

## Web-based Knowledge Sharing System in Faculty of Engineering Bangka Belitung University

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### ABSTRACT

New lecturers must be quickly adapted to their work environment. Adaptation was difficult when colleagues did not provide space for discussion to the new lecturers. This condition occurred at the Faculty of Engineering Bangka Belitung University, with the planned to open a new study program, new lecturers had to be in a temporary homebase that was not their field. The expectation from the Dean was the existence of a knowledge sharing system that can be accessed anytime and anywhere by lecturers. But in reality, the knowledge sharing system still did not exist and knowledge sharing carried out manually by face-to-face meetings between lecturers and through Whatsapp groups. This research was conducted at the Faculty of Engineering, Bangka Belitung University. The knowledge sharing system methodology uses a combination of two methods, which are Socialization, Externalization, Combination, Internalization (SECI), and Knowledge Management Life Cycle. The result of this research was a development of web-based knowledge sharing system with an object-oriented approach which has been tested with black box testing and resulted as the system functions worked well.

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## 1. INTRODUCTION

Someone will be faced with something new at the beginning of entering work environment. This is what happened as well at the Bangka Belitung University (UBB). New lecturers must be able to quickly adapt to their work environment. Adaptation will be difficult when colleagues do not provide space for discussion and work experience to new lecturers. The conditions that occurred at the Faculty of Engineering Bangka Belitung University, with the plan to open a new study program, resulted in new lecturers have to be in a temporary homebase that was not their field. Exchanging information only uses Whatsapp (WA), therefore sometimes the information conveyed is only limited to the skin.

The expectation from the Dean of the Faculty of Engineering Bangka Belitung University regarding knowledge sharing is the existence of a knowledge sharing system (KSS) that can be accessed anytime and anywhere by lecturers. However, in reality, the knowledge sharing system still does not exist and knowledge sharing activities are carried out manually by means of face-to-face meetings between lecturers and through WA groups. In this case, there is a gap between expectations and reality which causes the problem of a lack of knowledge sharing activities between lecturers which causes the rotation and dissemination of knowledge to be less extensive so that the performance of lecturers also decreases.

To find out the root of the problem, a fishbone diagram used as a tool to determine the root causes of the problems seen. The most important thing about the knowledge management and knowledge sharing process in an organization is the existence of a way to connect the three critical elements, which are technology, processes and individuals or human resources that support learning in organizations and create a culture of knowledge sharing [1]. Figure 1 shows a fishbone diagram of the problems faced by Faculty of Engineering, UBB.

