the functions mentioned. This is to ensure and control the quality of the web content.

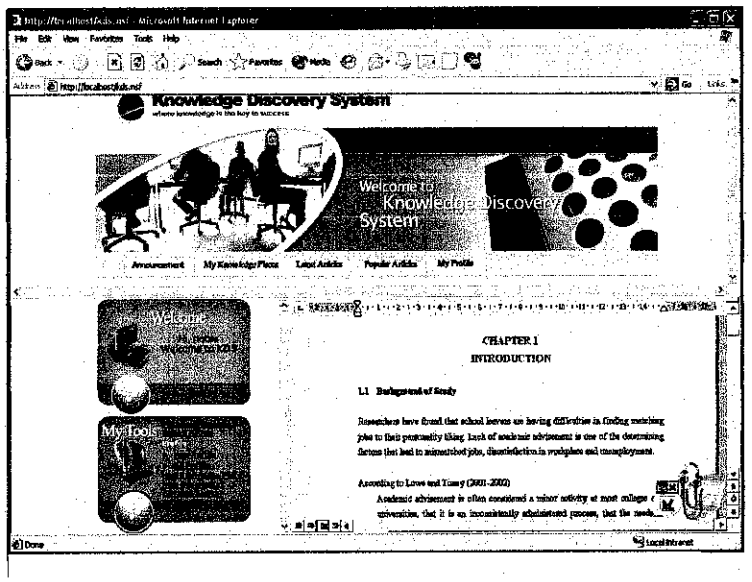


Figure 4.4: Article Viewing Page

As for the normal users, tools available are limited to only uploading articles, announcement, and comments, viewing own profile and perform search function as shown in Figure 4.5.

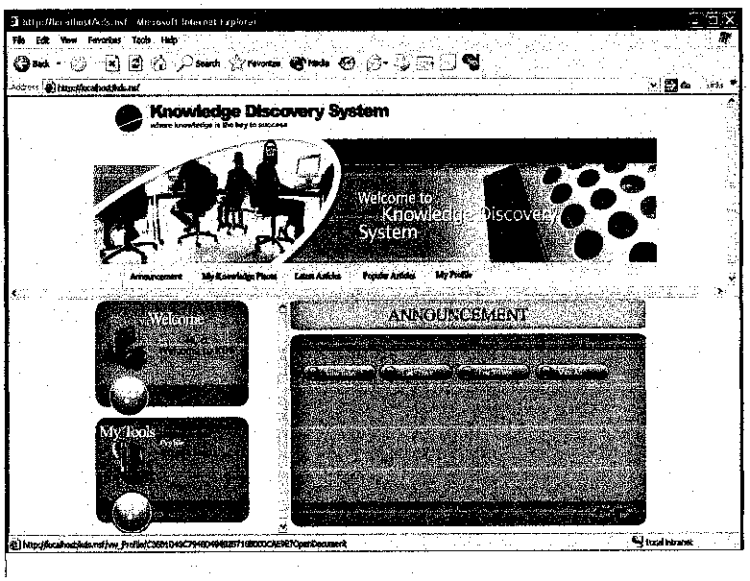


Figure 4.5 Normal User landing page

4.1.4 User Acceptance Test.

User acceptance test has been conducted in order to obtain the user's view regarding the finished system. This is important as to know how the users would preserve the Knowledge Discovery System functionality and efficiency. The test has been conducted on five final year students of University Technology Petronas enrolled in the Information Technology courses. These samples were chosen as they have been educated regarding system's interfaces and functionality through few courses that they have previously taken. Plus, these people also have gone through their industrial internship program where they were exposed to knowledge management system in the company they worked in.

Judging from their background and experience, they have the suitable character to evaluate the system as they have the knowledge regarding system interfaces as well as experience in using knowledge management tools. The user will be evaluating the system using the form as shown in the table below. They will assign values from 1 to 5 based on the definition scale defined below.

