JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Journal homepage: https://jurnal.stkippgritulungagung.ac.id/index.php/jipi
ISSN: 2540-8984
Vol. 9, No. 3, September 2024, Pp. 1395-1407

WEBSITE-BASED IMPLEMENTATION IN INFORMATION SYSTEMS FOR SUPERVISORY MANAGEMENT PURPOSES

Ayudhia Isnafiani Fanada*[1)], Nurgiyatna[2)]
1. Universitas Muhammadiyah Surakarta, Indonesia
2. Universitas Muhammadiyah Surakarta, Indonesia

Article Info
Keywords: Black Box Testing; Information System; SDLC Waterfal; Supervisory Management; Systsem Usability Scale; Website-based

Article history:
Received 8 June 2024
Revised 10 July 2024
Accepted 26 August 2024
Available online 1 September 2024

DOI :
https://doi.org/10.29100/jipi.v9i3.5341

* Corresponding author.
Ayudhia Isnafiani Fanada
E-mail address:
l200180095@student.ums.ac.id

ABSTRACT
Website-based implementation of Supervisory Management Information Systems at Inspektorat Daerah Kabupaten Karanganyar is very important in the supervision process for audit reports. Supervision of employee performance that is usually carried out is less effective if it is done physically because it wastes too much time and still uses paper. The purpose of this study is to implement a website-based Supervisory Management Information System, so that employee performance in the audit reporting process can run efficiently and audit reports can be stored directly in the database system. This system is designed using a website-based application with the CodeIgniter framework. The process of designing this system uses the Software Development Life Cycle (SDLC) stages with the Waterfall method. At the end of the stage, testing is carried out using Black Box Testing and calculating the value of the System Usability Scale (SUS). The results of the Black Box Testing show that the system works perfectly. In the SUS calculation, from 36 Respondents who were inspectorate employees, the average score was 71.86. This shows that this system can be easily used and managed by Inspektorat Daerah Kabupaten Karanganyar.

I. INTRODUCTION

THE Regional Inspectorate is a working supervisory system that is headed by the Inspector, who answers to the Regent through the Regional Secretary for the performance of his responsibilities. The Regional Inspectorate's job is to support the Regent in promoting and directing the execution of regional government issues, which are under its jurisdiction, as well as to support regional apparatuses. The objecive of supervisory is to ensure that the leadership is aware of the actual activity process and every aspect of carrying out the tasks or environment of each organizational unit, does not veer from course, and makes an effort to achieve the goals and objectives that have been established [1].

The Regional Inspectorate conducts regular field supervision, and the Employees on duty are required to create their own audit reports for future evaluations. However, the current paper-based audit report system is inefficient and time-consuming, as the reports are not generated sequentially and are immediately submitted to the Leadership at the end of the overall conclusion. To address these issues and improve the efficiency of the audit process, this research establishes a quality assurance information system that utilizes management information systems to enhance the quality of e-government [2]–[4], benefiting from the advancements in information system technologies. With the implementation of this supervisory management information system technology [5], [6], users will have the capability to easily save and swiftly access data, streamlining the data management process and improving overall efficiency in the field of supervision.

The objective of this study is to develop a supervisory management information system that enables effective administrative reporting by the Employees and facilitates the database system to store reports as they are created. The system aims to allow stakeholders to observe the implementation of monitoring in stages rather than solely at the conclusion of the report. The development process involves utilizing PHP, MySQL, and XAMPP [7], where PHP is a widely used server-side scripting language for web development [8], then MySQL is a popular relational database management system [9], and XAMPP provides a comprehensive web development environment [10]. The system will be accessed through a local server located in the inspectorate office. The Waterfall method has been commonly employed in various research endeavors, including the design of supervisory management information systems [3]. So, the Waterfall method was chosen as the software development model in this research because the stages that are followed must wait for the completion of the previous stage and are carried out sequentially [11].

The next stage will not be implemented before the previous stage is completed and cannot be returned or repeated at the previous stage. This software development approach follows a linear sequence, commencing with requirement analysis, followed by design, development, testing, and finally implementation, with each phase relying on the successful completion of the preceding phase [12].

Research conducted by Putri et al. [13] implementing a website-based project management information system to manage project data. This website system will increase the accuracy and automation of project data recording, thereby facilitating the Employees performance. On the other hand, research conducted by Setyaningsih et al. [14] focuses on monitoring community complaint reports based on mobile applications to help the people of Desa Kedunggede. This mobile application also helps village apparatus perform more effectively and efficiently. Even though our research is different from the two studies, we still use the strength of these references in designing our research.

This research is different from the two studies in the context of its focus, this research offers a more comprehensive approach by introducing an audit supervision management information system in the Inspectorate. There is a significant difference in the scope of current research, which includes data integration from multiple sources, audit process automation, and real-time reporting to support faster decision making. Thus, the current research has a deeper impact on the effectiveness of audit oversight at the organizational level, in contrast to previous research that focused more on the domain of community-based projects and applications.

