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Application of Rapid Application Development Method in Designing Knowledge Management System to Improve Employee Knowledge and Performance at Ministry of Agriculture

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Abstract

This research aims to design and build a knowledge management system that can accommodate, manage, and disseminate knowledge to increase employee knowledge. In this research, data collection was obtained in three ways, including observation, interviews, a literature study, and a study of similar literature. The author uses the building block knowledge management method, unified modeling language (UML), to design a web-based system with a user interface that is quite easy to use. In this research, the author uses an object-oriented system development method, namely rapid application development (RAD), which uses unified modeling language tools to describe use case diagrams. Based on the research results, it was found that the KMS was built on a web basis using the RAD (rapid application development) approach and UML (unified modeling language) notation for system analysis design and PHP and MySQL for coding and databases. Before the existence of KMS, searching for documents could take 10 minutes, whereas after the KMS application, users only need five minutes to search for stored documents, resulting in a time efficiency of nine minutes. This system also helps employees communicate with each other anytime and anywhere by creating new discussion topics. Apart from fostering a culture of knowledge sharing, discussion forums in this system can be used as a place for employees to collaborate and find solutions.

Keywords: Knowledge Management System, Rapid Application Development, Employee, Unified Modeling Language.

1. Introduction

Every organization is aware of increasingly fierce competition, and the same is true for public organizations. Although public organizations must continue to carry out various kinds of innovations in order to continue to improve services to the community [1]. Of course, a good human resource base is necessary to support innovation in an organization. A new paradigm has emerged from initially using material resources to the maximum extent possible, or what is called resource-based, to knowledge-based, namely a way of managing intellectual assets owned by all employees in an organization optimally [2]. Knowledge in an organization is a form of intellectual asset that must be continuously developed so that it can support organizational learning and create new knowledge in the organization. Basically, the development of science in the current era of globalization is happening very quickly [3]. Human ability to develop various knowledge is getting better with the presence of tacit and explicit knowledge. Tacit knowledge is knowledge that is contained in the minds of each human being personally. Meanwhile, explicit knowledge is knowledge stored or written in a medium [4]. Good knowledge management in an organization is expected to create a culture of knowledge sharing between employees. If this knowledge-sharing culture runs well, it will certainly make an organization a learning organization [5].

In implementing a knowledge management system in an organization, at least four functions are required: finding knowledge, creating knowledge, using knowledge, and packaging knowledge [6]. Managing existing knowledge in an organization requires a platform that can accommodate and manage all knowledge that the organization owns, both tacit knowledge and explicit knowledge [7]. With the development of information technology, a concept emerged to apply this technology to manage all knowledge sources owned by an organization; this concept is known as a knowledge management system (KMS). KMS is a system that is able to classify existing knowledge, how to maintain knowledge, and how to use that knowledge [8]. One use of e-learning is knowledge management. This idea gathers all knowledge components that are dispersed and exist in different forms, specifically forms that are simple to understand and forms that are complex to understand [9]. According to Belingger, the value of knowledge management and effectiveness are closely associated because

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controlled knowledge enables organizational members to effectively shape and develop their future while dealing with present circumstances [10].

The current obstacle in this section is that knowledge that comes from information sources (explicit knowledge) such as meeting results, training results, and standard operational procedures is still stored in the form of printed reports or on hard disks [11]. If an employee needs a solution to a work-related problem or requires work-related documents, then the employee still has to go to a source related to this matter [11]. If employee rotation occurs, the knowledge possessed by old employees will easily be lost because they do not leave documentation such as meeting results, training results, and standard operational procedures [12]. As a result, parties who need knowledge that comes from information sources (explicit knowledge) tend to have problems [13] [14]. Not only is the source of knowledge derived from work programs that have been carried out, but other sources of knowledge, such as the knowledge contained in each individual employee who is experienced or tacit knowledge, have not been maximized properly [15]. This will cause knowledge-sharing activities to not be implemented optimally [16]. Therefore, there is a need for a documentation system that can accommodate, manage, and disseminate employee knowledge [17] [18]. The following research is similar to the research the author will conduct. This KMS is web-based and uses the KM Roadmap method. Produce applications that can increase the knowledge of company employees, especially regarding water resource management at the company discussed in this study [19] [20]. The user interface is not very easy to use [21]. This application produces a KMS that can support knowledge documentation, especially for educators and education staff at one public senior high school in Indonesia [22]. This system uses the Alfrasco Community Edition method [23]. This application produces a KMS that can make it easier for employees to obtain new information and knowledge from each division [24]. This system uses the K-Gap and waterfall methods for system development [25].

