



# Ranah Research

E-ISSN: 2655-0865

## Journal of Multidisciplinary Research and Development

082170743613

ranahresearch@gmail.com

<https://jurnal.ranahresearch.com>DOI: <https://doi.org/10.38035/rrj.v8i4><https://creativecommons.org/licenses/by/4.0/>

## Design of an Artificial Intelligence Based Knowledge Sharing System to Support Electronic Procurement Services

Mahsa Elvina Rahmawyanet<sup>1</sup>, Dana Indra Sensuse<sup>2</sup>, Sofian Lusa<sup>3</sup>

<sup>1</sup>Universitas Indonesia, Depok, Indonesia, [mahsa.elvina@ui.ac.id](mailto:mahsa.elvina@ui.ac.id)

<sup>2</sup>Universitas Indonesia, Depok, Indonesia, [dana@ui.ac.id](mailto:dana@ui.ac.id)

<sup>3</sup>Universitas Indonesia, Depok, Indonesia, [sofian.lusa12@ui.ac.id](mailto:sofian.lusa12@ui.ac.id)

Corresponding Author: [mahsa.elvina@ui.ac.id](mailto:mahsa.elvina@ui.ac.id)<sup>1</sup>

**Abstract:** Digital transformation of government procurement involves consistent user support for the Electronic Procurement System. However, knowledge about system utilization remains fragmented across multiple platforms, is not reviewed periodically, and is not managed through a structured knowledge sharing mechanism. This study aims to design and evaluate a knowledge sharing system based on artificial intelligence for electronic procurement support services. The study uses an exploratory mixed method design by integrating Soft Systems Methodology into Design Science Research. Data were collected through interviews, document analysis, questionnaires, and prototype testing. The prototype includes a virtual assistant based on retrieval augmented generation, a centralized knowledge base, source attribution, feedback fitur, question logs, a monitoring dashboard, and knowledge governance functions. Evaluation using twenty answerable questions produced faithfulness of 1.000, answer relevancy of 0.819, context precision of 1.000, and context recall of 0.934. Blackbox testing confirmed that the main functional requirements operated as designed. The System Usability Scale score from 43 respondents was 79.24, indicating good usability, while 102 respondents rated all knowledge management process dimensions in the high category. The results show that integrating organizational problem structuring, knowledge governance, and retrieval augmented generation can provide a credible foundation for improving knowledge access and user support in digital public procurement.

**Keyword:** artificial intelligence, electronic procurement, knowledge management, knowledge sharing system, retrieval augmented generation.

### INTRODUCTION

Digital government transformation is not just a process of replacing manual services with electronic ones, but also a change in how public organizations manage processes, data, knowledge, and collaboration. Digital government demands integration between systems, stakeholder engagement, and the organization's ability to continuously respond to changing user needs (Verhoest et al., 2024; World Bank Group, 2020). In this context, cross-organizational digital transformation projects require coordination and learning mechanisms

that are capable of maintaining knowledge continuity as actors, technologies, and work patterns change. (Hafseld et al., 2022; Maulana & Dečman, 2023).

Knowledge management is one of the organizational capabilities that determines the success of public sector digital transformation. Organizations need to discover, capture, share, and apply knowledge to transform scattered information into resources that support effective service delivery and decision-making (Becerra-Fernandez et al., 2015; Perdana & Sensuse, 2021). In public organizations, knowledge sharing is also influenced by the characteristics of structure, culture, interdepartmental coordination, and the availability of supporting technology (Willem & Buelens, 2007; Zhang et al., 2022). Therefore, the development of a knowledge sharing system cannot be positioned as a mere technology project, but needs to pay attention to organizational processes, the role of managers, content quality, and user habits.

The digital transformation of government procurement in Indonesia is being implemented through the Electronic Procurement System. This system has become a general application for digital government and is used by ministries, institutions, local governments, businesses, and procurement service managers. Presidential Regulation Number 95 of 2018 places knowledge management as an element of e-government management, while Presidential Regulation Number 17 of 2023 drives the acceleration of digital procurement transformation through collaboration between the public sector and private sector. This situation increases the need for operational knowledge that is up to date, always be validated, easily accessible for user, and can be used consistently by various user (Peraturan Presiden Nomor 95 Tahun 2018 Tentang Sistem Pemerintahan Berbasis Elektronik, 2018; Peraturan Presiden Republik Indonesia Nomor 17 Tahun 2023 Tentang Percepatan Transformasi Digital Di Bidang Pengadaan Barang/Jasa Pemerintah, 2023).

The pre-identification of user support services indicates that system utilization knowledge remains scattered across different portals, social media, and storage media. Technical and operational documents are not periodically updated and reviewed, documentation formats are not yet standard, and a dedicated platform for the process of knowledge creation, validation, publication, retrieval, and evaluation is lacking. This fragmentation has the potential to prolong search time for answers, create dependency on every individual, and prevent problem solving experience from systematically becoming organizational knowledge.

Artificial intelligence technologies have opportunities to improve access to organizational knowledge. The relationship between artificial intelligence and knowledge management can be understood as a partnership, like artificial intelligence helps discover patterns, retrieve information, and present answers, while humans retain the role of validating, interpreting, controlling risk, and updating knowledge (Jarrahi et al., 2023). The development of retrieval augmented generation allows language models to produce answers based on context drawn from specific knowledge sources making it more suitable for environments that require transparency of sources and control of hallucinations (Es et al., 2024; Grabuloski et al., 2025). However, the quality of answers still depends heavily on the completeness, currency, and governance of the knowledge base.

