



# Design and Construction of Knowledge Management System for Teachers' Teaching Materials at SMA 22 Palembang

**Muhammad Adlyn Alfarabi \***

Informatics Engineering Study Program, Faculty of Sains and Technology, Universitas Bina Darma, Palembang City, South Sumatra Province, Indonesia.

Corresponding Email: [adlynalfarabi@gmail.com](mailto:adlynalfarabi@gmail.com).

**Leon A. Abdillah**

Informatics Engineering Study Program, Faculty of Sains and Technology, Universitas Bina Darma, Palembang City, South Sumatra Province, Indonesia.

Email: [leon.bdillah@yahoo.com](mailto:leon.bdillah@yahoo.com).

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**Abstract:** Improving teacher competence to be better and more honed can be built by sharing knowledge. However, in its implementation, sharing knowledge can be a problem because the knowledge that is disseminated has not been distributed perfectly and irregularly. This happens because there is no container that can accommodate the desired knowledge from research results, teaching materials and teacher teaching methods. Therefore, this study was conducted with the hope of producing a Knowledge Management System (KMS) which is a system that can collect, manage and distribute knowledge. This study was conducted within the scope of State Senior High School (SMA) 22 Palembang City. The creation of this knowledge was carried out in a Nonaka manner, namely Socialization, Combination, and Internalization (SECI). The system development methodology used is the Knowledge Management System Life Cycle (KMSLC), with Unified Modeling Language (UML) modeling to build a website. This study aims to build KMS teaching materials to help teachers in teaching and make it easier for students to obtain knowledge tacitly and explicitly. This study aims to create equality of knowledge between teachers in schools, thus a container is needed that will accommodate this knowledge. Knowledge can be obtained and created through tacit and explicit means, so that students taught by teachers can also know the same knowledge. Therefore, a form is created to discuss with fellow teachers in this system, so that a process of sharing knowledge occurs.

**Keywords:** Knowledge Management System; Teaching Materials; SECI; KMSLC; Tacit and Explicit.

## 1. Introduction

In today's era of educational and research-based organizations, Information Technology (IT) which has now changed to the term Information and Communication Technology (ICT) has a significant impact on the knowledge management process. ICT enables the infrastructure and tools for knowledge to be developed, stored, used for teaching and learning system improvement equipment. This direct field includes hardware and software technologies that adapt dramatically when responding to additional situations or problems. In practice, what we describe as Knowledge Management (KM) emphasizes the systematic practice of managing and applying information resources. It is concerned with knowledge creation, implementation, and extension of systems to make systems useful for improving and aligning knowledge with mission objectives [1][12]. In KM, all types of activities from storage and retrieval to reuse are covered. It can be based on direct experience, empirical facts, educational content, and job tasks [2]. KM is important to drive innovation and help organizations achieve their goals.

A central platform is essential in the context of high schools in terms of knowledge asset creation (teaching materials). Even with the advancement of science and technology, some educational institutions struggle to manage the cataloging and distribution of teaching materials. The lack of an integrated system results in varying levels of teacher competency especially in content knowledge which will lead to the provision of standard education to students [14]. This requirement led to the development of a Knowledge Management System (KMS) to capture teaching materials and enable collective knowledge sharing among teachers.

KMSLC methodology is a structured approach to designing, planning and deploying a KM system. In this study, KMSLC has been used in conjunction with Unified Model Language (UML) modeling to enable a web-based platform specifically designed for teachers at SMA Negeri 22 Palembang. Given that extensive data, including textual, numeric and visual information, were collected through thematic analysis; enabling system design and performance requirements. Knowledge transfer is considered as an essential part of KM that passes on and knowledge between people or groups. This process makes communication and collaboration stronger while ensuring that knowledge is fully utilized. In this study, a knowledge sharing platform was designed to meet the needs of teachers at SMA Negeri 22 Palembang to access and contribute to the same teaching material resources. The designed system is in line with tacit and explicit knowledge to ensure equal standing for educators in developing their expertise.