Attributes	Rating				
	1	2	3	4	5
1. User Friendliness					
2. Functionality					
3. User control and freedom					
4. Visibility of system status					
5. Aesthetic and minimalist design					

Table 4.1: Sample Evaluation Form

The definition for scale is:

1 – Very Poor, 2 – Below Average, 3 – Average, 4 – Meet Expectation, 5 – Outstanding

Each of the evaluation characteristics are explained to the volunteers. They are:

⇒ User Friendliness: Evaluation of the overall system interface design including its efficiency, visual visibility, ease of use and colors coordination.

⇒ Functionality: Evaluation on the importance of the functions inserted in the system as well as the usefulness of the data

⇒ User control and freedom: Evaluation on the ease of use and undoing action function.

⇒ Visibility of the system status: Evaluation on informing the user on the page the user is currently visiting and the actions the users taken.

⇒ Aesthetic and minimalist design: Evaluation on the system content, whether it contains enough relevant data within the page to be useful for the user.

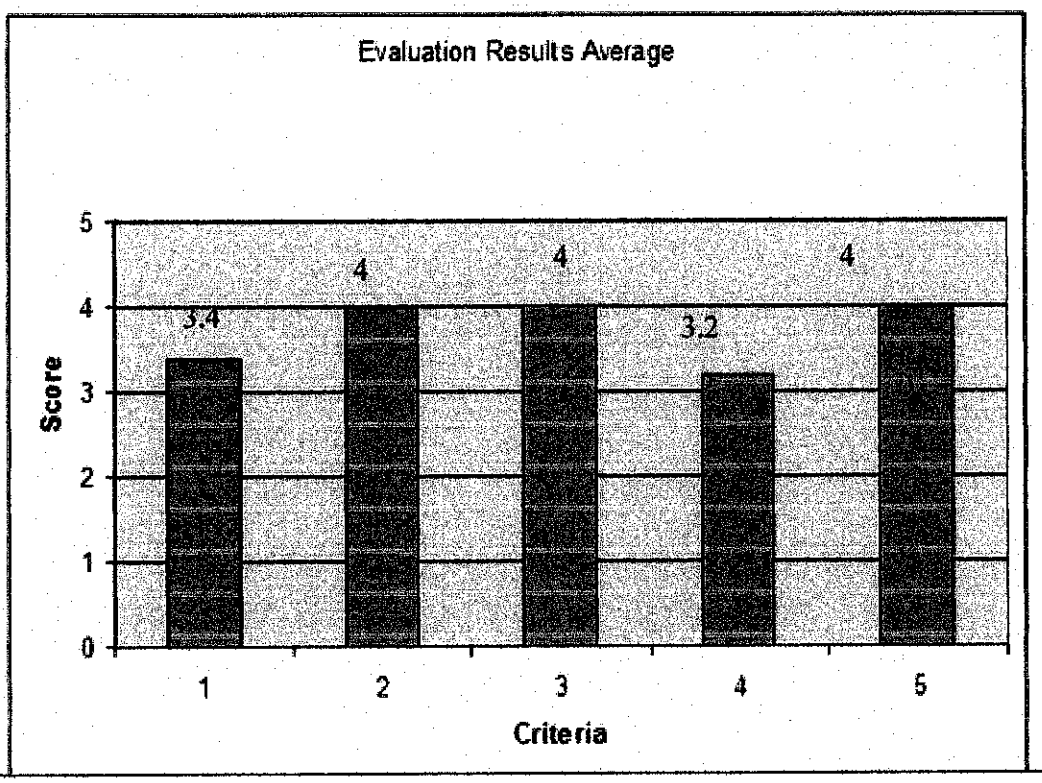
4.1.4.1 Evaluation Results

Evaluator/ Criteria	User Friendliness	Functionality	User control and freedom	Visibility of the system status	Aesthetic and minimalist design
Sample 1	4	5	5	3	4
Sample 2	3	4	3	3	4
Sample 3	3	4	5	5	4
Sample 4	3	4	4	3	4
Sample 5	4	3	3	2	4