Previous research has developed knowledge sharing systems in government organizations, cross-organizational collaboration, statistical activities, urban planning, and sectoral knowledge repositories (Da Silveira et al., 2024; Sensuse et al., 2021; Supriana, 2021; Zulhalim & Wibowo, 2022). Other research shows that Soft Systems Methodology can help map collaboration issues and information sharing cultures involving multiple actors (Devi et al., 2023; Fitriyani et al., 2024). However, there is limited research integrating organizational problem analysis, knowledge cycle governance, retrieval augmented generation-based virtual assistants, technical evaluation of answers, and usability evaluation within a single government procurement support service design.

To identify this gap, this study integrates Soft Systems Methodology with Design Science Research. Soft Systems Methodology is used to understand unstructured problem situations, stakeholder interests, and feasible changes, while Design Science Research is used to develop and evaluate system artifacts (Checkland, 2000; Dresch et al., 2015; Vom Brocke et al., 2020). This integration is intended to ensure that the design is not only technically feasible but also relevant to work processes, user needs, and the context of public service governance.

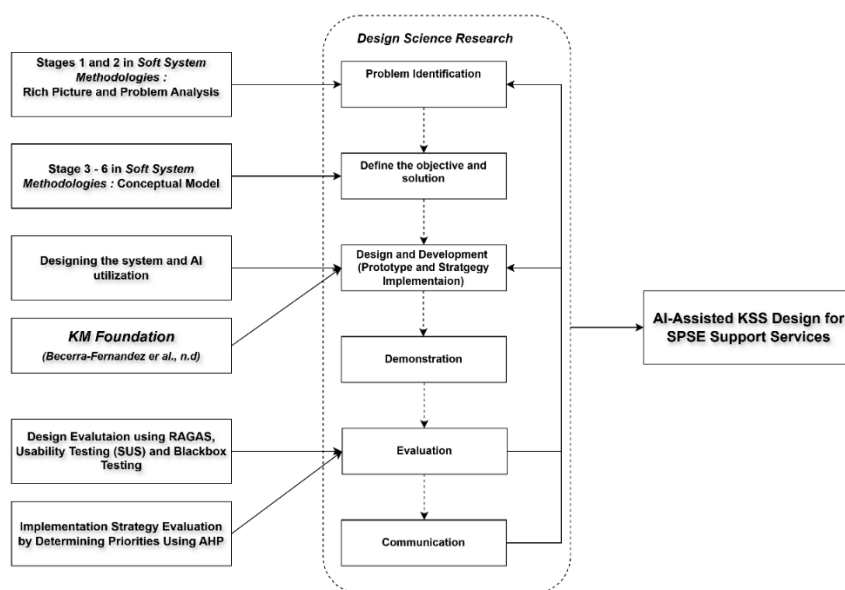
This research answers two questions: (1) how to design a knowledge sharing system based on artificial intelligence (AI) that is suitable for supporting user services in the Electronic Procurement System; and (2) how to evaluate the design in terms of functionality, retrieval-based answer quality, usability, and support for knowledge management processes. The research's contribution lies in the integrated design that connects human knowledge creation and validation mechanisms with AI based search, source transparency, user feedback, and knowledge gap analysis.

**METHOD**

This research was designed to produce a knowledge-sharing system based on artificial intelligence that meets the needs of user support services for the Electronic Procurement System. The research method was designed by integrating qualitative and quantitative approaches so that the process of problem identification, prototype development, and evaluation of the design results could be carried out comprehensively. In general, the research implementation includes research design, research stages, data collection and analysis, prototype evaluation techniques, and determination of research subjects and respondents.

**Research Design**

This research is an applied research with an exploratory mixed-methods design. A qualitative approach was used to understand the problems, needs, actors, and knowledge sharing processes, while a quantitative approach was used to evaluate artifacts and user perceptions. Data collection was conducted cross-sectionally over a single research period. The selection of informants and respondents used purposive sampling because participants must have involvement or experience with support services and the use of the Electronic Procurement System. (Creswell & Poth, 2018). The integration between Soft Systems Methodology and Design Science Research is presented in Figure 1.



**Figure 1. Design Research**  
Source: Result of Research

## Stage of Research

The main framework for development uses Design Science Research which includes problem identification, setting solution objectives, design and development, demonstration, evaluation, and communication of results (Peppers et al., 2007). The problem identification stage to the formulation of changes is deepened with six stages of Soft Systems Methodology: understanding unstructured situations, expressing situations through rich pictures, formulating root definitions, building conceptual models, comparing models with actual conditions, and determining feasible changes (Checkland, 2000).

## Data Collection and Analysis

Primary data was obtained through interviews with representatives of the organization's operational team, needs analysis questionnaires, prototype testing, usability questionnaires, and knowledge management process perception questionnaires. Secondary data came from regulations, organizational reports, service documents, and scientific literature. Interview data was analyzed through open coding and theme grouping. Qualitative findings were then mapped into rich pictures, CATWOE analysis, conceptual models, gap analysis, functional requirements, and non-functional requirements.

## AI Based Knowledge Retrieval

The artificial intelligence component was implemented using a retrieval-augmented generation (RAG) architecture to ensure that responses were generated based on verified organizational knowledge rather than solely on the reasoning capability of the Large Language Model (LLM). The system employs Google's Gemini 3.5 Flash as the baseline LLM for answer generation due to its capability to process long-context documents and synthesize responses from retrieved evidence. Knowledge retrieval is supported by a vector database in which organizational documents are transformed into dense vector representations using the Gemini text-embedding model.

Before indexing, organizational documents were converted into text and segmented using a recursive text-splitting strategy. Each document was divided into chunks of approximately 1,000 characters with an overlap of 200 characters to preserve contextual continuity across adjacent passages. These chunks were subsequently embedded and stored in the vector database. During inference, the user's query was embedded using the same embedding model, and the most relevant document chunks were retrieved through semantic similarity search. The retrieved context was then incorporated into the prompt provided to the LLM to generate grounded responses together with references to the supporting knowledge sources.