This system also uses the SECI model (Socialization, Externalization, Combination, Internalization) which transforms all knowledge — both explicit and tacit among the knowledge integrated into the system. The socialization stage focuses on informal knowledge sharing; externalization translates tacit information into explicit. In the combination stage, the system combines knowledge and internalization makes explicit knowledge used in practice. This all-encompassing method ensures that the system meets the various needs of teachers and helps in continuous improvement of their skills. In addition, the integration of the SECI model will also ensure that both explicit and tacit knowledge are captured and utilized in the system. Socialization - This is where informal knowledge sharing takes place, Externalization transforms tacit knowledge into explicit form. Combination results in organized and integrated knowledge, while Internalization ensures that explicit knowledge is internalized and practiced. The development of KMS for SMA Negeri 22 Palembang is a major step towards a better knowledge management process in higher education institutions. Using the latest methodologies and technologies, the aim of this study is to enable a platform where knowledge sharing is possible and where education in general can be improved. This initiative highlights the role of ICT in addressing knowledge gaps and encouraging more collaboration among educators, which benefits both teachers and students.

Knowledge Management System (KMS) is a system designed and built to manage knowledge effectively. Knowledge management is inherently complex and broad in scope, necessitating a system that can efficiently organize and facilitate the management of knowledge. A Knowledge Management System utilizes information technology to enable schools and organizations to handle knowledge effectively and efficiently. According to [5], KMS refers to technology that supports Knowledge Management (KM), allowing it to operate smoothly and efficiently [15]. Another definition of KMS is a collection of information systems used to manage organizational knowledge[1].

Table 1. Previous Research

| No | Literature   | Title   | Research Result   |
|----|--|---|---|
| 1  | Evaluation of Employee Knowledge Sharing Infrastructure at the South | The approach strategy that will be used in KMS is a codification-based strategy, where knowledge is translated into explicit form | Advantages: Infrastructure supports KMS implementation.<br>Disadvantages: Need to |

|   |  |  |  |
|---|--|--|--|
|   | Sumatra Provincial Library Service (Duana Meilia, 2017)  | (codified) and stored in a database for easy access. Future research suggests building a KMS for application in libraries.   | improve or understand HR (staff and employees).  |
| 2 | Design of Knowledge Management System (KMS) for 2013 Curriculum using Tiwana and Zack Model (Mutia <i>et al.</i> , 2017)   | Knowledge Management System optimizes the use of information system technology for efficient and effective teaching and learning according to the 2013 Curriculum.                       | Advantages: Implementation using the HumHub portal facilitates real-time discussions. Disadvantages: System access depends on the HumHub server. |
| 3 | Design and Construction of Prototype Knowledge Management System for Teachers' Teaching Materials with SECI and MVC Models: Case Study of SDIT Al-Hikmah Cipayang Depok (Lestari & Sensus, 2014) | The KMS design accommodates large amounts of teaching materials and supports simultaneous access, aiding schools in teaching activities. The user-friendly interface enhances usability. | Advantages: The system design uses the MVC model. Disadvantages: Development requires expertise in the MVC model.                                |

Knowledge sharing is the exchange of knowledge between two or more individuals, where one party communicates their knowledge and the other assimilates it, leading to a collaborative process and the creation of new knowledge [4]. Several factors influence individuals' decisions to engage in knowledge-sharing activities, which are grouped into three categories [2]:

- 1) Organizational Factors Organizational factors, also known as environmental factors, influence individuals' willingness to participate in knowledge-sharing activities. These external factors can stimulate positive attitudes toward knowledge sharing [9].
- 2) Individual Factors These factors originate from within an individual, reflecting their internal motivation and willingness to share knowledge.
- 3) Technological Factors Technological factors pertain to the software and hardware used in knowledge management and sharing, which facilitate the process and determine its efficiency.

The introduction of Knowledge Management Systems is a transformative step in addressing the challenges of managing and sharing organizational knowledge. By leveraging innovative methodologies and encouraging collaboration, KMS ensures that knowledge resources are utilized effectively, ultimately leading to increased productivity, learning, and organizational growth.