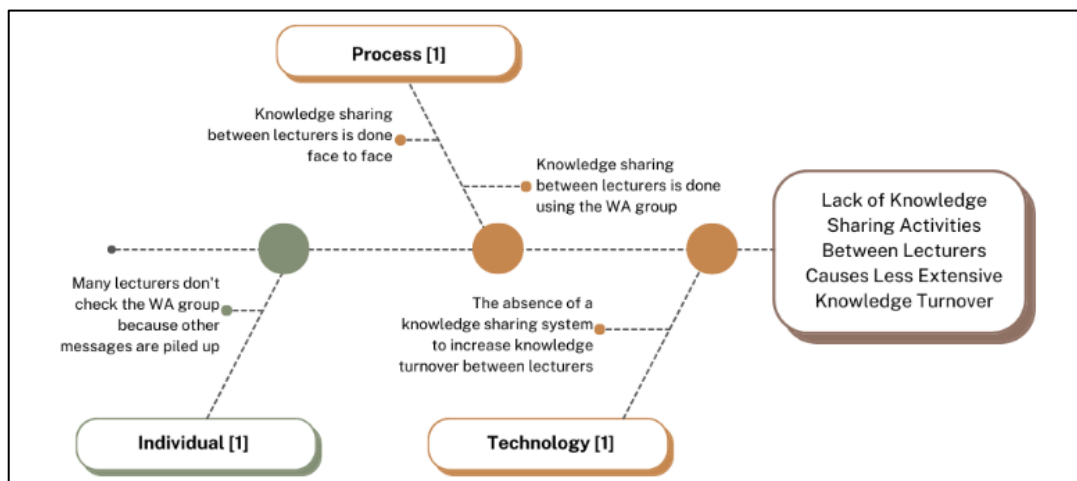


Figure 1. Fishbone diagram

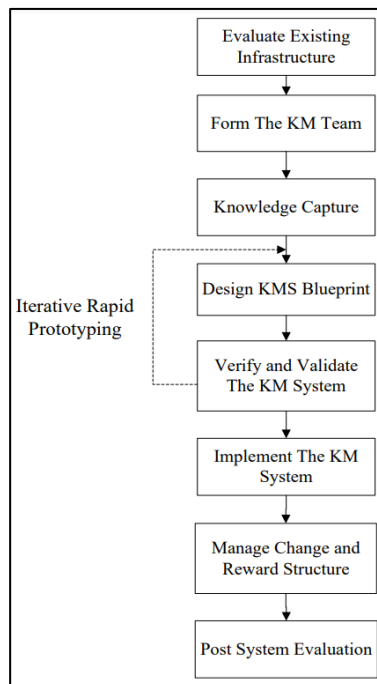
From the results of the analysis using fishbone diagram, it was found that three domains were the focus of the problem, which are Technology, Process and Individual. Researchers decided to focus on the root of the problem in the technology domain, namely the absence of a knowledge sharing system to increase knowledge turnover between lecturers. According to [2], to support the implementation of knowledge sharing, a technology is needed that can ensure that knowledge sharing runs effectively and efficiently.

According to [3], sharing knowledge is a necessity for every organization, including universities. The importance of sharing knowledge in learning activities, making universities must always trying to improve the culture. Knowledge sharing is an activity of exchanging knowledge, experience and skills between individuals, teams, organizational units and organizations in an appropriate format. Enhancement of individual skills and knowledge sharing, each of which can assist individuals and groups in realizing their creative potential. Team knowledge sharing plays a role as the extent to which team members share ideas, information, and suggestions relevant to each other's tasks. The positive impact of team knowledge sharing on team creativity is consistent with the idea that knowledge communication between individuals within a team is a viable resource for teams to generate new ideas [4].

Purpose of this research is to develop a web-based knowledge sharing system to improve the performance of lecturers at the Faculty of Engineering, UBB. The research was carried out within 9 months starting from April 2022 to December 2022. The research location was carried out at the Faculty of Engineering, UBB. Then, the laboratory used is the Computer Laboratory of the Faculty of Engineering, UBB.

## 2. RESEARCH METHOD

To conduct this research, Knowledge Management System Life Method Cycle (KMSLC) by Awad and Ghaziri used to develop the knowledge sharing system. This method has eight stages as shown in Figure 2. However, in this research, only five stages which from evaluate existing infrastructure up to verify and validate the KM system conducted, refer to [5].



**Figure 2.** Knowledge Management System Life Method Cycle (KMSLC) by Awad and Ghaziri [5]

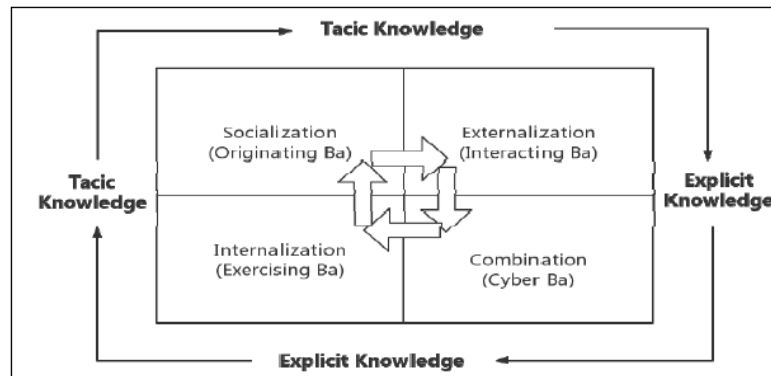
The five stages of KMSLC used in this research listed below.