Table 4.2: Summary of Evaluation by Five Samples

Table 4.2 summarizes the evaluation that has been made by all five evaluators. Please note that the score are on the scale of 5

4.1.4.2 Evaluation Results Analysis



Criteria Legend:

1: User Friendliness
2: Functionality
3: User Control and Freedom
4: Visibility of the System Status
5: Aesthetics and Minimalist Design

Figure 4.5: Average Score of the System

Once the evaluators have completed filling the evaluation form, they were asked some opinions on the evaluation they have made. The full score for each criterion is 5. Figure 4.9 above summarizes the evaluation results in a histogram representation.

User Friendliness

The average score for this criterion is 3.4. Based on an informal interview session, the evaluators perceived the website will need some improvement in terms of its consistency between the web page layouts with the uploading article page. However, they agreed that the system's

layout is attractive enough to attract the knowledge staffs particularly to use the system.

Functionality

The system's average score in this criterion is 4. All the samples agreed that the system provided a place for to share their knowledge with a common group of people via the Knowledge Places created. However, improvement needs to be done on more detailed knowledge regarding how to filter the contents shared to ensure its quality. They suggested that various types of multimedia material and applications should be incorporated into the system to increase its functionality.

User Control and Freedom

The system's average score in this criterion is 4. All the evaluators agree that the system offers freedom to users. They are satisfied that the system allows user to go to navigate between pages as simple as a click of a link or a button.

Visibility of the System Status

The system's score in this criterion is 3.2. Three of the evaluators think that the system is average while the other two suggested that the system needs improvement in this criterion so that it will increase the effectiveness of the system's user friendliness.

Aesthetics and Minimalist Design

All of the evaluators agree that the system does not contain any irrelevant information. All the information presented during both parts of the system is relevant to the context given. They concluded that the system contains consistent data that conform to the objective of the system which is to allow users to collect, share and manage knowledge in a virtual environment.

Overall, the evaluators are satisfied with the performance of the system. Although there are some drawbacks, they have agreed that this system can be used as a Knowledge Management tool for organization to manage their knowledge capital which most of organizations in Malaysia are lacking of.

4.2 Discussions.

4.2.1 Significant of using Lotus Domino Designer to develop the KDS

As mentioned earlier, the author used Lotus Domino Designer as a tool to develop the project because PETRONAS itself is an authorized subscriber of Lotus Notes and Domino products. This particular reason has omitted the problems of software licensing and purchasing of hardware and servers. Since PETRONAS spent huge amount of money to purchase Lotus Notes products, fully utilizing its usage would bring better advantage to the corporation. Nevertheless, the nature of Lotus Notes products is an equal important reason to why the tool has been selected and used. Among the reasons are discussed as the following.

Lotus Notes supports workgroup

Lotus Notes is a groupware software package that allows group of people to work together across geographical boundaries, regardless of computer platforms. The concept of working together and sharing resources has already resemblance the concept of Knowledge Management that the author tried to promote in this project. Apart from that, Lotus Notes applications are developed as document databases: the basic element of the Notes database is an individual document. Because a Notes database document can contain both structured and unstructured content, Notes documents are able to provide a variety of useful facilities such as supporting a variety of data types from multimedia elements which include text, sound, video and even WWW pages and tabular data. The significant of this characteristic of Notes is that any applications developed (in this case KDS), if stored in the server database can be easily shared by all authorized clients as long as the have access to the Domino server. Figure 4.6 illustrates applications that have been uploaded to the Domino server, which all clients everywhere around Malaysia can access these applications. Moreover,

Notes provide facilities such as full text search; version control and document links will give better control for a particular system developed using Domino via Notes.

