Application of Rapid Application Development Method in Designing a Knowledge Management System to Improve Employee Performance in National Construction Company

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Abstract

This research aims to learn how to create and implement a web-based knowledge management system to enhance worker productivity. This study uses literature reviews, interviews, and observation to collect data. The system development methodology used in the research was called Rapid Application Development (RAD). The study's findings suggest that knowledge management and documentation have significantly benefited from this research. The employee knowledge documentation process can be centrally and methodically recorded thanks to implementing the knowledge management system (KMS) used in this study. This improves the efficiency of the time spent conducting knowledge searches. The findings of this study allow staff members to log into the system directly. This technology will enable employees to organize, store, and transfer knowledge effectively. In line with the established key performance indicators (KPIs), having a knowledge management system improves employee performance overall. Employees can access knowledge from anywhere with flexibility when a web-based knowledge management system is implemented, thanks to MySQL database storage and PHP programming. Workers have access to and can contribute to the organization's information, which encourages high flexibility and supports worker mobility. In general, it is intended that the creation of this knowledge management system will serve as a valuable means of advancing knowledge management. Implementing this system is expected to increase employee productivity and performance while optimizing the use of knowledge owned by the company.

Keywords: Rapid Application Development, Knowledge Management, Employee Performance.

1. Introduction

The primary force behind the transformation of contemporary civilization is the advancement of computer-based information technology. Information technology is seen as both a need and a convenience in this day and age. This advancement affects many facets of life, including business, healthcare, education, the economy, and even the armed forces [1]. Among its many essential effects is making many daily tasks more efficient. The knowledge management system (KMS) is one of the most critical features of the growth of information technology. For businesses and organizations, KMS is crucial to managing, archiving, and accessing knowledge [2]. With KMS, data and information processing become more efficient, and companies can make more appropriate decisions based on available information. KMS also plays a crucial role in assisting decision-making. With easy access to well-documented knowledge, decision-makers can detail deeper analysis to support strategic decisions [3]. This has a positive impact on the effectiveness and efficiency of the company. Seeing the critical role of KMS in the modern business world, companies need to continue to follow developments in information technology. In this way, they can ensure that their KMS implementation remains relevant and provides the maximum contribution to managing company knowledge. Awareness and investment in information technology, especially KMS, are the foundations for a company's success and competitiveness in this ever-evolving era [4].

The importance of knowledge management systems is demonstrated by research conducted in the industrial sector. One example is the aerospace industry, where information technology and innovation have been used to develop a successful knowledge management system [5]. This innovation has accelerated Lapan's development as a research institution by enabling each individual's knowledge to be correctly stored and maintained as best practices in future research. Additionally, knowledge management can promote a positive culture of knowledge sharing, which will aid in improving institutional work. In education, educational staff play a crucial role in

carrying out complex administrative activities to achieve the vision and mission of the institution [6]. Therefore, establishing an information technology, particularly a knowledge management system, is necessary to ensure an equitable distribution of knowledge among the staff. A web-based knowledge management system used to accommodate, store, discuss, and utilize knowledge can optimize the use of technology to create a more effective and efficient teaching and learning process by making it easier to monitor learning activities [7].

Experts have given several definitions for knowledge management, a management theory introduced in the 1990s. A knowledge management system facilitates collecting and distributing knowledge or knowledge that belongs to a business. Knowledge management is a technique for gathering, producing, streamlining, and enhancing understanding [8]. The capacity to generate and preserve more value from fundamental company competencies is known as knowledge management. Creating and distributing innovative goods, products, or services; managing and enhancing relationships with clients, partners, and suppliers; and overseeing and improving work procedures and processes are just a few business problems knowledge management can help with [9]. Paper and pen alone will not be sufficient to manage all existing knowledge in carrying out knowledge management, which is naturally a vast and complex topic; therefore, a knowledge management system is required. Knowledge management systems are ways to organize, enhance, and simplify knowledge management through contemporary information technology, including the Internet, intranet, extranet, and data warehouse [10]. A knowledge management system is a technique or instrument that businesses and industrial associations using information technology can use to achieve knowledge management goals. Several soft environment conditions, like systems, and several challenging environment conditions, like information technology equipment, are included in this knowledge management system. Arrangement [11].