1. Evaluate Existing Infrastructure  
 This stage evaluates the infrastructure in terms of software and knowledge. In software evaluation, identification of applications that have been used in the knowledge sharing process is carried out. Then the knowledge evaluation will be carried out using the SECI method to determine the current state of knowledge sharing.
2. Form the KM Team  
 This stage is carried out by forming a knowledge sharing team whose task is to support development of KSS at the Faculty of Engineering, UBB. Team formation is carried out through identification of users and stakeholders needed and then they are involved in the development of KSS.
3. Knowledge Capture  
 The process of capturing knowledge is done by writing, recording and translating knowledge from senior lecturers and academic officials at the Faculty of Engineering, UBB.
4. Design KMS Blueprint  
 Perform the process of converting the KSS design into web-based application.
5. Verify and Validate the KM System  
 Conduct knowledge testing, which is user acceptance testing. User acceptance testing is used black box testing method to test the application function by looking at the output data generated.

### 3. RESULTS AND DISCUSSION

#### 3.1. Evaluate Existing Infrastructure

Evaluate existing infrastructure, conducted by researchers using an analysis with SECI method. The SECI model developed by Ikujiro Nonaka and Hirotaka Takeuchi as shown in Figure 3 is a wheel of transformation of tacit and explicit knowledge, following four sub-processes, namely socialization, externalization, combination and internalization. This model is precise enough to allow an in-depth understanding of micro processing and can be easily interpreted from an Information Technology perspective.



**Figure 3.** The SECI Model by Ikujiro Nonaka and Hirotaka Takeuch [6]

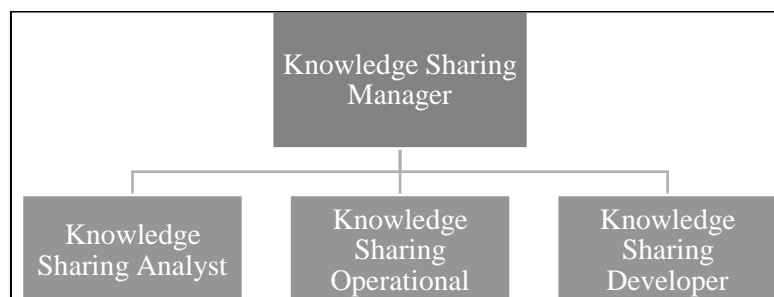
Each process has its own core. The essence of socialization is knowledge sharing. The essence of externalization is the codification of knowledge. The essence of the combination is the storage, systemization and processing of data, information and knowledge. Finally, the essence of internalization is to learn previously processed knowledge. Using these simple facts, the SECI model is quite appropriate for the practical classification of IT available for development or support of Knowledge Management Systems (KMS) [6].

Based on the results of the analysis of knowledge sharing that runs using the SECI method, several things were found, namely:

1. Socialization: knowledge sharing activities are carried out manually by means of face-to-face meetings between lecturers and through WA groups.
2. Externalization: The process of documenting knowledge is quite long because it requires a decision letter from the rectorate and this piles up because everything is done semi-manually.
3. Combination: The storage and dissemination of knowledge documents can only be accessed via WA and there are many possibilities for data to be lost or buried by other chats.
4. Internalization: Because there is no special container to store knowledge documents, many lecturers miss important documents and end up not knowing certain information or knowledge.

### 3.2. Form the KM Team

The next step of this method is to form the KM or Knowledge Sharing team. Because this research aims to develop a knowledge sharing system at the Faculty of Engineering, UBB, the knowledge sharing team formed must be around the academic community at the Faculty of Engineering, UBB. In designing this knowledge sharing team, referring to [7], the structure of the knowledge sharing team design is shown in Figure 4 below.



**Figure 4.** Knowledge Sharing Team

The roles of each position here are as follows:

1. Knowledge Sharing Manager is responsible for the sustainability of the system, making plans and strategies in the development of knowledge sharing. This position will be filled by the Dean of the Faculty of Engineering, UBB.

2. Knowledge Sharing Analyst will be responsible as admin where their job is as supervisor and approval in terms of deleting content activities carried out by knowledge sharing system users. This position will be filled by the staff of the Faculty of Engineering, UBB.
3. Knowledge Sharing Operational is responsible for adding, storing, and editing information or knowledge in the system. This position will be filled by all lecturers of the Faculty of Engineering, UBB. To enter the system, lecturers will be given their respective usernames and passwords.
4. Knowledge Sharing Developers are responsible for designing and building various facilities needed by system users, configuring servers and applications, and responding to all troubleshooting that occurs both in terms of hardware and software. This position will be filled by the academic community within the Faculty of Engineering, UBB who has more knowledge about IT.

