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Research Artikel

S-Know Microlearning: Integral Part of Knowledge Management for Employee Training in the Indonesian Banking Industry.

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A B S T R A C T

The lack of integrated and easily accessible knowledge-sharing platforms within organizations, especially in the banking industry, has led to challenges in preserving institutional expertise and supporting effective employee training. S-Know (Smart Knowledge) is a web-based knowledge management system developed to address this issue by facilitating the storage, management, and distribution of organizational information. It offers features such as learning paths, learning modules, quizzes, and discussion forums to promote structured collaboration and self-directed learning among employees. The content is designed using a microlearning approach to ensure better comprehension and relevance to new staff training. The development of S-Know followed the Knowledge Management System Life Cycle (KMSLC), encompassing stages of knowledge capture, system design, implementation, and evaluation, each tailored to align with real organizational needs. Technically, S-Know leverages the Laravel framework for scalability and flexibility, with black box testing used to evaluate system functionality against user requirements. Test results and user interviews confirmed that all core features performed effectively and supported the intended goals. Overall, S-Know shows strong potential as a strategic and adaptive platform for knowledge management that can enhance human resource development and support sustainable organizational knowledge. To further support its growth and long-term value, future development may focus on encouraging greater user participation in knowledge sharing and improving accessibility, especially through integration with mobile platforms.

1. INTRODUCTION

The rapid development of information technology encourages organizations and companies to invest in and implement information systems [1]. In this era of digitalization, daily life is inseparable from the use of technology. Nearly all activities are now conducted digitally [2]. As a result, every aspect of life must adapt to avoid being left behind, particularly in the world of work. Despite these technological advances, human resources (HR) remain the key determinant of organizational success. Employees are not merely task executors but also the driving force behind innovation and the frontline in delivering value to customers [3], [4]. Therefore, HR development is a vital investment to ensure that organizations remain competitive in an increasingly dynamic market [5].

The banking industry is one of the sectors heavily impacted by digitalization. It plays a crucial role in driving economic activity, from financing essential aspects of daily life to supporting consumer transactions such as buying and selling [6]. To remain efficient, banks must employ a workforce capable of swiftly adapting to change. Thus, the effectiveness of training programs is critical to helping new employees succeed in competitive environments [7].

Unfortunately, conventional training methods often feel ineffective, especially in today's fast-paced landscape [8]. An effective training program should not only improve employees'

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technical skills but also foster a flexible, collaborative, and change-ready organizational culture [9]. Therefore, organizations need more dynamic training methods aligned with current technological trends.

One increasingly popular approach is microlearning, which delivers focused content in small, digestible units [10]. This method helps new employees learn efficiently without being overwhelmed by lengthy or complex material. Learners can study gradually and based on their needs, anytime and anywhere.

To ensure microlearning is structured and effective, a system is needed to organize knowledge systematically and make it easily accessible. This is where a Knowledge Management System (KMS) becomes essential. A KMS is a technology-based platform designed to store, organize, and distribute knowledge within an organization [11]. In the context of onboarding, a KMS can store tutorials, training modules, and essential documents that employees can access independently whenever needed.

Integrating microlearning with KMS offers dual benefits: simplified training content and efficient information storage. Moreover, if delivered through a web-based system, employees can access knowledge without time or location constraints. This enables smoother onboarding processes and ensures all employees have equal access to vital information.

In light of this urgency, this study aims to design and develop a microlearning-based training system integrated with KMS using the Knowledge Management System Life Cycle (KMSLC) approach. The focus is on training new employees in the banking industry. The system is expected to create an interactive, efficient, and sustainable learning environment that supports human capital development amid the ongoing wave of digital transformation.

2. LITERATURE REVIEW

2.1. Human Resources (HR)

In an increasingly competitive business environment, HR plays a crucial role in contributing to an organization's success. HR development is not only focused on enhancing technical skills but also on strengthening non-technical aspects such as communication, leadership, and adaptability [12]. Efficient training processes form a fundamental foundation to ensure that new employees are adequately prepared to perform their duties effectively.

