

# Development of a Conceptual Framework for Implementing Learning Management System (LMS) in Higher Education: An Empirical Validation Study

**Rivaldi Rizalul Akhsan\***  
Faculty of Computer Science  
Universitas Indonesia  
Depok, Indonesia  
[rivaldi.rizalul@ui.ac.id](mailto:rivaldi.rizalul@ui.ac.id)

**Dion Lamilga Sudiono Putra**  
Faculty of Computer Science  
Universitas Indonesia  
Depok, Indonesia  
[dion.lamilga@ui.ac.id](mailto:dion.lamilga@ui.ac.id)

**Dana Indra Sensuse**  
Faculty of Computer Science  
Universitas Indonesia  
Depok, Indonesia  
[dana@cs.ui.ac.id](mailto:dana@cs.ui.ac.id)

**Deden Sumirat Hidayat**  
National Research and Innovation Agency  
(BRIN)  
Central Jakarta, Indonesia  
[dede025@brin.go.id](mailto:dede025@brin.go.id)

**Erisva Hakiki Purwaningsih**  
Faculty of Computer Science  
Universitas Indonesia  
Depok, Indonesia  
[erisvaha.kiki@ui.ac.id](mailto:erisvaha.kiki@ui.ac.id)

## Abstract

*Higher education institutions today face increasingly complex challenges in adopting and implementing Learning Management Systems (LMS) to improve student learning experiences. Although previous research regarding LMSs exists, it has not fully explored the findings of their conceptual framework through empirical studies of Critical Success Factors (CSFs). This research provides in-depth details about the development of a conceptual framework designed to guide the LMS implementation process in higher education settings. The Systematic Literature Review (SLR) method is used to identify and introduce the main elements in this conceptual framework. Furthermore, the conceptual framework was validated through a series of questionnaires distributed to experts in the fields of education and information technology. The results of this research show that the conceptual framework developed covers important stages in LMS implementation, from planning to evaluation. Empirical validation carried out involving experts proves that the conceptual framework developed is valid as an instrument for implementing LMS in a higher education environment. The conclusions of this research provide valuable guidance for LMS implementation in higher education.*

**Keywords:** Learning Management System (LMS), Higher Education, Conceptual Framework, E-learning

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\* Corresponding Author

## Introduction

Technological advances such as e-learning platforms, mobile applications, and digital learning media have made the world of education more affordable, accessible, and attractive for students. Rapid technological developments have changed the world of education to encourage innovation in learning (Mei et al., 2023). This technology allows educators to create interactive and personalized learning experiences, facilitates collaboration between students and educators, and provides access to extensive educational resources. With advances such as the internet, mobile devices, and digital platforms, students and educators have easier and broader access to the latest information, resources, and learning methods (Opoku et al., 2023).

Learning technology is a very important part of Higher Education Institutions. In this digital era, the use of technology has brought significant changes to learning methods in higher education (Yue et al., 2023). Through technology, higher education institutions can provide access to various resources and learning materials online, increasing flexibility for students to study according to their own schedule. Apart from that, technology also allows for better interaction and collaboration between students and lecturers through online discussion forums, e-learning platforms, and innovative communication tools such as the Learning Management System (LMS) (Cao & Jian, 2023). By utilizing this learning technology, it is hoped that higher education institutions can improve efficiency, quality of learning, and provide a more interactive and interesting learning experience for students.

LMS helps educational institutions to provide easy access and flexibility for students in accessing learning materials, assignments, and other resources. Apart from that, LMS also facilitates interaction and collaboration between students and lecturers through features such as discussion forums, virtual classrooms, and online communication tools. This allows students to actively participate in discussions, share ideas, and collaborate with other students and lecturers to promote effective learning (Strakos et al., 2023). LMS can monitor and evaluate student progress in real-time, so lecturers can provide faster feedback and more effective guidance. Not only that, LMS also helps improve the quality of institutional learning by providing better accessibility, increasing interaction and collaboration, monitoring student progress, and providing diverse learning resources (Nguyen, 2021).