### 3.3. Knowledge Capture

Knowledge Capture can occur through externalization and internalization, which through externalization process, tacit knowledge converted into explicit knowledge and vice versa [8]. Tacit knowledge, which is the knowledge of senior lecturers and academic officials, will form the background needed to build, develop and interpret explicit knowledge for junior lecturers to make it better accessible. This process done by writing, recording and translating knowledge into articles and videos. Where the videos and articles were stored in web-based knowledge sharing system that can be accessed anywhere and anytime.

### 3.4. Design KMS Blueprint

Referring to [9], according to its function, the knowledge sharing system can be divided into six modules, namely video module, article module, question answering module, credit module, audit module and recommendation module. However, according to the current needs of the Faculty of Engineering, UBB, the modules that will be included in this knowledge sharing system are three modules, namely video module, article module, and question answering module (QnA).

After determining the module, the design of the Knowledge Sharing System using UML diagrams can be described. First, researchers design Use Case Diagram which can be seen in Figure 5. Use Case Diagrams describe the expected functionality of a system. Use Case Diagrams also describe the interactions that occur in the system. The interaction is between the system inside and outside the system and users or actors with the system [10]. There are two actors in the designed knowledge sharing system, namely admin and KSS user. This admin is part of a predetermined knowledge sharing team, while the KSS users are all lecturers of the Faculty of Engineering, UBB.

The class diagram shown in Figure 6 is a description of the system structure that represents the relationship between classes or objects that contain attributes and methods [11]. The total class that must exist later in this knowledge sharing system is at least eight classes, each of which has a primary key (PK) so that the classes can be well connected to each other. These classes include a class that stores the usernames and passwords of users, then a class that stores the three modules in the knowledge sharing system, and finally information about user profiles.

Furthermore, the functional design implementation process is carried out using a Web-based application. The results of the system implementation for the video module which represents one of the three modules in this knowledge sharing system can be seen in Figure 7. There is a search feature to make it easier for users to search for specific information or knowledge without having to search one by one manually. Figure 8 shows the profile page of this knowledge sharing system. This page provides the option to edit user data if there is an error in the data.