In addition, improving the quality of human resources has a positive impact on customer service. Proper training can enhance service quality, leading to greater customer satisfaction [13]. Therefore, companies must ensure that HR training programs are not merely formalities, but are intentionally designed to meet the real needs of the organization in adapting to continuously changing business dynamics.

2.2. Human Resource Management (HRM)

Human Resource Management (HRM) plays a vital role in ensuring that employees contribute optimally to achieving organizational goals. The responsibilities of HRM are not limited to managing the workforce effectively and efficiently [14], but also include efforts to enhance the quality of human resources through the development of skills, motivation, and competencies at all levels of the organization. In addition to development, HRM is also responsible for recruitment and selection to ensure the organization acquires qualified employees. One common form of selection used is the interview, which is considered important in the process of assessing job candidates [15]. Training programs are then essential to improve employee abilities and skills so they can face global challenges.

Additionally, efficient human resource management is especially important in the banking sector, considering its strategic role in supporting economic activities and public services. In this context, implementing a comprehensive HRM strategy is crucial to enable employees to deliver their best performance in a constantly evolving work environment.

2.3. Banking Industry

The banking industry plays a vital role in supporting economic growth by collecting and channeling funds from the public. It functions not only as a financial institution but also as a key driver in facilitating investment, production, and consumption [16]. Additionally, banking serves as a fundamental component of a country's financial structure through various loan and financing services that contribute to the economic development process [17].

In developing human resources within the banking sector, training plays a crucial role in ensuring that employees possess skills relevant to current demands. Training programs that adopt a microlearning approach can be an effective solution for delivering concise, clear, and easily accessible learning materials, supporting the enhancement of HR quality in a more efficient and practical manner.

2.4. Training

Training is a structured approach to enhancing employees' abilities in facing competitive market environment [18]. The primary focus of training is to develop skills that can be directly applied to the job. One commonly used training method is On-the-Job Training (OJT), which involves hands-on learning in the workplace under the guidance of experienced supervisors [19]. Other methods include internships, job instructions, and coaching, all designed to efficiently improve employee skills [20].

Training does not only focus on improving technical competencies but also prepares employees to adapt to changes within the organizational environment. Internships provide opportunities for employees to apply acquired knowledge, job instructions teach specific procedures, and coaching offers personalized guidance for deeper skill development. With well-planned training, employees are better prepared to face workplace challenges and contribute more effectively to the organization.

2.5. Microlearning

Microlearning is a learning method designed to deliver content in small, focused segments [21], making it highly effective for knowledge transfer in the workplace. This approach allows employees to acquire the information they need quickly and just

in time, according to the demands of their tasks. It supports the achievement of e-learning goals by presenting material in short, easily digestible formats, such as text, images, or videos lasting between 1 to 5 minutes [22].

A practical example of effective microlearning implementation can be seen in platforms like Microsoft Learn and Microsoft 365 Training, which offer short training modules in the form of videos, texts, and images for various Microsoft products. These modules are organized into small sections, enabling learners to progress step by step at a pace that matches their individual needs [23]. Therefore, microlearning can be integrated into a KMS to support situational mentoring in the workplace while strengthening and expanding the organization's knowledge base [24].

2.6. Knowledge Management System (KMS)

A KMS is a set of tools, strategies, and methods used to maintain, analyze, organize, share, and enhance information within a company, with the aim of increasing organizational efficiency and accelerating decision-making processes [25]. The implementation of a KMS enables companies to store, manage, and distribute knowledge in a structured and systematic way, thereby boosting innovation and enhancing organizational capabilities. Additionally, with web-based systems, KMS can overcome time and location barriers in knowledge flow, providing solutions to the needs of HR and advancements in information technology (IT) [26]. A KMS is an essential tool for creating, storing, and utilizing the knowledge possessed by an organization, making it a strong source of competitive advantage [27].

2.7. Knowledge Management System Life Cycle (KMSLC)

The KMSLC is a methodology for developing knowledge management systems that involves several phases, including knowledge capture, design, validation, implementation, and testing [28]. This process is typically represented using Unified Modeling Language (UML) and is implemented in web-based applications. One of the key stages is infrastructure evaluation, which includes assessing hardware, software, and human resources as sources of knowledge [29].