The findings related to LMS implementation experienced several obstacles in terms of human resources (HR), infrastructure, and development processes. In terms of human resources, LMS implementation requires in-depth training and understanding from educators and administrative staff to be able to manage the system effectively (Renko et al., 2020). Apart from that, adequate technological infrastructure is also a problem, because LMS requires a stable internet connection and adequate hardware to be accessed properly by users (Asamoah, 2021; Van der Merwe et al., 2023). The LMS development process is also a concern because the use of technology that continues to develop requires a continuous development process so that the LMS remains relevant and effective in supporting learning. Apart from that, data security and information management issues are also a concern in LMS development (Gumasing et al., 2022).

Based on other findings regarding the implementation of LMS such as Moodle, several fundamental problems were found related to methodological factors. One of them is related to infrastructure and development processes (Shaame et al., 2023). This research found that factors such as accessibility, flexibility, and personalization from the learner's perspective were crucial in influencing satisfaction and continued intention to use an LMS (Lavidas et al., 2023). However, the fundamental problem that arises is related to the technological infrastructure, which may be inadequate to support effective use of the LMS (Shaame et al., 2023). In addition, the LMS development process can also be problematic, especially in terms of customization, interactivity, and personalization desired by students (Masrani et al., 2023).

Moreover, previous research on LMS has not investigated the findings of their framework in an empirical study of success factors (Alkarney & Albraithen, 2018; Allam et al., 2024; Al-Nuaimi & Al-Emran, 2021). Therefore, this research aims to fill this gap by conducting an in-depth analysis and designing a rigorous conceptual framework, which will be empirically tested. As such, this research aims to provide a more comprehensive understanding of the factors that contribute to the successful

implementation of an LMS and make a significant contribution to developing our understanding of the use of educational technology in the modern era.

This writing aims to create a conceptual framework as a form of understanding LMS implementation. This conceptual framework provides direction and guidance for educational institutions that wish to implement LMS in the learning process. In this writing, various aspects related to LMS implementation will be discussed, such as selecting an appropriate LMS platform, developing effective learning content, optimal teaching strategies, and evaluating LMS performance. By using this conceptual framework, it is hoped that educational institutions can optimize the potential of LMS to improve the quality of learning, increase interaction between students and lecturers, and increase efficiency in overall learning management. This research provides practical guidance and solutions that can be implemented flexibly according to the needs and goals of educational institutions.

## **Theoretical Background**

### ***Implementation of Learning Management System***

The implementation of LMS in higher education has emerged as a critical strategy for facilitating digital transformation, supporting both online and blended learning environments. LMS platforms serve as centralized systems that manage, deliver, and evaluate educational content, offering opportunities for institutions to enhance instructional quality and operational efficiency ([Abogamous, 2022](#)).

The need for a structured framework is underscored by findings that LMS adoption involves both technological and human dimensions. Factors such as perceived usefulness, ease of use, and user satisfaction strongly influence user acceptance and continued usage of LMS tools ([Qendraj et al., 2022](#)). Moreover, successful LMS frameworks must account for diverse learning environments, technological innovations, and evolving pedagogical models ([Alotaibi, 2024](#)).

### ***Related Work***

Previous research has provided valuable insights into LMS usage in higher education, particularly around usability, learner satisfaction, and system quality. For instance, frameworks using Fuzzy VIKOR and ISO standards have been applied to assess LMS quality across multiple criteria ([Ayouni et al., 2021](#)). Studies have also emphasized the role of LMS in supporting innovation policies in universities, where LMS platforms like Moodle are seen as drivers of both pedagogical and managerial innovation ([Zabolotniaia et al., 2020](#)).

However, a key gap in the literature lies in the lack of empirical validation of the proposed frameworks. Many studies stop at the theoretical stage without testing the effectiveness of their models in real-world institutional contexts ([Veseli et al., 2025](#)). In addition, with the emergence of AI-integrated LMS platforms, there is a growing need to explore how these technological innovations influence personalization, assessment, and student engagement, while also addressing ethical and data security concerns ([Alotaibi, 2024](#)).

This study aims to address these gaps by developing a conceptual framework for LMS implementation that not only synthesizes insights from prior theoretical models but also empirically validates its effectiveness in a higher education setting. In doing so, the research contributes a practical tool that institutions can use to enhance LMS adoption and promote sustainable digital transformation in education.