This retrieval process was designed to minimize hallucination by restricting answer generation to the retrieved organizational knowledge. Furthermore, unanswered queries were automatically recorded as missing knowledge to support continuous enrichment of the organizational knowledge base.

## Evaluation Prototype

The prototype was evaluated in four ways. First, blackbox testing was used to check the functionality of the public page, admin page, and operational team page without reviewing the program code. (Nidhra, 2012). Second, the quality of the virtual assistant was tested using RAGAS on four metrics, namely faithfulness, answer relevancy, context precision, and context recall. (Es et al., 2024). The primary test used 20 questions for which answers were available in the knowledge base, and the negative test used eight questions for which no context was available. Third, the usability of the prototype was measured using the System Usability Scale, which consists of ten statements with a final score of 0–100. (Brooke, 1996; International Standard Organization, 2019). Fourth, the perception of prototype support for the knowledge

management process is measured in the dimensions of knowledge discovery, knowledge capture, knowledge sharing, and knowledge application.

**Subject And Respondent Research**

Usability testing involved 43 respondents, consisting of operational teams, e-procurement service managers, procurement officers, and decision-making officers from institutions, local governments, and private partners. A knowledge management process perception questionnaire was completed by 102 respondents. Quantitative data were analyzed using descriptive statistics in the form of mean, median, and mode. All evaluation procedures were used in a complementary manner to assess whether the artifact met functional requirements, was usable, generated source-based answers, and supported the knowledge management process. A summary of the research stages, main activities, data sources or research subjects, and analysis techniques used is presented in Table 1.

**Table 1. Summary of Research Stages and Analysis Techniques**

Stage	Main Activity	Data/Subject	Technique Analysis
Identification Problem	Interviews, regulatory analysis and service documents	Operational teams and organizational documents	Open coding, thematic analysis, fishbone
Formulation of activity system	Rich picture, root definition, CATWOE, conceptual model	Support service actors and users	Soft Systems Methodology
Design and development	Requirements formulation and prototyping	Functional and nonfunctional requirements	Design Science Research
Technique evaluation	Testing virtual assistant functions and answers	Blackbox scenario; 20 positive questions RAGAS; 8 negative RAGAS	Blackbox testing and RAGAS
User evaluation	Usability and perception testing of KM processes	43 SUS respondents; 102 KM perception respondents	SUS scores and descriptive statistics

Source: Result of Research

**RESULTS AND DISCUSSION**

The research results are presented following the stages of artifact development, starting from identifying the problem situation, formulating the activity system using Soft Systems Methodology, translating the conceptual model into system requirements, developing a prototype, and conducting technical and user evaluations. This sequential presentation is used to demonstrate the relationship between organizational problems and the features developed in the knowledge sharing system.

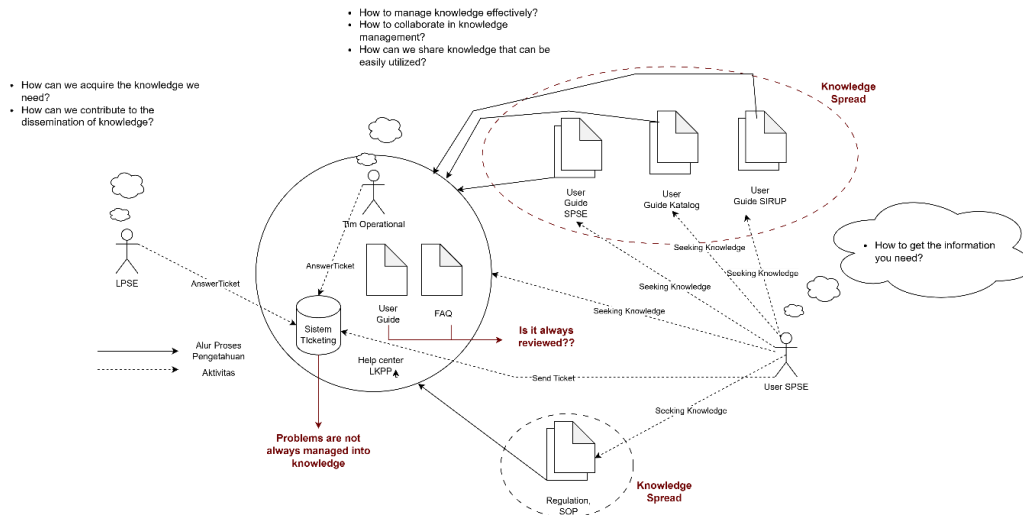
**Identification Problem and Conceptual Model**

Interviews and document analysis show that knowledge sharing in the e-Procurement System support services is done through various portals, documents, communication groups, meetings, and online storage platforms. However, the knowledge generated from problem solving has not always been consistently documented, reviewed, validated, and republished. This situation results in knowledge being dispersed, requiring users to navigate multiple platforms, and problem solving still relying on the experience of specific individuals.

The problems are grouped into process, people, organization, and technology aspects. In the process aspect, documentation standardization and regular review mechanisms are still lacking. In the people aspect, still not consistent to knowledge sharing and updating the knowledge. In the organizational aspect, the division of management roles and organizational coordination between units are not yet fully formalized. In the technology aspect, there is no

integrated platform that connects the knowledge base, search, validation, feedback, and knowledge needs analysis.