Subsequently, a development team is formed, and knowledge is gathered through interviews and observations. The blueprint design of the KMS is created using UML to map the knowledge structure. The final stage is the implementation of the KMS through coding, resulting in a fully functional system

2.8. Tacit Knowledge and Explicit Knowledge

Tacit knowledge and explicit knowledge are two complementary categories in knowledge management. Tacit knowledge resides in people's minds and is acquired through experience, skills, and intuition. It is often difficult to articulate [30]. On the other hand, explicit knowledge can be communicated and stored in organized formats such as books or digital files [31].

Tacit knowledge can also be transformed into explicit knowledge [32]. For example, when a chef writes down their recipes in a cookbook. This process enables personal knowledge to become more structured and accessible to others. By effectively managing both types of knowledge, a KMS can enhance innovation, productivity, and organizational competitiveness.

2.9. Related Research

The use of microlearning as a training medium has been explored in prior studies. One such study titled "Digital Microlearning for Training and Competency Development of Older Adult Care Personnel: Mixed Methods Intervention Study to Assess Needs, Effectiveness, and Areas of Application" [33], developed microlearning as a learning tool in elderly care. The results indicated that microlearning is an effective method for enhancing employee competencies due to its accessibility and ease of use.

Another study titled "The Implementation of Knowledge Management System (KMS) Evaluation Model in Improving Employee Performance: A Case Study of the State Electricity Company" [34] evaluated the implementation of a KMS evaluation model at PT PLN (Persero). The study aimed to identify factors and indicators influencing employee performance, and found that the elements of people, process, and technology had a positive impact. The results suggested that optimizing these three components of KMS can enhance employee performance within the organization.

Microlearning was also examined in a study titled "Assessing the Effectiveness of Microlearning in Employee Training Programs" [35]. The study reviewed literature and empirical findings to evaluate the impact of microlearning on knowledge acquisition, engagement, and organizational performance. Using both quantitative analysis and qualitative feedback, the study concluded that microlearning enhances training effectiveness and supports organizational success, while also recommending future research through longitudinal and cross-cultural studies.

Beyond the direct application of microlearning and KMS, research also explores the integration of behavioral analytics for personalized learning. For instance, Riza et al. [36] developed a learning media based on event logging systems for analyzing student's learning behaviors, addressing the challenge of integrating multimedia-based learning with systems for evaluating student responses. Their work highlights that every user activity is recorded by the system, allowing for objective and accurate analysis of behaviors. This objective data is crucial because the unique learning process for each student depends on their personality, attitude, motivation, intellectuality, and emotional development. The system developed also aims to become part of a Personal Learning Environment (PLE), which provides access to diverse learning resources tailored to student interests. This demonstrates a focus on systems that can recognize individual characteristics and adapt learning content accordingly, a goal that can inform the development of more adaptive platforms for knowledge management and training.

Based on these previous studies, it can be concluded that both microlearning and knowledge management have been widely utilized for various needs using different approaches. However, there are still some gaps in past research. For instance, knowledge management has not yet been applied as a microlearning platform in the banking industry, nor have quiz features been integrated as user evaluation tools. This research, therefore, aims to develop a

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knowledge management system application as a microlearning-based knowledge transfer medium for employee training in the banking industry. The application will integrate features necessary to optimize the training and knowledge transfer process.

3. METHOD

This study adopts the stages outlined in the KMSLC method [37]. Therefore, the system development is expected to be carried out in a structured and efficient manner, resulting in a KMS that effectively manages knowledge, facilitates processes, and supports the organization's objectives.

Figure 1 presents the research design used in this study. It illustrates the sequence of system development using the adapted KMSLC methodology, which has been tailored to meet the specific needs of the research. This adaptation aims to optimize the implementation of the KMS in the context of new employee training.