## 2. Research Method

### 2.1 Data Collection Methods

This research was carried out at SMA Negeri 22 Palembang to obtain the data needed for the research [6]. Data collection methods were divided into two streams: primary data and secondary data. Direct Primary data gathered from the actual research subject—two major techniques were involved for data collection. In the first place, an interview was conducted in June 2024 with the Curriculum VP and teachers of SMA N 22 Palembang for elaboration purposes and specific information. Observations were also conducted by me in that same month as well and I visited the actual research site to get on site appreciation of the study. The secondary data collection occurred after getting primary data. This was published as follow-up to the topic and problem identified in research by a literature study. Literature Study: Literature review was conducted by reading the journals and books with relevance for the topic to get a broader idea about the research theme. These approaches, when used together provided both depth and reliability of data collected in this study.

### 2.2 System Development Methods

The system development method used to design and build the Knowledge Management System Life Cycle (KMSLC) from (Awad & Ghaziri, 2010) which has 6 stages [9], namely.

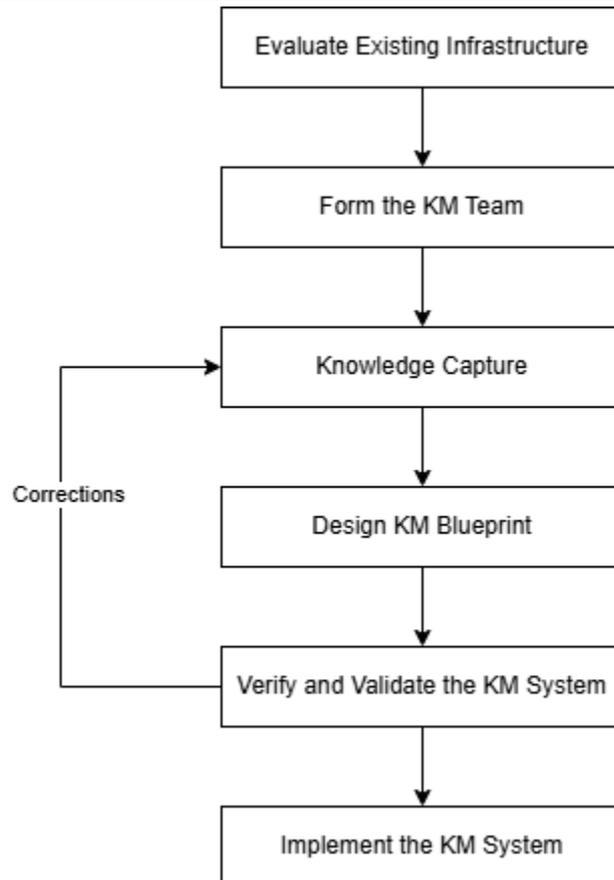


Figure 1. System Development Methods

Based on the stages in the image above, the following is an explanation of each stage in KMSLC, as below.:

1) Evaluate Existing infrastructure

Based on the results of observations and research that the author has carried out at State Senior High School 22 Palembang, the problems or analysis of the system running at the school include:

- a) To improve the competence of teachers as educators, there are no tools or facilities (systems) that are specifically designed to support teacher knowledge, both tacit and explicit. What is needed is the creation of a system or set of media that can be a container or a place to enable the process of sharing knowledge between fellow teachers with the aim of improving teacher competence in schools.
- b) The knowledge that teachers have is still individual in nature, which can cause differences in the level of knowledge between teachers and other teachers.

2) Form The KM Team

In this section is the formation of a team of users of the website that will be used (stakeholders) who will be involved in the system and there are 4 users who can enter the system to be created, namely Admin, Curriculum Section (admin of the Curriculum section at school), Teachers, and Principals After conducting an analysis of the system needs [12], the author can analyze that the teaching system used by SMA Negeri 22 Palembang City is still individual and there are no activities that can make the knowledge owned by teachers evenly distributed to all teachers, therefore the proposed system is the design of the Knowledge Management System at school.