According to the language, the word design means a plan of action before doing something. Meanwhile, the word build means something that is built [26]. So design is an activity to design or plan something that will be made or built. The aim of carrying out a series of design stages is to look at the problems that exist in the system that has been or will be built so that various alternative solutions can be sought to overcome these problems [27]. The processes at this design stage include input, output, and file processes [28]. In building computer-based business solutions, system analysts design systems specifically in line with business needs so that various alternative solutions can be sought before determining what solution will be used for the existing problem. Within the domain of information systems, a system is characterized as an assembly of interdependent parts that cooperate to accomplish a shared objective through the orderly transformation process of input to output [29]. A component is not a part of the system if it does not help the system achieve its objectives. Information is data that has been adapted to the needs of an organization, such as the needs required by a manager, staff, or ordinary employees, which are certainly different [30] [31]. In the context of an information system in an organization, information is used not only by one person but must be able to be used by many people, and this information can be determined by two factors, namely costs and benefits. Valuable information means that the benefits obtained are greater than the costs incurred to obtain the information [32] [33].

2. Research Methods

In this research, the author needs data and information related to the object under study. Data collection is carried out to understand ongoing problems and to develop new systems. In this research, data collection was obtained in three ways, including observation, interviews, a literature study, and a study of similar literature. Judging from previous research, the author used the building block knowledge management method, unified modeling language (UML), to design a web-based system with a user interface that is quite easy to use. In this research, the author uses an object-oriented system development method, namely rapid application development (RAD), which uses unified modeling language tools to describe use case diagrams. At this first requirement planning stage, there are several steps taken to design the KMS, including users and analysts meeting to identify problems and identify information needs to complete research data and align the organization's business processes with knowledge management. The next stage is design, namely making improvements and designing, which can be described as a workshop. Analysts can work to build, show, and explain system work patterns visually to users. Designing a knowledge management system using UML tools. The implementation stage is where the system begins to be built and refined. The author's research stages consist of a number of concepts and clear definitions of relationships between concepts that are based on heritage reviews, specifically theories and previous research findings. The author used the research stages to design the knowledge management system in this study.

3. Results and Discussion

Analysis of identifying knowledge in an organization requires a comprehensive approach, divided into three main aspects: structural, functional, and operational, and culture or habits that develop within the organization. Through this identification, both tacit and explicit knowledge can be evaluated to determine the extent to which this knowledge is used within the organization. Some steps that can be taken in the process of acquiring and

utilizing knowledge within an organization include visiting other organizations within the government to provide refreshments to employees. Knowledge exchange between employees is an important activity to increase their understanding. Providing training to employees is another crucial step, as this not only improves individual skills but also allows them to pass on the new knowledge gained to other colleagues. In addition, monthly discussion activities between divisions in a relaxed format can provide a forum for employees who have special skills or experience to share knowledge with their colleagues. It is also important to create a space that supports employee expression in creating new knowledge. Providing freedom of expression can inspire creativity and innovation, which in turn can produce new knowledge that is beneficial to the organization. By adopting these steps, organizations can systematically identify, acquire, and utilize both tacit and explicit knowledge more effectively, creating an environment where learning and knowledge exchange become an integral part of a dynamic and thriving organizational culture.

The process of developing knowledge is very crucial in the context of building knowledge management. At this stage, the organization focuses on how knowledge sources can be managed and processed well so that they can produce knowledge that can be used by all employees. In this case, the focus is on developing the sharing of tacit knowledge and collecting explicit knowledge into a database. Tacit knowledge is the basis for developing organizational knowledge, so the initial focus of knowledge development is sharing tacit knowledge using the socialization method, which emphasizes discussion between employees. At this stage of knowledge sharing, rewards are also given to employees who can share the tacit knowledge they have so that it becomes valuable knowledge. Explicit. The process of knowledge sharing and distribution in an organization or company is a process that involves changing isolated information or knowledge into something that can be used by all individuals in the organization or company. Organizations that have the task of carrying out all matters relating to data, publications, and information services are expected to be able to provide information or knowledge to all components within the organization. For this reason, the organization always provides training for all its employees, uses technology as a medium for employees to collaborate regarding the problems they face, and uses technology as a medium for disseminating knowledge.