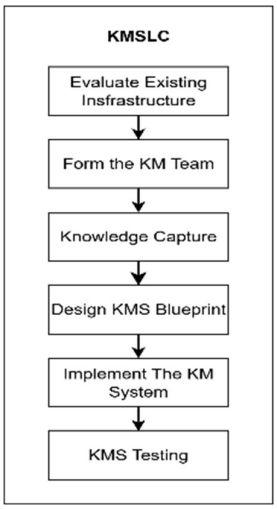

Figure 1. KMSLC Method

The development of the KMS was carried out using the KMSLC framework. It began with an assessment of the existing infrastructure, covering software, hardware, network components, and human resources with relevant organizational knowledge. Afterward, a dedicated KM team was formed, consisting of individuals with both technical expertise and contextual understanding of the organization. Knowledge capture was conducted through interviews, observations, and document reviews to collect insights from internal sources. Based on the results, the team designed the system using UML diagrams such as use case, activity, sequence, and class diagrams, along with a knowledge map to codify and organize the information. The system was then developed through programming and component integration aligned with the design. To ensure reliability and performance, functional testing was conducted to evaluate whether the system met all specified requirements.

4. RESULT

The results of this study present the findings obtained throughout the development process of S-Know, a KMS designed as a microlearning platform for onboarding new employees in the banking industry. The findings are structured around a series of methodological stages. Each phase of the research procedure is described in detail, beginning with an analysis of software requirements, followed by the technical design of the proposed solution, then progressing to the system development and implementation, and concluding with an evaluation stage to assess the performance and effectiveness of the developed solution

4.1. Evaluate Existing Infrastructure

This phase was conducted to evaluate the infrastructure required for the development of S-Know, a KMS designed for training in the banking industry. Although not tailored to a specific banking institution, the evaluation was based on general standards commonly used across the banking sector. Each component was assessed to ensure that the designed system can operate optimally and remain relevant to the needs of the banking industry. The results of the infrastructure evaluation are presented in Table 1.

Table 1. Evaluate Existing Infrastructure

Infrastructure	Evaluation Aspect	Description
Hardware	Server and Storage	Local server/hosting with standard capacity.
	User Devices	Devices such as laptops/PCs with adequate specifications for development and testing processes.
Software	Browser	A browser capable of accessing the web-based application.
	Development Platform	Visual Studio Code, PostgreSQL, and Windows/Linux operating systems.
Network	Internet	A stable internet connection for system access and microlearning video playback.

Data Equipment	Reference Data	Reference materials such as scholarly papers, articles, and other documents supporting the knowledge used.

4.2. Form the KM Team

In the design and development process of S-Know, no formal Knowledge Management (KM) team was established. Instead, all stages, from analysis, design, and development to system evaluation, were carried out collaboratively by the research team. Each team member contributed according to their respective roles and expertise, covering both technical and conceptual aspects, to ensure that the system was developed in alignment with the defined objectives.

4.3. Knowledge Capture

During the knowledge capture process, the author collected knowledge in the form of explicit knowledge, which refers to documented information. The knowledge was sourced from books, articles, and other publicly available documents relevant to the research and supportive of the system's development.

4.4. Design KMS Blueprint

In this stage, the first step is to visualize the results of the previously conducted knowledge capture in the form of a knowledge map. This process is intended to map the flow of knowledge, thereby supporting the effective utilization of information. The knowledge map is presented in Figure 2.

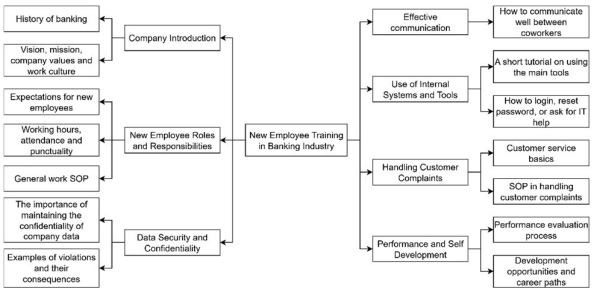

Figure 2. Knowledge Map

S-Know will be divided into two interfaces: a user interface and a dedicated administrator (admin) interface. This separation is implemented to tailor the features and access levels according to each user's role. To describe the structure and workflow of S-Know, it will be presented in a UML diagram.

The purpose of the use case diagram is to visually represent the system requirements, making the design process more intuitive. This diagram illustrates the actors' perspective, showing how different actors directly interact with the system.

Figure 3 presents the use case diagram of S-Know. This diagram illustrates the actors' perspective and visually represents the system requirements by showing how different users interact with the system.