Knowledge management systems (KMS) are central to driving company performance, and their practical implementation can provide significant benefits. Effective integration of KMS optimizes the management and distribution of knowledge and information, thereby enhancing employee performance and overall organizational effectiveness [12]. Efficient implementation of a knowledge management system creates an environment where the knowledge, experience, and information possessed by individuals in the organization can be managed in a structured manner. This allows access, adequate storage, and knowledge sharing between departments or work teams. As a result, employees can collaborate more effectively, finding solutions to complex challenges more quickly and precisely [13].

Furthermore, a better understanding of available knowledge can improve employee performance. Employees can access pertinent materials, instruction, and assistance through the knowledge management system, supporting the growth of their knowledge and abilities. This not only increases individual productivity but also contributes to the overall productivity of the organization. In addition, an effective knowledge management system can help reduce information redundancy, prevent knowledge loss when employees leave the company and facilitate better decision-making [14]. All this leads to increased operational efficiency and organizational competitiveness in the market [15] [16] [17] [18]. Therefore, the primary function of an adequately managed knowledge management system is to act as a catalyst for enhancing teamwork, expediting issue-solving, and raising overall performance within the organization. Therefore, organizations need to understand the importance of KMS and continue to develop and maintain these systems to support long-term growth and success [19][20][21].

2. Research Methods

Data collection methods are crucial in research to comprehensively understand topics, problems, and related solutions. The data collection approach in this research involves observation, interviews, and a literature study. We use observation to observe the ongoing implementation of the knowledge management system (KMS) directly. We conducted interviews with related parties to gain direct insight and conducted literature studies to gain an in-depth understanding of theory and practice related to KMS. We carry out KMS analysis to assess the extent of system implementation, providing a basis for analysis and improvement. We conduct a PIECE analysis, considering the aspects required in KMS (performance, information, economics, control, efficiency, and service). These six variables are the focus for identifying deficiencies and potential for system development. Rapid application development (RAD) is the system development method used in this research. This approach allows researchers to design, analyze, and implement system changes quickly, according to findings resulting from PIECES analysis. Thus, this research focuses on understanding the existing knowledge management system and emphasizes developing efficient and effective solutions through appropriate system development methods.

3. Results and Discussion

The document acquisition system explains the flow through three primary sources. AMD obtains the first document from the project draft resulting from the tender, which is then accompanied by documents from meeting minutes and client presentation results. The flow of information begins when AMD receives document data, either from meeting results or project drafts, and submits it to the CFO. The process continues when the CFO provides documents to the EPCD to estimate project costs. Next, EPCD provides project data and standard

operating procedures (SOP) to EPC staff to conduct price research. Once the research is complete, EPC staff returns the results to EPCD, who then provides project cost details to the CFO. The CFO then provides project cost details to the FO, who will prepare the necessary budget documents. The FO inputs the budget document into the PC and returns it to the CFO. The CFO then provides the budget report document to AMD and LCD. AMD then provided project documents to LCD. LCD plays a role in project validation by asking LCVD to find labor and CTTO to prepare electronic resources. Next, CTTO inputs best practices and HCGSD inputs related to the workforce. LCVD then provides the report document to LCD, which then provides the report to AMD. Thus, this running system involves various departments and processes to produce valid and well-planned projects.

This proposal system describes the process flow for obtaining and exchanging documents related to project proposals. Obtain proposal documents through several sources, such as project proposals, meeting minutes, and client presentations. The administrator submits these documents to the director. The process of exchanging data and information in the proposed system begins with the administrator, who manages user data. The director contributes significantly by uploading papers to the knowledge management system (KMS). The director must complete a form and provide a suitable description as part of this process. Managers can search for and download documents as necessary for projects.