In the application of knowledge, this currently includes various training and workshops provided to employees; apart from that, there is a knowledge sharing forum that is held once a month as a medium for employees to discuss all kinds of things in an effort to increase the knowledge and competence of all employees. Most organizational knowledge still contains explicit knowledge such as meeting results, training results, and SOPs. All explicit knowledge is stored either in the form of printed documents or in digital form, such as on a hard disk. However, such storage has several weaknesses, such as being vulnerable to loss or damage. Organizations have several types of knowledge goals that guide knowledge management within the organization. First, there are normative knowledge goals, which focus on creating a culture of knowledge sharing among employees. This aims to forge close bonds between them, make it possible for people to properly store their tacit knowledge, and make sure that each employee is aware of the value of learning. Second, there are strategic knowledge goals that focus on creating a knowledge documentation system, utilizing individual knowledge into organizational knowledge, and increasing efforts to develop knowledge in accordance with the organization's vision and mission. This includes keeping an eye on the potential knowledge that each employee may possess. Finally, there are operational knowledge goals that focus on providing media for the knowledge sharing process, documenting problems and their solutions to prevent repetition of errors, and increasing employee competency through the dissemination of available knowledge documentation. Through implementing and monitoring these three types of knowledge goals, we can build an environment that supports continuous learning and optimal use of knowledge in achieving organizational goals.

Knowledge management begins with the head of the general section holding a meeting with the heads of sub-sections in the general section, namely the head of the administration sub-section and the head of the service and data publication sub-section. At the meeting, various matters related to the work program that will be carried out or are currently underway are discussed for one year. At this general meeting, a document of assignment will be produced, which will be given to the two sub-divisions. After holding a general meeting with the section heads, the sub-section heads held another meeting with their respective employees. At this meeting, the head of the sub-section explains the results of the meeting and the problems discussed with the head of the section, and at this meeting, the duties and responsibilities for each employee are also determined according to their competence. To improve the performance of its employees, it provides various kinds of training to them; this is also in addition to government regulations regarding the rights of every civil servant (PNS) staff member in all government organizations who have the right to receive training. This also applies in organizations; in this division, training is often held for employees to improve their competencies. Later, each employee who has taken part in certain training must make a written report about what they got when taking part in the training, and the results of the training handout must be submitted to the administrator, who will be included in the knowledge archive document.

Apart from taking part in external training to further improve competence and close relationships between employees, and also carrying out knowledge transfer by each employee in a special forum that is held once a month. In this discussion forum, employees who have attended training and employees who have other skills outside their field of work can share them with other employees in the form of mini-workshops or casual discussions. The task of the sub-division head holding an executive role in carrying out all work programs means that the sub-division head has the obligation to provide reports on all the progress of the work programs carried out by his employees. At this stage, the sub-division head will monitor, view, and evaluate the employee's work progress and make a report on all the tasks that have been assigned. It is the obligation of each employee to make reports on all tasks that have been carried out or are currently in progress. The head of the services and data publication sub-section will review and correct all reports submitted by employees. Once everything is felt to be correct and appropriate, the head of each sub-section will provide a report to the head of the section.

Based on the results of the review of problems that have been carried out, the author found several problems that occurred in the existing system related to knowledge management in the general section, including the process of documenting knowledge sources such as meeting results, SOPs, and training results, which is still manual, namely in the form of paper media. Although some already use electronic media such as Word and Excel, the media used for storage, such as hard disks, are very susceptible to damage and data can be lost. Not only that, employees who want to use knowledge documents also have to go to the administration section to look for the desired document; this, of course, requires quite a long search time. The absence of a discussion forum to bring together employees, heads of sub-divisions, and heads of sections to discuss existing problems also means that knowledge-sharing activities are not running optimally. From the results of the analysis of problems and system requirements in the general section, the author proposes to create a KMS. The system proposed by this author consists of several system users, including section heads, sub-section heads, administrative staff, and ordinary employees.

The system that will be built will make it easier to manage all existing knowledge in the general section of the data and information center, including making it easier to document and disseminate documents as well as being a forum for sharing knowledge, especially tacit knowledge held by each employee. The dissemination of information will be much faster because all existing knowledge is stored in one system, making it easier for employees to search for, retrieve, and distribute it again. To overcome problems that occur during operational activities, an online discussion forum is provided, so that when an employee experiences a problem, all members of the forum can help by providing various solutions. For department heads, this system can also provide an overview of what problems are occurring in the division they lead so that it can become input for discussion during inter-division meetings. With this system, the storage of documents that are still manual using paper media can be reduced because all data and knowledge files will be stored in a database. Employees who need a document no longer need to bother going to administrative staff and having trouble looking for stacks of document files, which of course will take a lot of time to search for.