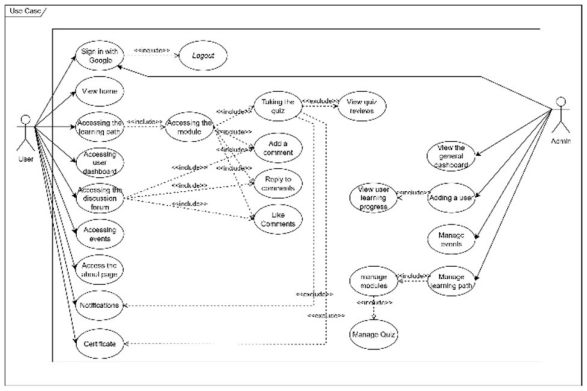

Figure 3. Use Case Diagram

Figure 4 illustrates the activity diagram, which depicts the workflow of processes within the system, showing the sequence of actions and decision points.

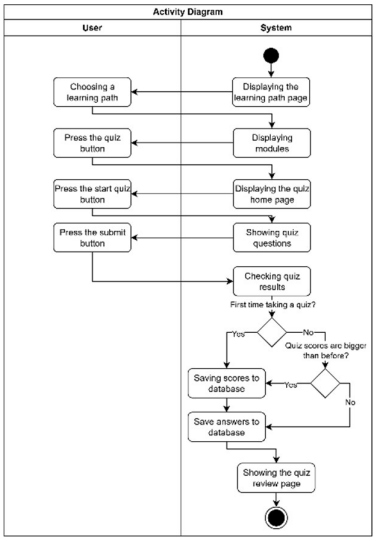

Figure 4. Activity Diagram

Figure 5 shows the sequence diagram that outlines the order of interactions between the system and its actors, detailing how processes flow step-by-step based on events.

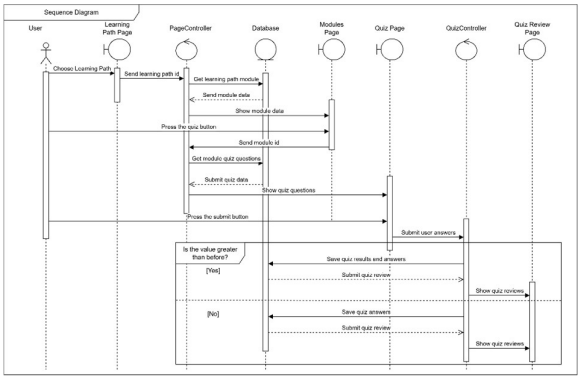

Figure 5. Sequence Diagram

Figure 6 displays the class diagram, representing the structure of system classes and their relationships, including attributes, methods, and inter-class associations.

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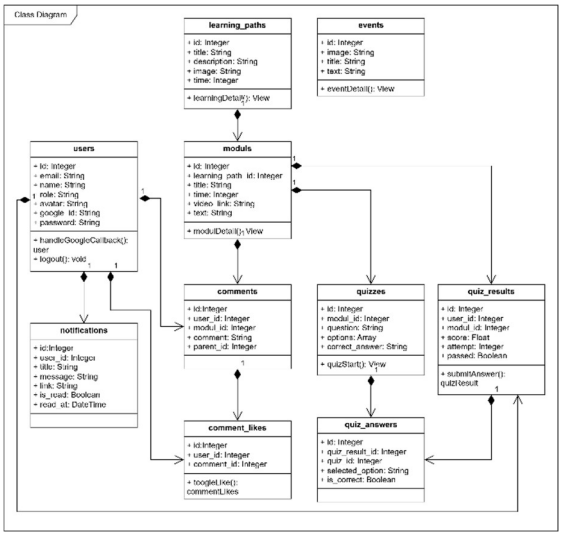

Figure 6. Class Diagram

4.5. Implement the KM System

The development process of the S-Know web application utilized Laravel as the primary backend framework due to its flexibility and scalability. For the frontend, Bootstrap was employed to ensure a responsive and user-friendly interface.

Figure 7 presents the learning path page of the S-Know system. This page allows users to access structured microlearning content through intuitive navigation, helping guide them through the overall training flow.