Furthermore, managers also actively participate by uploading documents related to requirements, procedures, and essential information related to the project into the KMS. Employees have access to search and download documents required for project implementation while also being able to upload preliminary documents and work results, including best practices related to the project. Managers can conduct searches, download pre-results and results documents, and compile reports based on the information in the KMS. Finally, the director can download the report documents uploaded to the system. Thus, this proposed system provides a structured framework for efficiently managing and exchanging project-related information through a KMS platform.

The admin is the leading actor in the first stage, which involves access rights to Edit Profile. The admin fills in the Edit Profile form with data, and the system saves it once it is complete. However, if the data entered is incomplete, the system will provide a notification and ask the admin to repeat filling in the data so that the data stored is accurate. After this process is complete, the actor, in this case, the admin, can see the changes to the data made. In the second stage, all actors, including admins and users, have access rights to enter the system. They log in using a username and password according to their access rights. The system then connects to the user table in the database to validate login information. The actor is granted access to the system if the information entered is correct. However, if the login is unsuccessful, the system provides a notification and asks the actor to join the accurate login information. In the third stage, the actor can exit the system. When the actor selects the logout option, the system processes the request and logs out of the user session. By logging out of the user session, the system ensures that access to the system is closed and information security is maintained. Thus, this stage includes the profile editing, login, and logout processes in the knowledge management system, considering data validation, security, and information consistency.

During the initial stage, actors with access rights to input management data carry out activities recorded by the knowledge management system. When actors input administrator data, the system stores traces of this activity in a database, creating an audit trail that is useful for system monitoring and security. At the next stage, the admin has access rights to manage user data. Admins can perform various actions, such as entering, changing, or deleting user data. The process begins with the admin inputting data on the user form, and if filled in completely, the system will save the data. If there is incomplete data, the system will ask the administrator to repeat the filling to ensure the accuracy of the data stored. After completing the process, the admin can view the entered user data. At the next stage, the administrator has access rights to manage knowledge data. As in the previous stage, admins can join, change, or delete knowledge data. This process involves the admin inputting data on the Knowledge form, and if filled in completely, the system will save the information. If there is incomplete data, the system asks the admin to repeat the filling so that the stored data remains accurate. After completing the filling, the admin can view the entered knowledge data. The system provides functionality to manage user data and knowledge and records every activity actors carry through this stage. This increases system security and strengthens transparency in information management in the knowledge management system. These activity traces provide effective monitoring and enable relevant parties to evaluate security and system usage better.

Within the scope of the knowledge management system, admins and CEOs have special access rights to manage forum data. Admins can enter data on the forum form, and if the fields are complete, the system automatically saves the data. On the other hand, if there is incomplete data, the system will ask the administrator to repeat the filling to ensure the accuracy of the information stored. Once this process is complete, admins and CEOs can access and view the forum data entered. Furthermore, admins and CEOs also have access rights to manage comment data in the forum. The process is similar, where the admin and CEO enter data on the comment form. If the form is filled in completely, the system will save the data, but if there is a lack of data, the system will ask to repeat the filling. Once this process is complete, both admins and CEOs can view and manage the comment data that has been entered. In addition, CIBO and CFRO have a unique role in validating minutes. Clicking the

minutes validation button saves the data, indicating that the authorized party has validated the minutes. This validation process involves admin, CIBO, and CFRO as the prominent people responsible for ensuring the validity and accuracy of the information in the minutes. This step aims to improve the knowledge management system's information validity and control. With these capabilities in place, the system offers CEOs and admins the ability to handle forum data and comments efficiently while offering a solid validation process by CIBO and CFRO. Enhancing the knowledge management system's control, validity, and accuracy is the primary goal to bolster the system's efficiency in promoting knowledge management across the enterprise.