## **Methodology**

The systematic literature review (SLR) was the first step of this research to thoroughly understand LMS implementation in the higher education context. SLR is carried out by identifying and reviewing relevant literature, with a focus on key success factors and challenges in implementing LMS in higher education. The SLR method used is the approach of Barbara Kitchenham. The Kitchenham Method provides a systematic and structured framework for identifying, evaluating, and synthesizing scientific literature with the goal of gaining an in-depth understanding of a research topic. [Figure 1](#) shows that

there are three stages in using the Kitchenham method, namely planning, implementation, and reporting (Kitchenham & Charters, 2007).

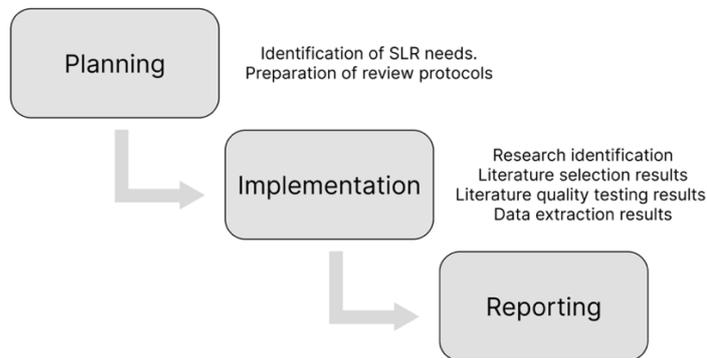


Figure 1. SLR Methodology

### Planning

In the Kitchenham method, the first stage is planning. At this stage, a research design is carried out, such as creating a background, PICOC (Population, Intervention, Comparison, Outcome, and Context), and research questions. At this stage, we also determine the inclusion and exclusion criteria to be used to test the quality of the paper. The PICOC formula for this study is presented in Table 1.

Table 1. PICOC Formula

<b>Population</b>	Higher Education Academic Portal users are involved in implementing the Knowledge Management System (KMS).
<b>Intervention</b>	Implementation of a Knowledge Management System in Higher Education Academic Portals.
<b>Comparison</b>	-
<b>Outcome</b>	Evaluation of the effectiveness of the Knowledge Management System is related to the influence of KMS in the tertiary environment and the challenges faced in implementing KMS in tertiary institutions.
<b>Context</b>	The research context includes the university academic environment.

Based on the PICOC formula, as previously mentioned, we formulated keywords for database searches. A literature search will then be carried out based on the keywords that have been determined. The search string is as follows: (“*Knowledge Management Systems*” OR “*KMS*”) AND (“*Higher Education*” OR “*College*”) AND (“*Implementing*” OR “*Implementation*”). We have selected five databases for our investigation, namely Scopus, Emerald Insight, IEEE Xplore, and ACM Digital Library. Consequently, we will explore relevant literature pertaining to our topic from these sources. Next, we formulated inclusion and exclusion criteria to be used for selecting papers obtained from the database search results. These criteria, shown in Table 2, will help ensure that only relevant and suitable papers are included in our analysis, thus maintaining the integrity and focus of our research.

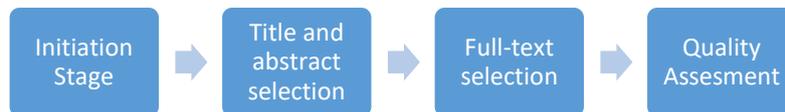
After the selection process of titles, abstracts, and full texts, the next step involved quality assessment, which comprised eight quality indicators. A threshold value of 5 was set for the quality assessment. Hence, papers scoring below five were eliminated from further consideration. This rigorous quality evaluation ensured that only studies meeting the predefined quality standards were included in our analysis, thereby enhancing the reliability and robustness of our research findings.

**Table 2. Inclusion and Exclusion Criteria**

Step	Criteria Inclusion	Criteria Exclusion
Initiation Stage	- Matches with search keywords - English - Publication year 2019-2024	- Languages other than English - Year of publication excluding 2019-2024
Stage 1 (Title and abstract selection)	- Discussing Knowledge Management - Research in higher education	- Papers that discuss topics other than the topic of Knowledge Management - Duplicate paper - Review paper
Stage 2 (full-text selection)	Open access paper	- The paper doesn't have full-text

### Implementation

At this stage, the selection process is conducted based on the protocol selection and review established during the planning phase. The implementation stage involves several steps, namely the Initiation Stage, Title and abstract selection, Full-text selection, and Quality Assessment. These four steps culminate in the generation of the final paper. The detailed workflow of these steps can be observed in [Figure 2](#) below.