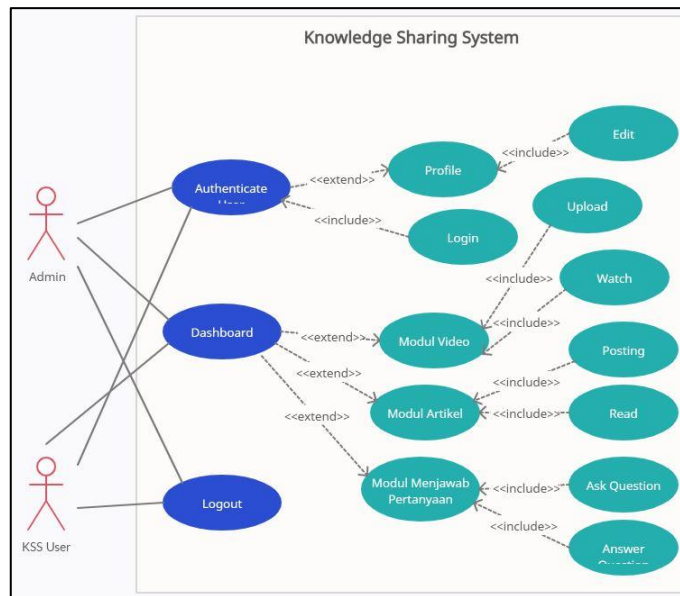


Figure 5. Use Case diagram

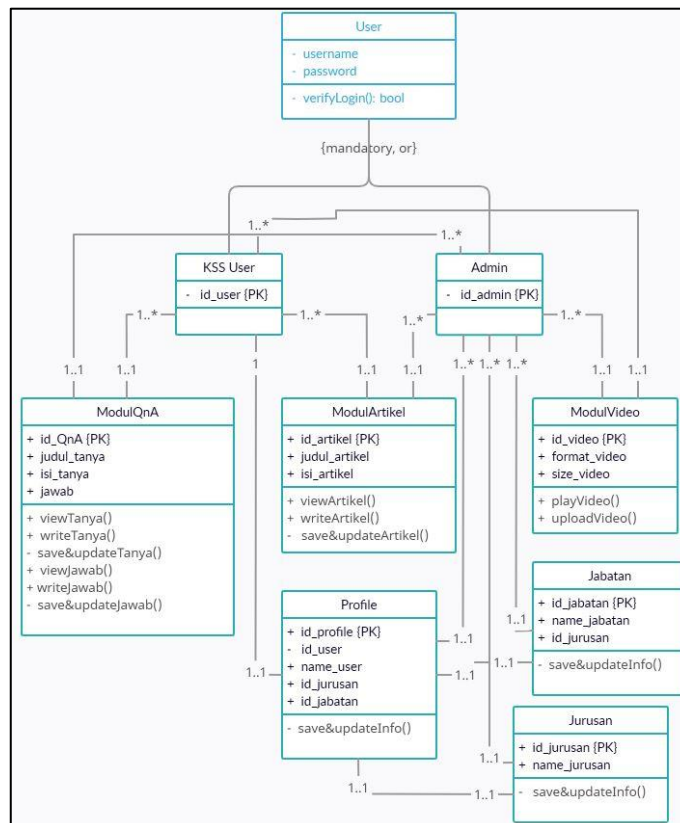


Figure 6. Class diagram

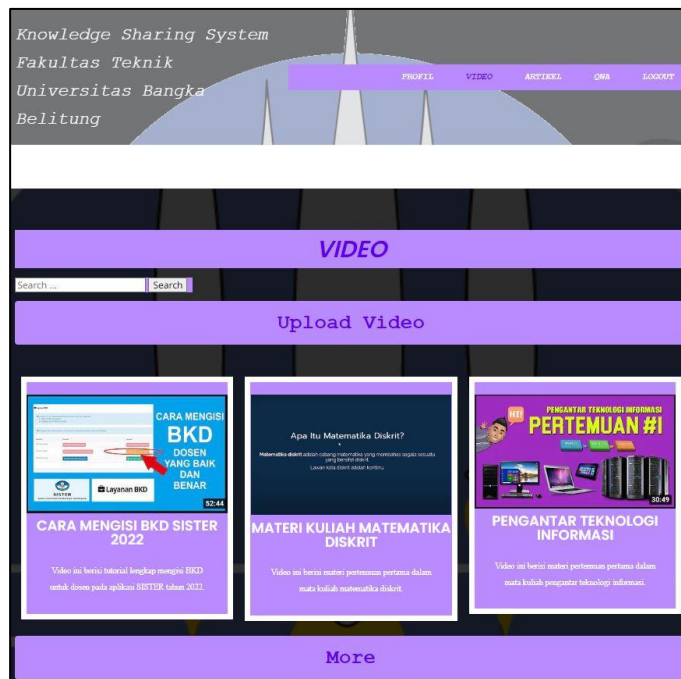


Figure 7. Video Module



Figure 6. Profile Page

### 3.5. Verify and Validate the KM System

At this last stage, user acceptance testing is carried out using black box testing which can be seen in Table 1. Black box testing is to generate input values based on exercising the specification which means to have generated enough tests so that every component that makes up the implementation has been demonstrated to produce a valid result when executed [12]. Testing based on the main features in the knowledge sharing system which consists of several functions generated from the video module, articles module, question answering module and viewing and editing user profile pages. The results of black box testing show that the main features of this knowledge sharing system have been working well.

**Table 1.** Black Box testing

Description	Condition	Test	Result	Status
Login	On the login page	Input username and password	Successfully entered the dashboard page	Valid
Open Profile Page	On the profile page	Login and go to profile page	Successfully view profile page	Valid
Edit Profile	On the profile page	Press edit button, change profile and save	Successfully edit profile and the changes seen in profile page	Valid
Play Video	On the video module	Choose one video and click play button	Successfully play the video	Valid
Upload Video	On the video module	Click "Upload Video" button and upload a video	Successfully upload the video and the updates seen in video module	Valid
Read Article	On the article module	Click on of the article	Successfully view the correct article	Valid
Post Article	On the article module	Click "Post Article" button, write an article and save	Successfully add new article and the updates seen in article module	Valid
Ask Question	On the QnA module	Click "Ask Question" button, write a question and save	Successfully add new question and the updates seen in QnA module	Valid
Answer Question	On the QnA module	Click "Answer Question" button, write an answer and save	Successfully add new answer in a question and the updates seen in QnA module	Valid