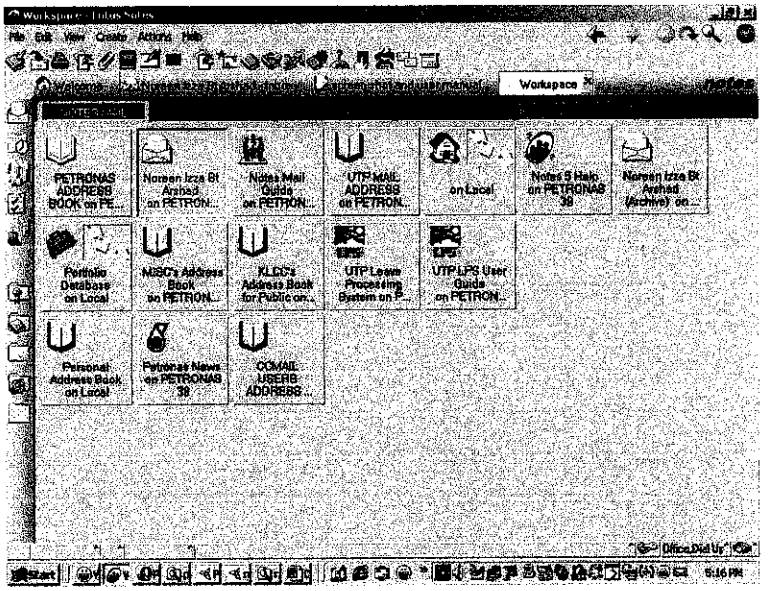


Figure 4.6: Applications uploaded on the Domino Server

Domino is a server technology that transforms Lotus Notes into an Internet server

One good advantage of Domino is "Domino is a server technology that transforms Lotus Notes into an Internet server, allowing any web browser to access and interact with Notes applications. This means that the applications development capabilities of Notes, is transformed into a web application development environment as well." (Monica Young, 2000). Domino translates Notes application into HTML on the fly when requested and then display it the web browser. When translating Notes to HTML, Domino automatically creates URL s where needed which means the application developer does not have to think about them.

Notes enable security control on database

Information is critical assets to every organization. Notes designed for collaboration and communication within and beyond the organization boundary, which include suppliers and customers. However, information should

remain as critical and confidential as it should at a particular level. Lotus Notes provide four levels of security, authentication, access control, field-level privacy and digital signatures. This provides an easy way for the author to assign access levels to varying users of the system.

4.2.2 Problem Identification

Adding value to the contents

Knowledge Management is an area that is still being explored until today. As discussed earlier, knowledge management is not just about the tools being used, it is wider than what is defined in text books since it involves human capital which in itself is much complicated. Nevertheless, the author tried to add as much value as possible to the system and one way of doing it is via categorizing the contents into critical functions such as "popular articles", latest article" and "MyKnowledge Places". This is to give value to the contents that the users submitted based on their frequency of viewing a particular article. However, the author realizes that this is not a sufficient element to filter the quality of a particular content submitted by users.

Programming Knowledge Limitations

Programming is not the main area of study of the author, as well as for this project, but additional knowledge proves useful when developing this system. With the author's limited knowledge in PHP programming, some sections of codes might be unacceptable for expert programmers. Though so, the system has been slowly developed from scratch using the author's limited capability and strong will to search for helpful resources.

CHAPTER 5
RECOMMENDATION AND CONCLUSION

5.1 Summary of Project

By successfully created a web-based Knowledge Discovery system, it is believed that the author had achieved the initial aims and objectives that are specified earlier. This project could be a stepping stone for the organization to incorporate knowledge management concepts into their organization in order to manage their knowledge capital which evidently crucial for every competitive organization. Knowledge Discovery System is the subset of knowledge management and hence the author tried to instill as many elements of knowledge management as possible into the system.

By creating a virtual workplace where users can share their information and expertise via Knowledge Discovery system, the objectives of this project has been met. Users are able to use the system to share articles and information with others which by comments from others will help them to learn to improve and eventually create knowledge among its users.