**Figure 2. Papers Screening Steps**

### Reporting

At the reporting stage, extraction and synthesis will be carried out from data obtained from the literature. Kitchenham emphasized that it should provide a summary of findings, identify patterns or trends, and examine similarities between the papers that have been reviewed ([Kitchenham & Charters, 2007](#)).

After that, the final SLR report is presented. The report must include all important elements found. In this research, the main findings refer to the influencing factors and challenges in implementing knowledge management systems in higher education. Kitchenham recommends that this research be written clearly and concisely, with complete references ([Kitchenham & Charters, 2007](#)).

From the results of the SLR analysis, three main stages in the LMS implementation process in higher education were identified. The following are the stages of LMS implementation in higher education: (a) Planning, (b) Implementation, and (c) Evaluation. From the SLR results, at the planning stage, the indicators found at that stage were identified, including: (a) Institutional Support Factor ([Mohammadi et al., 2021](#); [Sulaiman, 2023](#)), (b) ICT Infrastructure Factor ([Singh et al., 2023](#); [Sulaiman, 2023](#)) and (c) Human Resources Factor ([Singh et al., 2023](#); [Theresiawati et al., 2020](#)). Meanwhile, at the implementation stage, the identified indicators include: (a) Business Requirement ([Azarov & Mayboroda, 2020](#)), (b) System Design ([Kuadey et al., 2023](#); [Sulisworo et al., 2021](#)), (c) Development and Unit Testing ([Ean Heng et al., 2021](#)), (d) User Acceptance Test ([Ean Heng et al., 2021](#)), and (e) Implementation ([Meskhi et al., 2019](#); [Syed et al., 2021](#)). For the final stage, namely evaluation, the indicators identified are: (a) Support Training Factor ([Habib, 2023](#); [Sulaiman, 2023](#)) and (b) Maintenance Factor ([Habib, 2023](#)).

Based on the results of the SLR, a gap was identified, namely that the LMS is also part of the Information System (IS). Many LMS implementation processes only focus on the student, instructor, and institutional support aspects. There is a need to add the IS context aspect (development method). Moreover, previous research on LMS did not examine its framework findings in empirical studies of CSF findings. In this way, this research provides a framework for LMS implementation in higher education. This framework includes the key elements identified during the SLR. This conceptual

framework describes the structure and key elements that need to be considered in designing and implementing an LMS in higher education.

The developed framework was validated with four experts. The selection of four experts was based on pragmatic constraints, particularly the limited availability of qualified experts in the field of LMS implementation and accessibility within the scope and timeline of the study. These experts include academics with LMS expertise, practitioners who have experience implementing LMS in higher education, and educational technology experts. The validation process uses a questionnaire given to experts. The answer choices provided are in the form of a 1 to 4 Likert scale with the answer choices (a) Not Valid, (b) Fairly Valid, (c) Valid, and (d) Very Valid. For validated framework instruments, see [Table 3](#).

**Table 3. Success Factors of Implementation of LMS**

No	Implementation Process	Indicators	References
1	Planning	Institutional Support Factor	( <a href="#">Mohammadi et al., 2021</a> ; <a href="#">Sulaiman, 2023</a> )
		ICT Infrastructure Factor	( <a href="#">Singh et al., 2023</a> ; <a href="#">Sulaiman, 2023</a> )
		Human Resources Factor	( <a href="#">Singh et al., 2023</a> ; <a href="#">Theresiawati et al., 2020</a> )
2	Implementation	Business Requirement	( <a href="#">Azarov &amp; Mayboroda, 2020</a> )
		System Design	( <a href="#">Kuadey et al., 2023</a> ; <a href="#">Sulisworo et al., 2021</a> )
		Development and Unit Testing	( <a href="#">Ean Heng et al., 2021</a> )
		User Acceptance Test	( <a href="#">Ean Heng et al., 2021</a> )
		Implementation	( <a href="#">Meskhi et al., 2019</a> ; <a href="#">Syed et al., 2021</a> )
3	Evaluation	Support training Factor	( <a href="#">Habib, 2023</a> ; <a href="#">Sulaiman, 2023</a> )
		Maintenance	( <a href="#">Habib, 2023</a> )