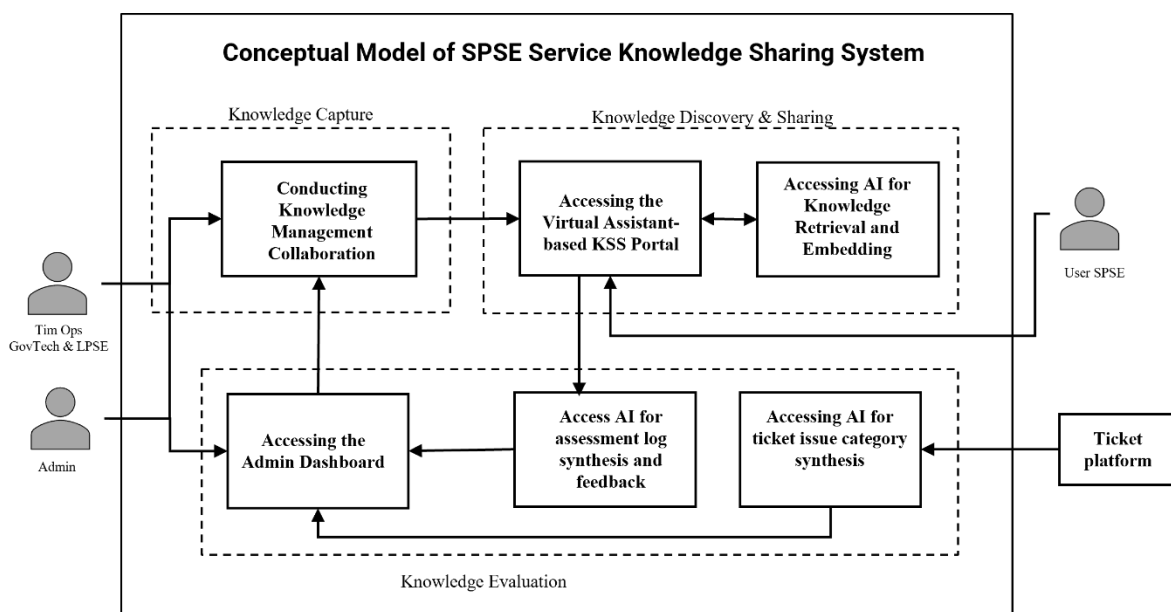
These problems are visualized through a rich picture in Figure 2. The image shows the involvement of users, digital procurement service managers, organizational operational teams, and the people of partners in the flow of knowledge that remains scattered across various channels.



**Figure 2. Rich Picture**  
Source: Result of Research

Based on the rich picture results, a system of activities was formulated to transform scattered and unmanaged knowledge into structured, validated, easily discoverable, and updatable knowledge. This transformation involves users as recipients and providers of feedback, the operational team as knowledge contributors, and administrators as those who conduct reviews, validation, publication, and updates.

The conceptual model in Figure 3 depicts the main activities of identifying knowledge needs, gathering sources, drafting, reviewing, validating, publishing, searching, using, providing feedback, and evaluating knowledge utilization.



**Figure 3. Conceptual Model**  
Source: Result of Research

The results of the conceptual model indicate that the required solution is not just a document repository, but a system that connects the cycles of knowledge creation, validation, distribution, use and evaluation.

### Prototype Design and Results

The conceptual model was translated into a prototype of an artificial intelligence-based knowledge sharing system. The prototype allows access for users, operational teams, and administrators. Users can look for knowledge, utilise a virtual assistant, get and check answer sources, and give ratings or feedback for the answer or knowledge document. The operational team can submit draft knowledge and monitor user needs. Admins can review, validate, publish, update, and reject the knowledge document from the operational team.

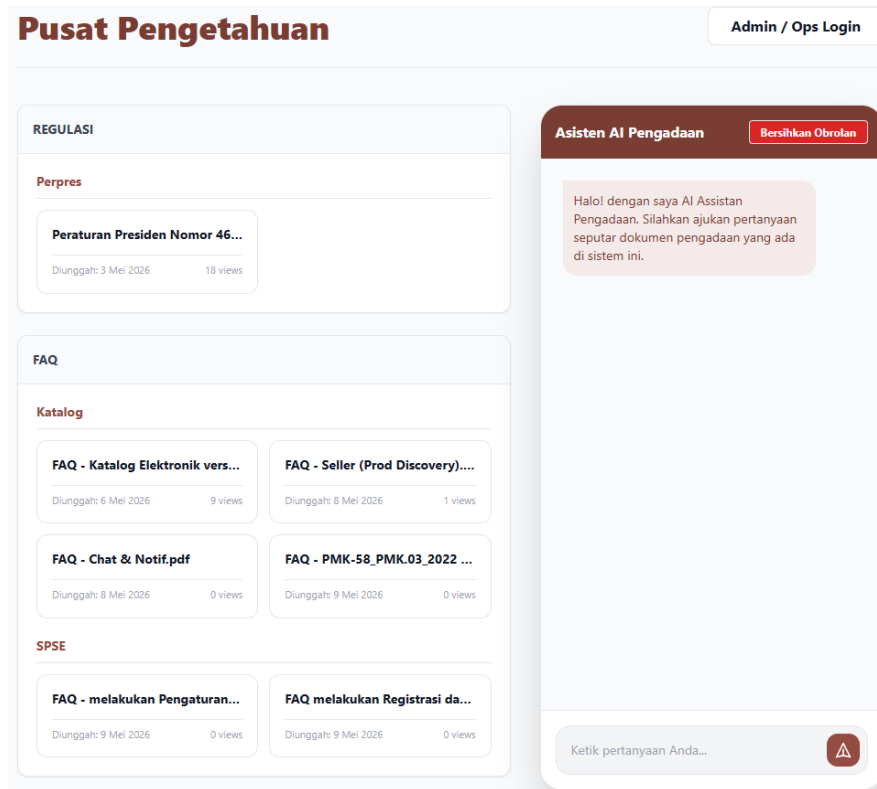
The virtual assistant uses a retrieval augmented generation approach. The system retrieves relevant document chunks from the knowledge base, and a language model generates answers based on that context. Answers are accompanied by sources for verification. When information is not found, the system provides an information response that knowledge still not available and records the question as missing knowledge. The relationship between the identified problems, system requirements, and prototype features is summarized in the Table 2.