3) Knowledge Capture

After entering this stage, the author has succeeded in identifying the users of the system to be built [11], then will enter the process of knowledge both tacitly and explicitly from the system to be created which uses the SECI method to identify it, which will be explained as in the table below:

Tabel 1. Identification Knowledge Capture with SECI Method

| Socialization   | Externalization   |
|---|---|
| Technical training for teachers<br>Discussion at teacher meeting activities | Preparation of teaching materials based on ideas, concepts and experiences of teachers<br>Documentation activities for teacher teaching materials |
| Internalization   | Combination   |
| Searching for teaching material documents                                   | Teacher teaching materials (RPP, syllabus, thematic) the essence of the subject book  |

4) Design KM Blueprint

In designing the Knowledge Management System (KMS) for teacher teaching materials, the author uses modeling from the Undefined Modeling System (UML).

a) Use case Diagram

Use Case diagram is a contextual (overall) description that will display a description of the system to be created. The following is a description of the system design that will be built at SMA Negeri 22, Palembang City, as follows.

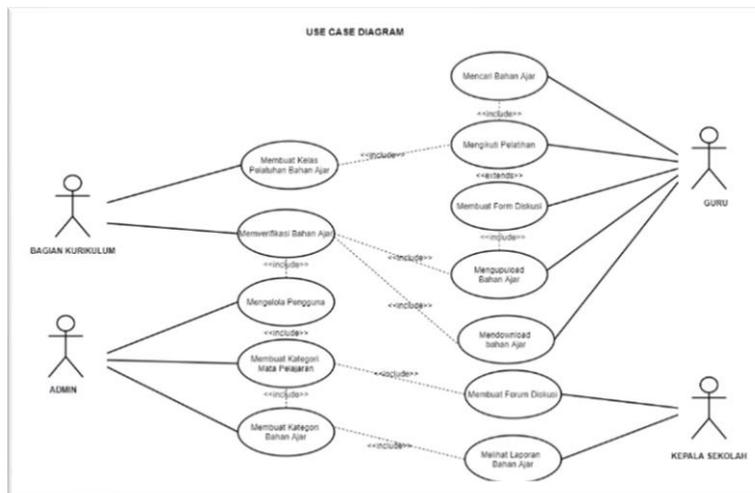


Figure 2. Use Case Diagram

b) Class Diagram

Class diagram is an adjustment of the program database image. At the beginning of the process, the class diagram defines classes in the form of objects or actors in the use case diagram that has been created, while the attributes that will be created describe their identities.

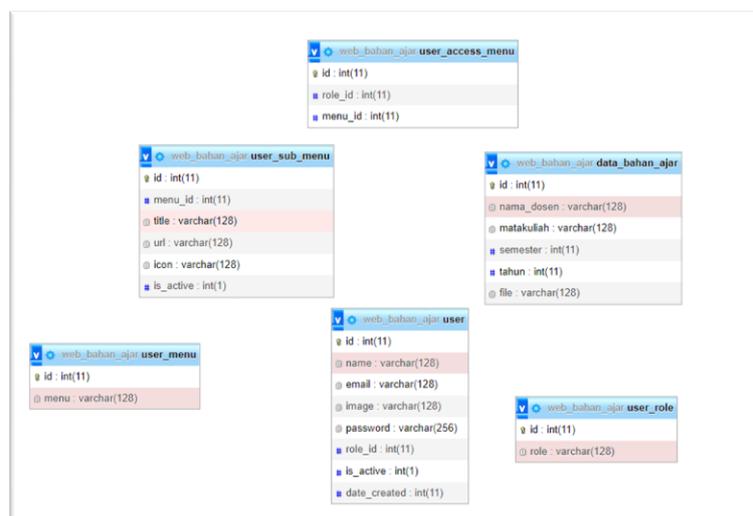


Figure 3. Class Diagram

### 5) Verify and Validated KM System

System testing uses the black box method which is carried out via the interface of the software that has been created, by showing that the features created function well and are in accordance with what the author expects.