Figure 7. Learning Path

Figure 8 shows the learning module interface, where users can engage with short video-based learning materials accompanied by textual explanations. This page also features a built-in discussion forum to support knowledge sharing and user interaction.

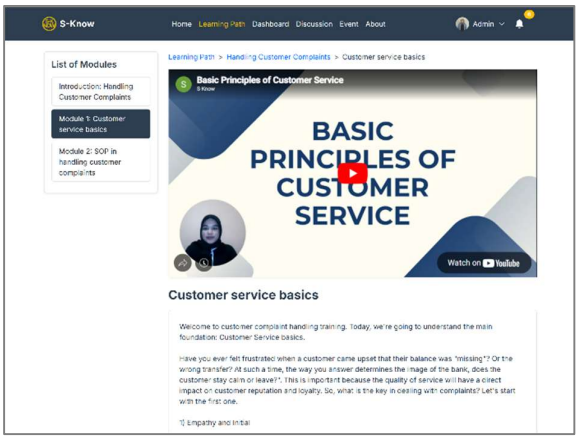

Figure 8. Module

Figure 9 illustrates the quiz page, designed to assess user understanding. Quizzes must be completed within a specific time limit and require a minimum score to pass, reinforcing learning objectives.

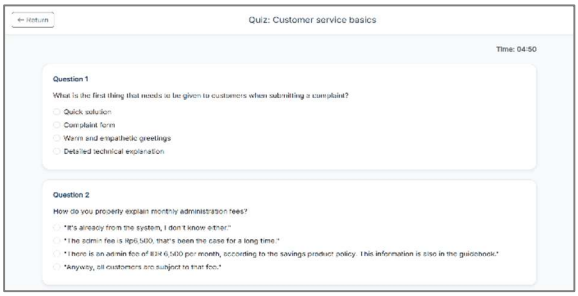

Figure 9. Quiz

Figure 10 displays the dashboard page, which provides a summary of the user's profile, recent activities, and learning progress. This overview helps users track their development within the system.

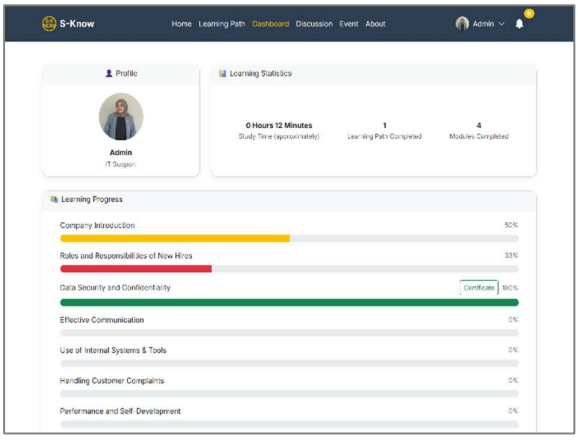

Figure 10. User Dashboard

Figure 11 shows the interface for administrators. Through this interface, administrators can manage various learning materials, knowledge assets, and content to be shared with users. This page also allows administrators to monitor users' learning progress, both in general and in detail for each individual user.

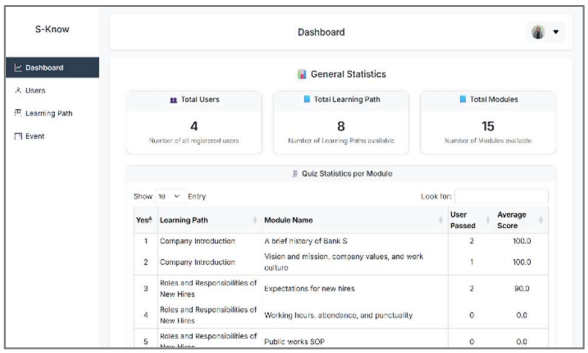

Figure 11. Administrator Dashboard

4.6. KMS Testing

KMS testing is conducted to ensure that all functionalities within S-Know operate according to the predetermined requirements. The testing method used is black box testing, which focuses on evaluating the system's output based on various input scenarios. The testing was carried out on the system's core features, and the results are presented in Table 2.