The study employed a mixed-method approach, combining a qualitative SLR with quantitative expert validation. The SLR was used to deeply explore existing theories and frameworks related to LMS implementation, while the quantitative phase ensured the empirical validation of the proposed framework through expert consensus. This approach was chosen to balance theoretical depth with practical relevance, making the framework both evidence-based and applicable in real-world contexts. Framework validation criteria for LMS implementation in higher education can be seen in [Table 4](#). Validation criteria adapted from ([Akbar, 2013](#); [Ratumanan & Laurens, 2006](#)).

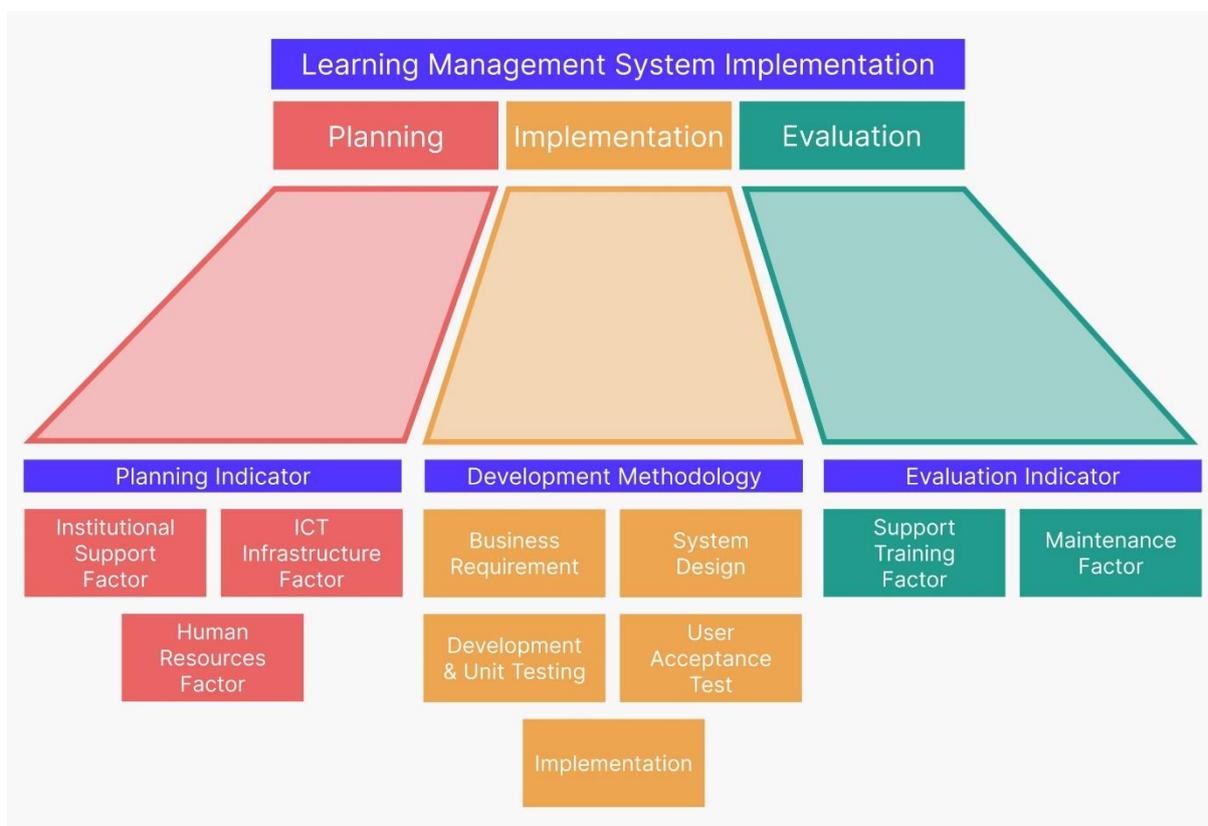
**Table 4. Validation Criteria for the LMS Implementation Framework in Higher Education**