#### 4. CONCLUSION

The conclusion of this research is to develop a web-based knowledge sharing system to improve the performance of lecturers at the Faculty of Engineering, UBB. This research was carried out by following five of the eight stages in the Knowledge Management System Life Method Cycle (KMSLC) by Awad and Ghaziri, which are from Evaluate Existing Infrastructure to Verify and Validate the KM System. In the evaluation stage of the knowledge sharing process, the method of Socialization, Externalization, Combination, Internalization (SECI) by Ikujiro Nonaka and Hirotaka Takeuchi is used to see how are the current knowledge sharing activities at the Faculty of Engineering, UBB.

As a result, researchers can conclude that a Knowledge Sharing System is needed that can be a media for the Faculty of Engineering, UBB in sharing knowledge and information that can be accessed anywhere and anytime. The media was developed with an object-oriented approach and a web-based system. After being tested using black box testing, the result is that this system functions works well.

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## REFERENCES

- [1] Merlo, T. R., "Factors influencing knowledge management use in technology enterprises in Southern United States," *Procedia Computer Science.*, vol. 99, pp. 15-35, 2016.
- [2] Pramana, D., "Perancangan Aplikasi Knowledge Sharing Dengan Konsep Gamification," *Jurnal Sistem dan Informasi.*, pp. 202-211, 2015.
- [3] Meylasari, U. S., & Qamari, I. N., "Faktor-Faktor yang Mempengaruhi Knowledge Sharing dalam Implementasi E-Learning," *Jurnal Manajemen Bisnis.*, vol. 8 (2), pp. 238–263, 2017.
- [4] Yuntao, D., Bartol, K. M., Zhie-Xue, Z., & Chenwei, L., "Enhancing employee creativity via individual skill development and team knowledge sharing: Influences of dual-focused transformational leadership," *Journal of Organizational Behavior.*, vol. 38, pp. 439-458, 2017.
- [5] Wardhana, A., Nurhadryani, Y., & Wahjuni, S., "Knowledge Management System Berbasis Web tentang Budidaya Hidroponik untuk Mendukung Smart Society," *Jurnal Teknologi Informasi dan Ilmu Komputer.*, vol. 7(3), pp. 619-628, 2020.
- [6] Yang, S., Liu, Y., & Liang, M., "Teachers' Personal Knowledge Management Tools and Application Strategies Exploration Based on the SECI Model," *International Joint Conference on Information, Media and Engineering (ICIME).*, pp. 341-346, 2018.
- [7] Dwi Agustia, R., & Hadiana, A., "Perancangan Blueprint Knowledge Management System Di Office of International Affair Universitas Komputer Indonesia," *Jurnal Tata Kelola Dan Kerangka Kerja Teknologi Informasi.*, vol. 1(2), 2017.
- [8] Zamir, Z., "The Impact of Knowledge Capture and Knowledge Sharing on Learning, Adaptability, Job Satisfaction and Staying Intention," *International Journal of Entrepreneurial Knowledge.*, vol. 7(1), 2019.
- [9] Gu, X., Yang, L., & Cao, S., "Design and implementation of knowledge sharing system based on WeChat small program," *IEEE 3rd Advanced Information Technology, Electronic and Automation Control Conference.*, pp. 2242-2246, 2018.
- [10] Mutia, I., Herlinda., & Atikah., "Perancangan Knowledge Management System (KMS) Kurikulum 2013 Menggunakan Model Tiwana dan Zack," *Jurnal Edukasi dan Penelitian Informatika (JEPIN).*, vol. 3(2), pp.152-162, 2017.
- [11] Anardani, S., Riyanto, S., & Setiawan, D., "Perancangan Knowledge Management System Berbasis Web pada Tenaga Kependidikan Fakultas Teknik Universitas PGRI Madiun," *Jurnal Teknologi Informasi dan Ilmu Komputer (JTIK).*, vol. 8(1), pp. 77-84, 2021.
- [12] Bierig, Ralf, et al. *Essentials of Software Testing.* Singapore, Cambridge University Press, 2021.