In the first stage, the admin has access rights to manage minute data. The admin enters data on the minutes form, and if it is filled in completely, the system will save the data. If the data is incomplete, the system will ask the administrator to repeat filling in the data so that the data stored is accurate. Once this process is complete, the admin can view the entered minutes. In the second stage, the administrator has access rights to manage document data. The admin enters data on the document form, and if it is filled in completely, the system will save the data. If the data is incomplete, the system will ask the administrator to repeat filling in the data. Once this process is complete, the admin can view the entered document data. In the third stage, the actor has access rights to request documents. The admin enters data on the document form, and if it is filled in completely, the system will save the data. The system will ask to repeat the data entry if the data is incomplete. After completing this process, the actor can view and request the entered document data. The system allows administrators to manage minutes and document data at this stage. Apart from that, actors can also request documents as needed. As a result, the knowledge management system's document and information management processes operate more efficiently.

The researcher used the CodeIgniter Framework version 3.1.6 with the PHP programming language for the knowledge management system development phase. With the help of CodeIgniter's lightweight and practical PHP framework, creating web applications with a structured architecture is simple. The researcher selected MySQL, a widely used database management system (DBMS) for online applications, as the database. Researchers use PHP MyAdmin, a database administration tool that facilitates managing and interacting with MySQL. Researchers use sublime text as a script editor to write and edit code. Sublime text is a light, fast, and highly customizable text editor, making it a common choice for software developers. The knowledge management system coding process is based on CodeIgniter's architecture and design patterns. This framework provides a clear and modular working structure, enabling developers to build web applications efficiently and quickly. In a further development, researchers can explore specific features of CodeIgniter, such as model-view-controller (MVC), routing, and database activities using MySQL. Using sublime text as an editor allows researchers to manage and edit code easily. This coding process is the first step in building the company's reliable knowledge management system.

The researcher used the black-box testing approach during the system testing phase. The black-box testing approach aims to assess the system's external features and requirements while omitting information about its internal implementation. As the end user, the company is responsible for running the system and evaluating its performance and functionality during the testing process. The company tests by running various usage scenarios that may occur in a production environment, conducting experiments, and thorough checks. The company acts as a real user and tests the system from the end user's perspective without needing to know internal implementation details. This testing phase involves constructing test scenarios based on the Knowledge Management System functionality, including functional, integration, performance, security, and error handling testing. We evaluate the test results, documenting any findings of errors (bugs), performance problems, or other improvement needs. The testing process also includes user acceptance testing, which involves end users to ensure that the system meets their expectations and needs. Active participation from end users is invaluable in improving the quality and reliability of the knowledge management system. By involving the company in black-box testing, we hope the system can identify and improve potential problems before introducing them into the production environment, thus increasing user trust and satisfaction.

4. Conclusion

This research significantly contributes to knowledge management and documentation based on the results of the description and discussion. The knowledge management system (KMS) used in this study makes it possible for staff members to organize and centrally store their knowledge documents, which enhances the efficacy of knowledge searches. The results of this research enable employees to access the system directly. This system allows employees to manage, store, and share knowledge efficiently with fellow employees. A knowledge management system positively contributes to employee performance under the determined key performance indicators (KPIs). Employees can access knowledge from anywhere with flexibility when a web-based knowledge management system is implemented, thanks to MySQL database storage and PHP programming. Employees have access to and can contribute to the organization's information, which encourages high flexibility and supports employee mobility. It is anticipated that the creation of this knowledge management system will

efficiently promote improved knowledge management. Implementing this system is expected to increase employee productivity and performance while optimizing the use of knowledge owned by the company.

This research has some drawbacks, even if it positively contributes to creating a knowledge management system (KMS). Therefore, to develop the KMS further, we can propose several suggestions. First, we should further optimize the knowledge generated from KMS to support decision-making by company leaders. Integration with decision-making support systems can be the next step so that existing knowledge can provide added value to the decision-making process at the managerial level. Additionally, the KMS can organize and display general expertise through frequently asked questions (FAQs). This will make it easier for users, especially employees, to access often sought-after information more quickly and efficiently. In addition, to improve the user experience, it is recommended to provide a preview feature on the knowledge management system. With this feature, employees can get an initial idea of the knowledge content they seek, making it easier to find the information they want. It is envisaged that by taking these recommendations into account, the future development of the knowledge management system can be more optimal and serve both the business and its users better.

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