Score	Value	Information
3.51 – 4.00	Very Valid	Very good to use
2.51 – 3.50	Valid	Can be used with minor revisions
1.51 – 2.50	Fairly Valid	Can be used with major revisions
1.00 – 1.50	Not Valid	Must not be used

## Results and Discussion

Based on research conducted by [Alkarney and Albraithen \(2018\)](#), the implementation stage of the LMS in higher education has three phases, namely Pre-implementation, During-implementation, and Post-implementation. This research adopts the scheme in the formation of its framework, which also includes three phases, namely planning, implementation, and evaluation. By referring to this framework, this research aims to identify and analyse key aspects in each stage of LMS implementation in order to improve the effectiveness and success of the system as a whole.

The following conceptual model is presented in [Figure 3](#). This model comprises three distinct phases: planning, implementation, and evaluation, each of which delineates the crucial stages of the LMS implementation process. What sets our model apart is the incorporation of IS as an integral aspect. This addition is driven by the recognition that previous research has often overlooked the inclusion of IS within its models, thereby underscoring the significance of its role in ensuring a comprehensive understanding of LMS implementation dynamics ([Alkarney & Albraithen, 2018](#)).



**Figure 3. Conceptual Model Implementation LMS**

The three phases outlined in our model depict a sequential flow that is crucial for the successful implementation of an LMS. The first phase, planning, serves as the foundational cornerstone of the entire process. In this phase, meticulous preparations are made, encompassing institutional support, infrastructure development, and human resource allocation. Planning is critical because it lays the groundwork for subsequent stages.

The implementation stage will explain how the framework development process takes place. We use an approach called System Development Life Cycle (SDLC) because LMS is basically an IS ([Alkarney & Albraithen, 2018](#)). This approach is inspired by knowledge that has been gathered from previous research on the success of information systems in business contexts. We refer to this business research because previous research on LMS Critical Success Factors (CSF) in higher education is still limited. In the business world, research has investigated a wider range of issues. As expressed by Alkarney & Albraithen, "e-learning systems are a specific type of information system".

The final aspect is evaluation, which includes a post-implementation stage involving ongoing training and routine maintenance efforts. These steps are critical to ensuring that the system is not only used as intended but also operates smoothly and efficiently according to established guidelines.

The validation of this framework was carried out by four experts who are experienced in the field of education. The first expert is a professor from the University of Indonesia who has in-depth knowledge in e-learning and Human Computer Interaction (HCI). The second and third experts come from the State University of Malang, both of whom are professors who have expertise in Vocational Learning Strategy Development in the fields of Informatics and Information Systems Management, as well as Learning Media Development. The final expert is a staff practitioner at the Ministry of Education and Culture who is responsible for managing the LMS. With the presence of these experts, framework validation can be carried out in depth and accurately.

After going through a validation test process by experts, the data that has been collected will be processed by calculating the average for each existing question indicator. The results of this average calculation will then be used to obtain the final score. Then the final score is converted into criteria according to [Table 5](#), which has been set. Thus, the data processing process will provide a clear picture of the results of the research that has been carried out.

[Table 6](#) is the result of validation by experts, which is very important in this research. Based on the final scores found in the table, it can be concluded that the validation test results by experts show a value of “valid”. This indicates that the framework used meets the required standards. However, there are several comments and suggestions for improvement from experts that can be taken into consideration for future improvements. Details regarding comments and improvements provided by experts can be found in [Table 7](#). Thus, the results of validation by these experts provide a strong foundation for the use of this framework, while continuing to improve it based on input from experts.

**Table 5. Description of Indicators**

<b>Indicators</b>	<b>Description</b>
Institutional Support Factor	Institutional Support Factors include management commitment, budget allocation, and understanding of institutional needs.
ICT Infrastructure Factor	ICT Infrastructure Factors include e-learning content, connectivity, hardware, and software.
Human Resources Factor	The Human Resources Factor involves the training needs of lecturers and staff to maximize the benefits of the LMS, user readiness, and determining the roles and responsibilities of the implementation team.
Business Requirement	Define business requirements, including required features and functionality.
System Design	Designing systems based on previously established business needs and requirements.
Development and Unit Testing	Build the LMS based on the design that has been created and carry out unit testing to ensure each component functions properly.
User Acceptance Test	Involve end users to test the system and ensure that the LMS meets their expectations and needs.
Implementation	Execute formal LMS implementation, including data migration, system configuration, and operational rollout.
Support training Factor	Provide ongoing support to LMS users, including advanced training and supporting resources.
Maintenance	Ensure continuity and sustainability of the LMS through routine maintenance, software updates, and addressing emerging issues.