Categorizations of articles enable users to join into identifiable groups that interest them for instance; one will join the Sales category under the "MyKnowledge Places" page where all articles regarding sales are shared with and by those with the same interest. Search tools which enable users to search a particular topic in an advance level were also built into the system which enhances the functionality of the system besides assisting the process of discovering knowledge.

5.2 Suggested Future Work for Expansion and Continuation

There are several suggestions and recommendations that can be done to this project and the prototype, so that in the future the system will have increased functionality and flexibility.

3.2 1 Incorporating Data Mining and Intelligent Agent

Knowledge Discovery System needs to encourage people to codify their experience, to share their knowledge and to develop an "active" attitude towards using the system. Hence, Filtering information is a significant issue of this system. By incorporating Artificial Intelligent and data mining into the system, a pattern on user preferences and behavior while interacting with the system can be captured. By studying the pattern of users behaviors when using the system, the elements of the effectiveness of Knowledge Discovery System namely sharing and knowledge creation can be measured. The Behavior concept describes characteristics of users interacting with a Knowledge Discovery System such as number of documents the user has read, number of contribution made to the system (uploading articles) and numbers of documents read and comments. This information if captured can be later used to classified stereotypes groups such as readers, writers or lurkers. As a result, user could learn at which level they are and the management could see the improvements of the system users.

Artificial intelligent can also be used to enhance the searching tools to enable better navigation and more accurate search results that meet the users desires.

5.3 Conclusion

The purpose of this project is to study the importance of knowledge management concept and to develop a Knowledge Discovery System that enables organizations to manage their knowledge capital. People in organizations often overlooked the important assets lies within the firm's environment. Organization is build of people with knowledge and expertise in distinct fields and these people caries knowledge with them that can not be simply searched of obtained from the internet. Research shows how important knowledge capital is for a business. Hence, the system developed aimed to solve the problem of loosing the asset and provide a way to manage the capital assets by incorporating knowledge management concepts into it. Though the develop system can serve as a beneficial tool for organization to manage its knowledge capita, it still requires a full management support and clear missions of

the company in order to create the culture of learning and gaining knowledge within an organization.

This report contains the finalized works and results of the project and serves as a key milestone to the overall project. With the given time frame and adequate resources, the objectives of this project has been achieved and the development of the system has proven to be very successful.

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APPENDICES

APPENDIX A: Questionnaire for survey purposes directed ESD

APPENDIX B: Sample evaluation form for user acceptance test

SAMPLE QUESTIONNAIRE

QUESTIONNAIRE: Knowledge Management System

1. Have you ever heard about Knowledge Management System or knowledge discovery system?

   A. Yes
   B. No

2. Have you ever encounter with such a system?

   A. Yes
   B. No

3. In your opinion, what is knowledge management?

   A. A fashionable expression, nothing more than that
   B. The management process that enable organization to use and reuse its staffs' knowledge
   C. Other(s)

4. What do you regard knowledge management being about?

   A. Information Technology(software and programs)
   B. People and their knowledge

5. In your opinion, what should a knowledge management system have?

   A. Vitual forum place
   B. Information sharing and retrieval
   C. Virtual workplace
   D. All of the above

6. As a potential professional employee, do you think knowledge management is important to a company?

   A. Yes
   B. No
   C. Not sure

5. Do you agree that knowledge can be obtained not only outside the organization (internet) boundary but also within the organization?

   A. Yes
   B. No.

6. Do you have problems to obtain information when you first experienced the working environment during your internship? If yes, please specify.

SAMPLE EVALUATION FORM FOR USER ACCEPTANCE TEST

Sample Evaluation Form (User Acceptance Test) APPENDIX C

The purpose of this user acceptance test is to serve as an evaluation on the overall system performance.

Attributes	Rating				
	1	2	3	4	5
1. User Friendliness					
2. Functionality					
3. User control and freedom					
4. Visibility of system status					
5. Aesthetic and minimalist design					

1 – Very Poor, 2 – Below Average, 3 – Average, 4 – Meet Expectation, 5 – Outstanding

Thank you for your kind co-operation in completing this questionnaire.