Table 2. System Test Results

Tested Feature	Results
Login and Logout	Valid
Main Page Navigation	Valid
Learning Path	Valid
Learning and Training Modules	Valid
Quiz and Result Review	Valid
User Dashboard	Valid
Discussion Forum	Valid
Events	Valid
Notifications	Valid
User Management	Valid
Knowledge Management	Valid
Event Management	Valid

In addition to functional testing, an evaluation was also conducted through interviews with selected respondents to assess the system's performance from a user perspective. The assessment focused on three key aspects: technical implementation, feature functionality, and overall effectiveness of the system. The summary of respondent feedback is presented in the Table 3.

Table 3. Respondent Feedback

Aspects	Summary of Responses
Technical implementation	The S-Know system is considered easy to use without technical training due to its simple and intuitive interface. The learning flow is logical and helps users understand the material effectively. The system runs smoothly without major technical issues.
Features & Functionality	Key features like quizzes and progress tracking are seen as helpful for reinforcing understanding and encouraging completion. While the modules are clear and concise, it's recommended that event features requiring registration use linked forms instead of plain text.
Effectiveness & Feasibility	Overall, S-Know is viewed as an effective digital training tool with added value from features like discussion forums and event updates, making it suitable for real and sustainable implementation if regularly updated.

5. DISCUSSION

We have successfully developed S-Know, a web-based KMS designed to support knowledge management in the context of onboarding new employees in the banking industry. The system focuses on providing core features that enable structured knowledge delivery through a microlearning approach.

The main features developed include Learning Paths, Learning Modules, and Quizzes. These three components are structured to support a concise, targeted, and easily accessible learning flow for users. The content provided within the modules is currently limited to illustrative and simulated materials related to basic onboarding. Nevertheless, this approach is considered a representative starting point for microlearning implementation, as described by [38], who noted that microlearning is effective for delivering knowledge in small, incremental modules.

In the development of S-Know, user involvement as knowledge holders has not yet been deeply integrated. This is because the initial phase of development primarily aimed to collect knowledge that had previously been scattered across documents, emails, or communicated verbally. Therefore, the early focus was on knowledge capture and restructuring of materials to be redistributed through the system.

Moving forward, system development will aim to encourage more active user participation in sharing knowledge. The goal is for the system to become a convergence point for knowledge from various departments, which can then be collected, managed, and reused sustainably.

Insights from post-development interviews with banking professionals further affirm the relevance of the system. Respondents noted that S-Know is intuitive and easy to use, even without prior training, and appreciated the logical sequence of the learning flow. They also highlighted the added value of features like discussion forums and event modules, which are often missing in existing internal e-learning platforms

From a technical standpoint, S-Know is currently web-based, which presents limitations in terms of access flexibility and advanced security features. Several studies, such as [39], suggest that mobile-based KMSs offer advantages in credential security and internal accessibility, particularly for organizations with high data confidentiality standards. Given that organizational knowledge is a strategic asset, its management must ensure that access is granted only to authorized personnel.

Therefore, future development of S-Know will focus on enhancing security features and improving access flexibility, including the potential integration with mobile platforms. This is aimed at making the system more adaptive to organizational

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needs and capable of supporting broader, more collaborative, and sustainable knowledge management

6. CONCLUSION

S-Know is a web-based KMS developed to support the storage, management, and distribution of information within organizations, specifically in the context of onboarding new employees in the banking industry. The system is equipped with features such as Learning Paths, Learning Modules, Quizzes, and a Discussion Forum, all designed to facilitate structured knowledge sharing and promote user collaboration.

Based on the testing results, all core features function effectively and meet the user needs identified during the analysis phase. Interviews with end users confirmed that the system is intuitive, easy to use without prior training, and offers value through features like discussion forums and event modules, capabilities that are often missing from existing internal learning platforms.

Overall, S-Know shows strong potential as a solution for supporting organizational knowledge management, particularly in addressing challenges such as regularly changing information. Although S-Know meets the basic requirements for delivering learning content, the system still has limitations, such as limited user involvement as knowledge contributors and constrained flexibility and security due to its web-based nature. Future development is expected to enhance collaborative features and improve accessibility, allowing S-Know to evolve into a more adaptive learning platform that aligns better with organizational needs.

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