Input provided by experts is of primary concern to researchers in order to make necessary improvements. Referring to [Table 7](#), this input includes various valuable comments related to the existing framework. The experts also provided recommendations regarding further implementation, corrections to existing stages, and suggestions regarding the flow of the framework being developed. This input will be an important basis in efforts to improve and refine the framework so that it can provide better results and meet the needs of this research.

**Table 6. Results of Validating the Conceptual Framework for LMS Implementation**

Items	Experts				Average
	I	II	III	IV	
Institutional Support Factor	3	3	4	4	3.5
ICT Infrastructure Factor	3	3	4	4	3.5
Human Resources Factor	3	3	4	3	3.25
Business Requirement	3	3	4	4	3.5
System Design	3	4	4	3	3.5
Development & Unit Testing	3	3	4	4	3.5
User Acceptance Test	3	3	4	3	3.25
Implementation	3	4	4	3	3.5
Support Training Factor	3	4	4	4	3.75
Maintenance Factor	3	4	4	4	3.75
<b>Average</b>					3.5

**Table 7. Expert Recommendations Regarding the Conceptual Framework for LMS Implementation**

Experts	Suggestions
<b>I</b>	It is necessary to see to what extent this proposed conceptual framework intersects with existing frameworks, such as Khan's e-Learning framework, as well as information system implementation frameworks in general.
<b>II</b>	It's good enough; it needs to be implemented in several agencies.
<b>III</b>	It would be better if there were a design stage before implementation.
<b>IV</b>	Having described the implantation process, it would be good to provide arrows to illustrate the flow from the start of the process to the end.

## Limitations and Future Research

This study, like any other study, has several limitations that need to be noted. The first limitation is the scope of the research, which only focuses on creating frameworks in higher education environments, without considering other levels of education. These limitations may imply that the research results cannot be fully applied to different educational contexts. Furthermore, another limitation lies in validation. Validation in this research mainly focuses on the conceptual results of the framework developed. Therefore, other potentially relevant aspects, such as practical validity, have not been explored in depth. In planning future research, it is important to consider and overcome these limitations so that research results are more comprehensive and generalizations can be made more precisely.

This research provides important recommendations regarding future research directions. First, further research should focus on providing empirical validation in other relevant aspects, such as implementation aspects and the relationship between variables in the framework that has been developed. This will help strengthen the empirical foundations of the framework and explain in more detail how it can be applied in practical situations.

Furthermore, to further enrich the research findings, future research can be explored further at other educational levels. This will help in understanding how this framework can adapt and provide benefits in a variety of different educational contexts. Thus, these recommendations provide important guidance for researchers who wish to continue this study and take this research as a starting point for further development of knowledge in this area.

## Conclusion

This research succeeded in developing a conceptual framework from the literature study that was carried out. Indicators identified in the literature study regarding success factors in implementing LMS in higher education include institutional support factors, ICT infrastructure factors, human resources factors, business requirements, system design, development and unit testing, user acceptance tests, implementation, training support factors, and maintenance factors. This conceptual framework can be used to implement LMS in higher education. These findings provide insight into the factors that need to be considered in designing a conceptual framework according to the needs of higher education.

After the conceptual framework was formed, an expert validation procedure was designed using a questionnaire to assess the suitability and feasibility of the LMS implementation framework in the higher education environment. Expert validation confirmed that the developed framework complies with the indicators required for the implementation of a learning LMS in higher education. Even with good results, slight revisions to the conceptual framework need to be made. In addition, input from experts will be a valuable contribution to future research.

This research succeeded in achieving its main objective, namely, developing a conceptual framework for implementing LMS in higher education. The results of expert validation are the main pillars that strengthen the validity and feasibility of the framework developed. This validation process involves experts who have expertise and experience in the field of higher education and learning technology.

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