**Table 2. Synthesis of Problems, Requirements, and Prototype Features**

<b>Problems</b>	<b>Needs</b>	<b>Response in Prototype</b>
Knowledge is scattered and hard to find	Centralized access and fast search	KSS portal, knowledge base, and virtual assistant
Updates and validation are not consistent	Contribution, review, and approval flow	Knowledge upload, draft review, and publication pages
Answers are difficult to verify	Transparency of Resource	Inclusion of source documents and knowledge links
Undocumented unmapped issues	Identify knowledge gaps	Question log and missing knowledge dashboard
User input is not linked to content improvements	Knowledge evaluation mechanism	Rating, feedback, and input dashboard
Cross-actor collaboration is still informal	Division of management roles	Access admin and operational teams with different functions

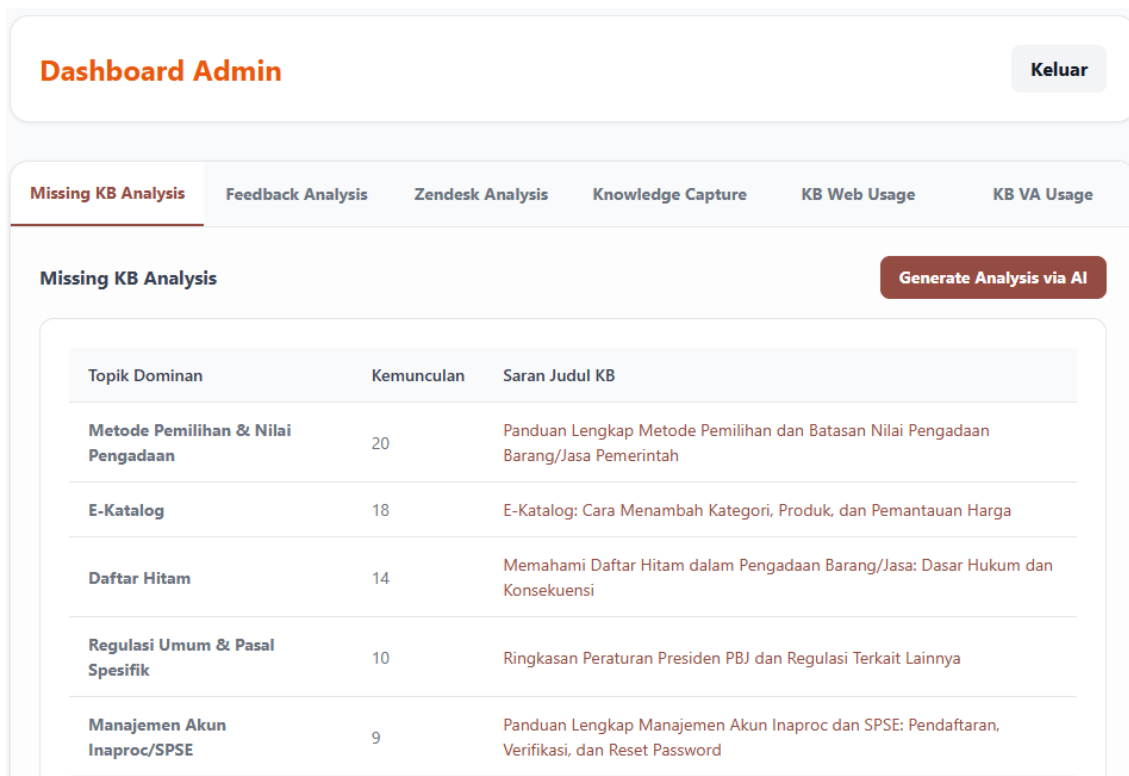
Source: Result of Resource

The main prototype interface is shown in Figure 4, which includes a user page, a virtual assistant fitur that equipped with answer sources, and a knowledge document page. This interface demonstrates that the system provides access to knowledge document, source based answer presentation, and support for knowledge contribution and validation.



**Figure 4. Homepage and Virtual Assistant**  
Source: Result of Research

Meanwhile, in Figure 5 displays the knowledge shows monitoring and analysis dashboard. This dashboard is used to monitor user activity, identify missing knowledge, review feedback from users not only in the virtual assistant fitur but also in knowledge documents, and support prioritization of knowledge base creation.



**Figure 5. Dashboard Monitoring**  
Source: Result of Research

### Prototype Evaluation

The prototype evaluation was done to answer the second research question, namely to assess the design results of an artificial intelligence based knowledge sharing system in terms of functional suitability, the quality of the virtual assistant responses, system usability, and its support for the knowledge management process. The evaluation was conducted in a complementary manner utilization blackbox testing, RAGAS, the System Usability Scale, and a knowledge management process perception questionnaire. The use of several evaluation methods was designed so that the prototype was not only assessed based on the success of its technical functions, but also based on the quality of the responses and user acceptance.

### Functional Prototype Evaluation

Functional testing was done using blackbox testing on the user page, the operational team page, and the admin page. Testing done both positive and negative scenarios, including page access, document search and opening, interaction with the virtual assistant, providing ratings and feedback, submitting knowledge drafts, reviewing and publishing knowledge, managing the dashboard, and restricting access based on roles.

The test results showed that the main functions of prototype could be executed according to the established scenarios. On the user page, the system can display knowledge, receive questions via the virtual assistant, provide answers and show the sources, and receive ratings and feedback. On the operational team page, users can submit knowledge drafts and monitor knowledge needs as a collaboration between stakeholders. Meanwhile, on the admin page, the system can support the review, validation, publication, updating, and management of knowledge.

Some improvements were identified, particularly in input validation, navigation consistency, displaying messages when data is not yet available, and restricting access based on roles. Nevertheless, the test results indicated that the main functional requirements had been met, and the prototype could be used as a basis for the next stage of system development.

### Virtual Assistant Answer Quality Evaluation

The quality of virtual assistant answers was evaluated using RAGAS using 20 questions for which answers were available in the knowledge base. The four metrics used were faithfulness, answer relevancy, context precision, and context recall. The evaluation results are shown in Table 3.