Table 2. System Testing Black Box

| System Testing Black Box |  |  |                   |
|--------------------------|--|--|-------------------|
| No                       | System Testing Description                                   | System Procedure Testing   | Evaluation Result |
| 1                        | Login To System  | Enter Username and Password  |                   |
| 2                        | Managing User Data   | Admin can add, edit and delete user data   | √                 |
| 3                        | Creating Subject Categories                                  | Admin manages the subject category section   | √                 |
| 4                        | Creating Teaching Material Categories                        | Admin inputs the category of teaching materials that will be managed by the system.  | √                 |
| 5                        | Looking for Teaching Materials                               | Using the search feature provided  | √                 |
| 6                        | Uploading and Downloading Teaching Materials                 | Teachers can download the teaching materials they need from the system, Teachers can upload their teaching materials into the system | √                 |
| 7                        | Create a discussion form                                     | Principals and teachers can create discussion forms to conduct discussions in the comment's column                                   | √                 |
| 8                        | Viewing Teaching Materials Reports                           | The principal can view the teacher's teaching material report  | √                 |
| 9                        | Conducting Verification and Validation of Teaching Materials | Verify whether the teaching materials uploaded by teachers are in accordance with the curriculum or not.                             | √                 |
| 10                       | Logout   | Click Logout from the system   | √                 |

## 3. Result and Discussion

### 3.1 Results

Based on the analysis conducted in the previous chapter regarding the design of the Knowledge Management System for Teacher Teaching Materials at SMA Negeri 22 Palembang, this chapter discusses the implementation and outcomes of the system. Following the stages outlined in the applied methodology, the development resulted in a functional Knowledge Management System for teacher teaching materials at SMA Negeri 22 Palembang.

#### 1) Explicit Knowledge

##### a) Teachers' Explicit Knowledge

Fulfilling responsibilities and obligations as outlined in their job descriptions.

##### b) Possessing teaching materials aligned with the subjects they teach and further enhancing their scientific knowledge.

#### 2) Tacit Knowledge

##### a) Teachers' Tacit Knowledge

Leveraging knowledge and experience from teaching and learning activities, as well as knowledge sharing among teachers at SMA Negeri 22 Palembang.

##### b) Collaborating to find solutions and discuss teaching materials with other teachers.

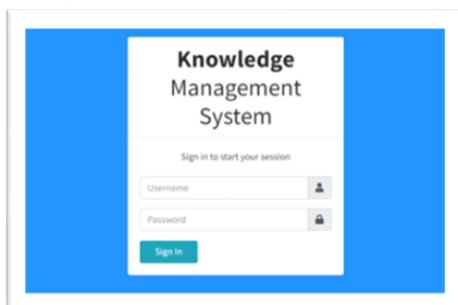


Figure 4. Login Page



Figure 5. Dashboard Page

The login page serves as the initial entry point for users, requiring them to input their username and password to access the system. This process is illustrated in Figure 4. Upon successful login, users are directed to the dashboard page, which serves as the main interface of the system. This is depicted in Figure 5. The add account page allows users to create teacher accounts by entering the necessary information for new accounts, enabling them to log into the system. This is shown in Figure 6 below. This page enables users to categorize teaching materials according to the subjects being taught. Teachers can upload teaching materials corresponding to their subjects, as shown in Figure 7 below.

Figure 6. Add Account Page

Figure 7. Add Teaching Materials Page

After uploading teaching materials, the system automatically updates and displays them on the teaching materials data page. This is explained in Figure 8 below. The add subject page is specifically for teachers to input the subjects they teach. This allows them to search for and upload relevant teaching materials. This is illustrated in Figure 9 below.

Figure 8. Teaching Materials Data Page

Figure 9. Add Subject Page

Once subjects are added, the entered data is displayed in the subject table page for reference and further management. This is explained in Figure 10 below.

| No | Nama                 | Action |
|----|----------------------|--------|
| 1  | Matematika           |        |
| 2  | Fisika               |        |
| 3  | KIMIA                |        |
| 4  | BIOLOGI              |        |
| 5  | Bahasa Inggris       |        |
| 6  | Bahasa Indonesia     |        |
| 7  | Pendidikan Pancasila |        |

Figure 10. Subject Table Page

### 3.2 Discussion

The implementation of Knowledge Management System (KMS) for teacher teaching materials at SMA Negeri 22 Palembang has shown great success in managing and disseminating knowledge. This system efficiently solves the problem of how to disseminate knowledge through the integration of explicit and tacit knowledge. Examples include teaching/learning materials and job requirements that are clearly defined so that they can be standardized and more easily accessed. Tacit knowledge (teacher experience/opinion/solution) that builds collaboration and innovation for teaching.