The proposal to create a web-based knowledge management system (KMS) that can overcome problems in the general department is the right step to increase efficiency and exchange knowledge in the office environment. This system was designed with the aim of storing and providing facilities that support the exchange of knowledge between employees in the general department. It is hoped that this web-based KMS can be a comprehensive solution for managing knowledge in the general department. Its main functionality includes the ability to obtain knowledge, both through information storage and efficient search and distribution of knowledge among staff in the general department. Sophisticated and structured search features will enable fast and efficient access to a variety of stored information. Systematic and organized knowledge storage will help prevent the loss of important information as well as facilitate collaboration and the exchange of ideas between employees. Furthermore, KMS can support daily activities in the general department by providing a platform for sharing documents, guidelines, procedures, and other important information. Collaborative features such as discussion forums or spaces for the exchange of ideas will strengthen a culture of knowledge sharing among employees, creating an environment that supports the growth of shared knowledge. Thus, it is hoped that this web-based KMS will not only become a place for storing knowledge but also an active platform that facilitates knowledge exchange, collaboration, and innovation in the general department. This will help improve efficiency, productivity, and quality of work while establishing a work culture based on learning and sharing knowledge.

In this KMS system, the admin first logs in to get status as admin. The administrator's duties in the system include checking knowledge source files such as meeting results, SOPs, and training results uploaded by employees. Apart from checking incoming knowledge files, admins also have the task of deleting knowledge files that are deemed inappropriate. The admin is also responsible for creating or changing news on the news menu in KMS. Admins can also add, edit, or delete employees who can enter the system. The rights that the admin as a user has are the ability to read, create, and comment on the discussion forum menu and blog. To enter the system, the employee must first sign up (register). After the employee has successfully registered, they must enter their username and password in the login column. After entering the system, employees will get access

rights as users. Employees can view, print, or upload knowledge sources such as SOPs, meeting results, training results, etc. On this user page, employees can write about anything according to the categories provided. Another right that employees get in the system is being able to read or comment on the blog menu about posts made by other employees. In this system, employees will also easily exchange knowledge with other employees by uploading training handouts they have attended and can immediately discuss using discussion forum media.
In this KMS system, the sub-division head must first sign up (register) after successfully registering, and then he will get status as a user after logging into the system. The obligation of the sub-division head as the leader of operational activities is to monitor all kinds of developments that occur in the KMS system and verify documents uploaded by employees. Heads of sub-sections in this system can also upload and download knowledge documents. In this system, the head of sub-divisions also has the right to add to and comment on articles created by employees. Sub-division heads can also view written statistical reports made by employees based on category. Entering the KMS system, the head of the department first signs up (registration) after successfully registering, and then logs in to get his rights as a user. The rights of the section head in this KMS system are to create, read, and comment on articles created by other employees. All knowledge created, including tacit and explicit knowledge, will be stored in a database so that it will be easier to search for and reuse. If an employee is looking for work-related documents, they can directly access this database.

4. Conclusion

Based on the previous description, the knowledge management system (KMS), which was designed using RAD (rapid application development) and a web-based approach, showed successful implementation. This approach utilizes UML (unified modeling language) notation in system analysis design, while coding and database management are carried out with PHP and MySQL. One of the significant successes of KMS implementation is the time efficiency it produces. Before KMS was introduced, document searches took up to 10 minutes. However, after implementing KMS, the time required to search for documents was successfully reduced to only five minutes, resulting in a time efficiency of 8 minutes. However, the benefits of KMS are not limited to the document search aspect alone. This system is also the main facilitator for strengthening communication between employees. The KMS discussion forum feature enables interaction, idea sharing, and problem-solving among employees. So, apart from promoting a culture of knowledge sharing within the organization, KMS acts as a collaboration platform that facilitates the exchange of information and collaboration between team members. This, ultimately, increases the overall efficiency and productivity of the organization. Overall, KMS is not only a tool for managing knowledge but also a catalyst that drives innovation, collaboration, and mutual growth within organizations, helping organizations to remain relevant and competitive in an ever-changing business environment.
Based on the analysis that has been carried out, there are several suggestions that can be given for further development regarding the knowledge management system. First, it is recommended to develop KMS so that it can be accessed via mobile devices or cellphones. This will expand accessibility and enable users, especially employees who frequently travel or are outside the office, to stay connected and access the information they need more flexibly. In addition, for future research, it is recommended to consider the use of different methods in KMS development. For example, researchers can consider methods such as Roadmap of knowledge management, software quality assurance, or applied cognitive work analysis to support the development of a more holistic, structured, and quality system. The use of these methods can provide deeper insights into critical aspects such as knowledge management, software quality assurance, or cognitive analysis that can enrich the overall KMS implementation and performance. By integrating various relevant methodologies, knowledge management system development can be more effective and in line with the needs and future developments of the organization.

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