**Table 3. Result of RAGAS Evaluation**

Metric	Mean	Interpretation
Faithfulness	1,000	Answers are consistent with the context of the source
Answer relevancy	0,819	The answer is relevant, but could still be improved in terms of completeness and focus.
Context precision	1,000	The context taken is appropriate to the question
Context recall	0,934	Most of the important context was successfully found

Source: Result of Research

A faithfulness score of 1.000 shows that the generated answer is consistent with the source context in the knowledge base and does not contain information unsupported by the knowledge base. A context precision value of 1.000 shows that the context retrieved by the system is relevant to the question from the user. Both results indicate that the retrieval augmented generation approach can give answers that can be traced back to the knowledge base.

The answer relevancy score of 0.819 shows that the answers were generally relevant, but some questions still need improvement in terms of focus, completeness, and presentation structure. Meanwhile, the context recall score of 0.934 indicates that most important information was successfully retrieved. The less than perfect score was primarily found in questions regarding regulations because the required information was scattered or repeated in several parts of the document.

Compared to other RAGAS metrics, the answer relevance score (0.819) was the lowest, indicating that although the generated responses were based on the retrieved context, the system did not always provide the answers users expected. This result was particularly true for regulatory knowledge, which is influenced by the characteristics of Indonesian public procurement regulations, containing formal legal language, extensive cross-references, and lengthy procedural descriptions. As a result, semantically related information is often scattered across multiple information segments or articles, making it more difficult to synthesize a concise and comprehensive response. Similar challenges have been reported in semantic retrieval systems applied in highly regulated domains, where response quality depends not only on the language model but also on document segmentation, retrieval strategies, and the completeness of the underlying knowledge base (Es et al., 2024; Grabuloski et al., 2025).

In addition to the positive test, an evaluation was conducted on eight questions for which answers were not yet available in the knowledge base. In these cases, the system responded that the information was not found in the reference document. This response indicates that the system does not generate speculative answers when context is unavailable. Unanswered questions are then recorded as missing knowledge and can be used as a basis for adding or updating knowledge.

These results indicate that answer quality is influenced not only by the language model but also by the quality of the knowledge base, document structure, text segmentation, metadata, and context retrieval mechanisms. Therefore, further improvement in answer quality needs to be directed at refining the chunking, metadata, reranking, and model instruction formulation processes (Es et al., 2024; Grabuloski et al., 2025).

### **Prototype Usability Evaluation**

A usability evaluation was conducted using the System Usability Scale with 43 respondents consisting of operational teams, e-procurement service managers, procurement officials, and commitment-making officials. The test results yielded an average score of 79.24.

This score indicates that the prototype is in the good category and is acceptable to users. Respondents generally assessed that the functions available in the prototype are integrated, relatively easy to learn, and can be used to search and acquire knowledge. This score also indicates that users have a fairly good level of confidence when interacting with the system.

However, some of the respondents still indicated a need for user guide and technical assistance in the initial stages. This feedback shows that KSS implementation needs to be accompanied by user socialization, simplification of terminology, consistency of navigation, and the provision of brief guides. Therefore, a good usability score does not eliminate the need for change management and user outreach.

### **Evaluation of Support for Knowledge Management Processes**

An evaluation of the prototype perceived support for the knowledge sharing process was conducted on 102 respondents. The instrument consisted of 12 statements representing the dimensions of each knowledge discovery, knowledge capture, knowledge sharing, and knowledge application. All statements had a median and mode of 4, while the mean value ranged between 3.83 and 4.13. A summary of the evaluation results is presented in Table 4.

**Table 4. Result of Questionerre KM Perception**

Dimension	Mean	Median/Modus	Main Finding
Knowledge discovery	3,83–4,05	4/4	Speed up searches and provide relevant information
Knowledge capture	3,84–4,13	4/4	Feedback helps improve and capture new knowledge.
Knowledge sharing	3,84–4,02	4/4	More organized and available access anytime
Knowledge application	4,01–4,12	4/4	Support problem solving, work and quality of service

Source: Result of Research

In the knowledge discovery dimension, respondents assessed that the prototype would help speed up searches, give relevant information, and make it easier for users to find knowledge sources. These results indicate that the search feature, knowledge base, and virtual assistant can support the knowledge discovery process.

In the knowledge capture dimension, the assessment, feedback, question log, and draft submission features were assessed as helping to capture knowledge needs and previously undocumented issues. The highest score on this dimension was given to the statement that user input can contribute to enriching the available knowledge.

In the knowledge sharing dimension, respondents assessed that knowledge can be accessed in a more organized and readily available manner. This situation suggests that portals and knowledge bases can be a more structured alternative to information exchange solely through communication groups or separate storage media.

In the knowledge application dimension, the prototype was assessed as supporting problem-solving, applying knowledge in work, and improving service quality. Relatively high scores on this dimension indicate that the available knowledge is not only read but can also be used as a basis for carrying out tasks and resolving user problems.

Overall, the results of the perception evaluation indicate that the prototype supports all four knowledge management processes. This finding is in line with (Becerra-Fernandez et al., 2015), which explains that the process of discovering, capturing, sharing and applying knowledge is an interconnected series.

## Discussion

The research findings answer the first question by demonstrating that knowledge sharing systems for digital procurement services need to be designed as a combination of search technology, content governance, and actor collaboration. Portals and virtual assistants have the function as the access layer, while management pages, monitoring dashboards, and feedback form the governance layer. Without the second layer, virtual assistants risk simply accelerating the distribution of incomplete or knowledge that not updated.