The simplified user interface allows for a smooth experience with ease of use through simple pages such as the welcome/login page, dashboard, and account creation. It also aligns the work of educators in creating and distributing resources, adding support in the form of teaching materials and subjects. Examples: Add Teaching Material Page (Fig. 7) & Teaching Material Data Page (Fig. 10). Improved process of uploading and managing educational content, etc. reducing redundancy, with less and consistent work on the "Add Subject Page" on the smartphone (Fig. 9 & Table of Contents Subject Table) Facilitates teachers to become responsible educators with specific subjects translated only into content, with all administrative issues removed. Similarly, the "Add Subject Page" (Fig. 9) and "Subject Table Page" (Fig. 10) provide a classified layout to link teaching materials to specific subjects, allowing teachers to facilitate content without administrative burden. This is implemented to reduce knowledge gaps and improve the level of education.

The use of the SECI model and the Knowledge Management System Life Cycle (KMSLC)—a structured methodology in any case, ensures that the system covers the full scope of tacit and explicit knowledge. Conversely, by encouraging equal access to resources and institutionalizing more collaboration, professionals are encouraged and grow together. The benefits for teachers at SMA Negeri 22 Palembang are the existence of an integrated repository for continuous learning and optimal utilization of resources. A fully developed KMS is able to help teachers manage teaching materials effectively and provide an effective platform for collaboration between pedagogical practitioners. To achieve these goals, various features and compliance with the latest knowledge management practices make educational institutions in great need of this tool at SMA Negeri 22 Palembang.

## 4. Related Work

There has been much research on Knowledge Management Systems (KMS) in educational settings, particularly to improve teaching and learning practices. KMS allows knowledge to be captured and stored in explicit form for quick access, use, and sharing by educators and students. For example, literature that is an example of e-learning as knowledge management, has emphasized the importance of organizational learning in educational settings [16]. The key role of school leadership in implementing KMS at the secondary education level, as highlighted by research, that principals are important for knowledge management initiatives and their involvement influences the impact of the system [17][18]. Previous research shows the important role of principals in influencing knowledge management initiatives and the overall effectiveness of the endpoint of this system. Principals as leaders in knowledge management emphasize the need to provoke a culture of sharing, a starting point for staff. Indeed, other studies have stated that organizational culture and structure are key to the success of knowledge creation and dissemination in educational organizations [19]. The establishment of such KMS and an example of it is KMS at SMA Negeri 22 Palembang is indeed a trend that shows that the pendulum has swung towards considering implicit and explicit knowledge, but in an educational setting. This involves designing a simple, yet very user-friendly interface, practicing learning design methodologies to accelerate learning access for teachers [20][21]. Subject-based materials and such systems that are intuitively designed are important factors for their scalability in practice, especially in relation to real educational environments.

In addition, the focus on usability and system architecture is also supported by research that shows the important role of both factors in the success of KMS implementation in schools [22]. Moreover, the performance of KMS in educational infrastructures is usually influenced by the organizational as well as human factors, the latter due to specific reasons in KMS, individuals and technology. The key factors that influence the effectiveness of KMS in educational institutions are organizational, individual and technological. The relationship between knowledge management and organizational learning is crucial in determining the level at which the principal functions and consequently, it influences other output areas in educational output [23]. This relationship shows how important it is to foster an environment where educators can share and collaborate for the improvement of student learning experiences [1][3][12]. The development and use of KMS in educational settings is a multi-faceted process that demands effective leadership, user-centered design, and

an understanding of organizational dynamics that stimulate knowledge sharing. When these components are combined, they can result in better educational practices and outcomes and thus contribute to an improved learning environment.

## 5. Conclusion and Recommendations

The results of the study show proof of concept of designing and developing Knowledge Management System on Teacher Teaching Materials of Senior High School 22 Palembang which has the potential to achieve superior teaching resource management on a mass scale. This system streamlines the planning and distribution of teaching materials, with fewer errors or discrepancies to pass the preparation. In addition, this system encourages collaboration and knowledge sharing among teachers for the equitable dissemination of scientific progress information and supports teaching at a high-quality level along with the basis for continuous professional advancement of staff through implicit and explicit knowledge exchange channels.

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