The integration of Soft Systems Methodology and Design Science Research provides methodological value. Soft Systems Methodology helps identification that the underlying problem lies not only in the absence of applications, but also in the fragmentation of roles, media, procedures, and the culture of sharing. Design Science Research then translates these findings result into demonstrable and testable artifacts. This approach strengthens the relevance of design in public organization environments that involve multiple interests and inter-institutional boundaries (Devi et al., 2023; Fitriasaki et al., 2024).

The results of RAGAS show the advantages of retrieval augmented generation for domains that need answers from a knowledge base. Faithfulness and context precision on the result indicate that restricting answers to the context of the knowledge base can improve traceability. However, lower answer relevancy indicates that context based truth is not always identical with the most useful answer. Further refinements should include improvements to

document chunking, metadata, reranking, prompts, context incorporation, and human evaluation of answer completeness (Es et al., 2024; Grabuloski et al., 2025).

Negative testing in RAGAS indicates the importance of failsafe design. In public services, systems should not give speculative answers when the source in knowledge base are unavailable. Restriction response, logging questions, and escalating to human resources are more accountable mechanisms. This also transforms the limitations of the knowledge base into organizational data for improved knowledge documentation.

Good usability scores and high perceptions in the whole of the knowledge management process indicate initial acceptance of the system concept. However, qualitative findings from respondents give advice to emphasize the need for socialization, a user guide, integration with existing procurement portals, more comprehensive content, and consistent human resources. These findings support the view that the success of a knowledge sharing system is influenced by organizational and human factors, not only technological features (Amine et al., 2024; Ncoyini & Cilliers, 2020).

In theory, this study expands the implementation of knowledge management processes to digital support services through the direct relationship between user interactions and knowledge base improvement. Knowledge discovery happens through the searching process in the document and a virtual assistant. Then, knowledge capture through feedback, question logs, , draft contributions from collaboration, and integration with categories in the ticketing platform. For knowledge sharing, portals and virtual assistants are used to resolve operational issues. The dashboard serves as a connecting mechanism that transforms the searching process and integration process into knowledge creation initiatives.

In practice, organizations can implement the design in stages. The initial stage should prioritize establishing knowledge owners, metadata standards, validation flows, and curating knowledge sources. The next phases could integrate the virtual assistant with existing procurement portals, ticketing systems, and user needs analytics. Operational implementation also needs to include monitoring indicators, including knowledge base coverage, successfully answered question rates, update times, feedback quality, escalation rates, and the use of answers in service resolution.

The research has limitations. The evaluation was conducted on a prototype and did not measure operational impacts such as reduced ticket resolution time, reduced repeat inquiries, or increased service satisfaction after implementation. Integration with the ticketing system has not yet been fully implemented. In addition, the RAGAS evaluation uses a limited set of questions and needs to be supplemented by human evaluation, testing on user language varieties, and monitoring of regulatory changes.

## Conclusion

The research resulted in the design of an artificial intelligence-based knowledge sharing system that integrates a retrieval augmented generation-based virtual assistant, centralized knowledge base, source listing, user feedback, question log, knowledge gap dashboard, and knowledge management functions. The design was developed through the integration of Soft Systems Methodology and Design Science Research so that technology requirements are derived from organizational, actor, process and service governance problems. Evaluation shows that the main function of the prototype works as designed; answer quality obtained faithfulness 1.000, answer relevancy 0.819, context precision 1.000, and context recall 0.934; a System Usability Scale score of 79.24 indicates good usability; and all dimensions of perception of the knowledge management process are in the high category. These results show that design can be a basis for improving access to knowledge and supporting digital procurement user services. Future research should evaluate the proposed system in real operational environments by measuring objective service performance indicators, such as ticket resolution time, response consistency, knowledge reuse, and user satisfaction over

extended periods. In addition, further studies may explore technical enhancements to the retrieval-augmented generation architecture, including adaptive chunking strategies, reranking mechanisms, domain specific embedding models, and comparative evaluations of different LLM to improve answer quality when processing complex public procurement regulations.

### Acknowledgment

The author expresses appreciation and gratitude to the Ministry of Communications and Digital for the financial support provided, enabling this research to be carried out successfully.

### REFERENSI

- Amine, Z. M., Asmae, E. K., Asmaa, R., & Samir, B. (2024). Strategic Implementation of Knowledge Management Systems in Moroccan Public Administration: Guidelines and Key Success Factors. *9th IEEE/ACIS International Conference on Big Data, Cloud Computing, and Data Science, BCD 2024*, 103–108. <https://doi.org/10.1109/BCD61269.2024.10743105>
- Becerra-Fernandez, Irma, Sabherwal, & Rajiv. (2015). *Knowledge Management Systems and Processes Second Edition*. Routledge, Taylor & Francis Group.
- Brooke, J. (1996). *SUS-A quick and dirty usability scale*. <https://doi.org/https://doi.org/10.1201/9781498710411-35>
- Checkland, P. (2000). Soft Systems Methodology: A Thirty Year Retrospective a. In *Systems Research and Behavioral Science Syst. Res* (Vol. 17, pp.11–58). John Wiley & Sons, Inc. [https://doi.org/https://doi.org/10.1002/1099-1743\(200011\)17:1+%3C::AID-SRES374%3E3.0.CO;2-O](https://doi.org/https://doi.org/10.1002/1099-1743(200011)17:1+%3C::AID-SRES374%3E3.0.CO;2-O)
- Creswell, J. W. ., & Poth, C. N. . (2018). *Designing and Conducting Mixed Methods Research*. SAGE.
- Da Silveira, M., Deladiennee, L., Scolan, E., & Pruski, C. (2024). A knowledge-sharing platform for space resources. *Data and Knowledge Engineering*, 151. <https://doi.org/10.1016/j.datak.2024.102286>
- Devi, E. T., Wibisono, D., Mulyono, N. B., & Fitriati, R. (2023). Designing an information-sharing system to improve collaboration culture: a soft systems methodology approach in the digital service creation process. *Journal of Enterprise Information Management*, 36(5), 1240–1269. <https://doi.org/10.1108/JEIM-08-2022-0294>
- Dresch, A., Daniel, ., Lacerda, P., Antônio, J., & Antunes, V. (2015). *Design Science Research A Method for Science and Technology Advancement*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-07374-3>
- Es, S., James, J., Espinosa-Anke, L., Schockaert, S., & Gradients, E. (2024). RAGAS: Automated Evaluation of Retrieval Augmented Generation. *Proceedings of the 18th Conference of the European Chapter of the Association for Computational Linguistics System Demonstrations*, 150–158. <https://doi.org/https://doi.org/10.48550/arXiv.2309.15217>
- Fitriasari, N. S., Sensuse, D. I., Hidayat, D. S., & Indriasari, S. (2024). Advancing Intellectual Property Rights through Digital Knowledge Collaboration Model: A Soft Systems Methodology Approach. *2024 9th International Conference on Informatics and Computing, ICIC 2024*. <https://doi.org/10.1109/ICIC64337.2024.10957616>
- Grabuloski, M., Karadimce, A., & Sefidanoski, A. (2025). Enhancing Language Models with Retrieval-Augmented Generation A Comparative Study on Performance. *WSEAS Transactions on Information Science and Applications*, 22, 272–297. <https://doi.org/10.37394/23209.2025.22.23>
- Hafseld, K. H. J., Husein, B., & Rauzy, A. R. (2022). Government inter-organizational, digital transformation projects: five key lessons learned from a Norwegian case study. *Procedia Computer Science, Elsevier*, 196, 910–919. <https://doi.org/10.1016/j.procs.2021.12.092>

- International Standard Organization. (2019). *ISO 9241-210:2019. Ergonomics of human-system interaction-Human-centred design for interactive systems*. www.iso.org
- Jarrahi, M. H., Askay, D., Eshraghi, A., & Smith, P. (2023). Artificial intelligence and knowledge management: A partnership between human and AI. *Business Horizons*, 66(1), 87–99. <https://doi.org/10.1016/j.bushor.2022.03.002>
- Maulana, R. Y., & Dečman, M. (2023). Collaborative Governance in the Digital Transformation Age: A Systematic Literature Review with Bibliometric Mapping. *Central European Public Administration Review*, 21(1), 31–60. <https://doi.org/10.17573/cepar.2023.1.02>
- Ncoyini, S. S., & Cilliers, L. (2020). Factors that influence knowledge management systems to improve knowledge transfer in local government: A case study of Buffalo City Metropolitan Municipality, Eastern Cape, South Africa. *SA Journal of Human Resource Management*. <https://doi.org/https://doi.org/10.4102/sajhrm.v18i0.1147>
- Nidhra, S. (2012). Black Box and White Box Testing Techniques - A Literature Review. *International Journal of Embedded Systems and Applications*, 2(2), 29–50. <https://doi.org/10.5121/ijesa.2012.2204>
- Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems*, 24(3), 45–77. <https://doi.org/10.2753/MIS0742-1222240302>
- Peraturan Presiden Nomor 95 Tahun 2018 Tentang Sistem Pemerintahan Berbasis Elektronik (2018).
- Peraturan Presiden Republik Indonesia Nomor 17 Tahun 2023 Tentang Percepatan Transformasi Digital Di Bidang Pengadaan Barang/Jasa Pemerintah, Pemerintah Republik Indonesia (2023).
- Perdana, Y., & Sensuse, D. I. (2021). Knowledge Sharing System Development: A Systematic Literature Review. *2021 International Conference on Advanced Computer Science and Information Systems, ICACISIS 2021*. <https://doi.org/10.1109/ICACISIS53237.2021.9631327>
- Sensuse, D. I., Suwiyanto, V., Lusa, S., Gandhi, A., Mishbah, M., & Elisabeth, D. (2021). Designing knowledge sharing system for statistical activities in bps-statistics indonesia. *Data*, 6(5). <https://doi.org/10.3390/data6050048>
- Supriana, C. E. (2021). Designing knowledge sharing systems to support integrated eco-city planning and management. *IOP Conference Series: Earth and Environmental Science*, 737(1). <https://doi.org/10.1088/1755-1315/737/1/012006>
- Verhoest, K., Hammerschmid, G., Rykkja, L. H., & Klijn, E.-H. (2024). *Collaborating for digital transformation: how internal and external collaboration can contribute to innovate public service delivery*. Edward Elgar Publishing Limited. <https://doi.org/10.4337/9781803923895>
- Vom Brocke, J., Hevner, A., & Maedche, A. (2020). *Design Science Research. Cases*. Springer International Publishing. <https://doi.org/https://doi.org/10.1007/978-3-030-46781-4>
- Willem, A., & Buelens, M. (2007). Knowledge sharing in public sector organizations: The effect of organizational characteristics on interdepartmental knowledge sharing. *Journal of Public Administration Research and Theory*, 17(4), 581–606. <https://doi.org/10.1093/jopart/mul021>
- World Bank Group. (2020). *GovTech: The New Frontier in Digital Government Transformation*. <http://operationsportal.worldbank.org/secure/P169482/home>.
- Zhang, Z., Wang, X., & Chun, D. (2022). The Effect of Knowledge Sharing on Ambidextrous Innovation: Triadic Intellectual Capital as a Mediator. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(1). <https://doi.org/10.3390/joitmc8010025>
- Zulhalim, & Wibowo, W. C. (2022). Designing Inter-Organizational Collaborative Knowledge Sharing System for Indonesian MBKM Policy. *Proceeding - 6th International Conference*

*on Information Technology, Information Systems and Electrical Engineering: Applying Data Sciences and Artificial Intelligence Technologies for Environmental Sustainability, ICITISEE 2022, 482–487. <https://doi.org/10.1109/ICITISEE57756.2022.10057927>*