Current research shows an evolution from simple application development approaches to more sophisticated audit oversight management platforms. This not only improves data collection efficiency but also allows organizations to have a more comprehensive and real-time view of audit effectiveness and management risks [15].

The research that we have done is a solution to the problems faced by the Inspectorate. By converting the existing system into a website-based supervisory management information system specifically designed for the needs of the Inspektorat Daerah Kabupaten Karanganyar, we have paved the way for more efficient monitoring and improved the Employees performance. This new system can simplify and automate existing processes, enabling more effective and faster implementation of audit results, as well as better facilitating the Employees tasks. These innovations have the potential to provide significant benefits to the organization and contribute to the operational success of the Inspectorate.

The remaining discussion in this article is organized as follows. In Section 2, we present the research techniques conducted, providing a detailed explanation of requirements definition, system and software design (including Use Case Diagrams, Activity Diagrams, Entity Relationship Diagrams, and Wireframes), implementation and unit testing, integration and system testing, as well as operation and maintenance. In Section 3, we present the results of the study and analysis, including the Login Page, the Form for Submission of Audit Findings by Members, the Audit Results Page by the Chairman, and the Audit Findings Acceptance Page by the Technical Controller. Additionally, we discuss the Black Box Testing and System Usability Scale Testing that were performed. Finally, in Section 4, we conclude this paper and discuss its implications.

II. METHOD

The methodological component of development is crucial in the system development process [16]. This study follows a development approach using the Waterfall method, which is a part of the Software Development Life Cycle (SDLC) model, to create a supervisory management information system [17]. The Waterfall method is one of the oldest and most well-known SDLC models, where it systematically progresses through software development stages with well-defined requirements specifications [18], [19]. The flow of the system developer stages using the Waterfall method is depicted in Figure 1.

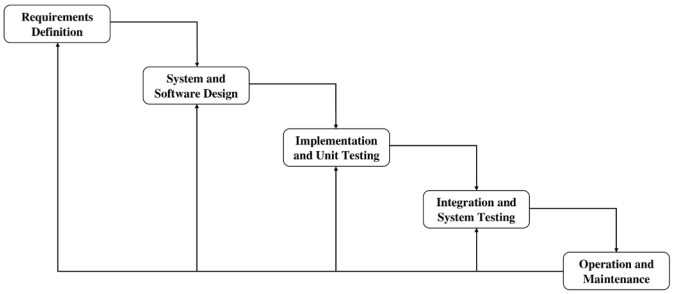


Figure 1. Waterfall Method System Development Life Cycle (SDLC) Flow

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Journal homepage: https://jurnal.stkippgritulungagung.ac.id/index.php/jipi
ISSN: 2540-8984
Vol. 9, No. 3, September 2024, Pp. 1395-1407

An explanation of the stages of the SDLC Waterfall method includes:

A. Requirements Analysis and Definition

The first stage of the study was gathering historical data through observation and interviews. At Inspektorat Daerah Kabupaten Karanganyar, this observation was made while compiling supporting information. The primary goal of the analysis phase is to gather data in order to fulfill the functional specifications of a system that will be created.

In the requirements analysis, both functional and non-functional requirements are identified. The functional requirements are determined based on the actions the system must perform to fulfill the demands of the Members. The Admin's responsibility is to provide the Chairman with a letter of assignment. Subsequently, the Chairman assigns Members to input the findings data, encompassing audit numbering, audit title, conditions, criteria, causes, and effects during the supervision process.

Once the Members submit their findings, the Chairman reviews them and forwards approved findings to the Technical Controller. In case the Chairman rejects the findings, the Member has the right to re-audit the findings (revisions). After receiving the findings, the Technical Controller directs them to the assistant responsible person. If rejected, the findings are returned to the Chairman and the Member for revisions. Upon receiving the revised findings, the Chairman rechecks them for appropriateness, and if deemed appropriate, the Chairman prints the Inspection Result Manuscript report (NHP report in Bahasa). In the event of rejection by the Assistant Responsible Person, the Technical Controller is responsible for submitting a re-revision.

While the non-functional requirements for users include the need for hardware, such as a personal computer (PC) or laptop that can access the internet, an operating system (OS) like Windows, Mac OS X, or Linux, and a web browser like Google Chrome, Mozilla, Safari, etc.

B. System and Software Design

Use Case Diagrams and Activity Diagrams are essential components of the Unified Modeling Language (UML) used for designing system [20], [21]. UML is a widely recognized modeling language used as a standard specification for documenting and developing software, enabling the generation of ready-to-deploy programming code [22]. Below is the design of the supervisory management information system:

1) Use Case Diagram

Use Case Diagrams are graphical representations used to depict system requirements and identify the features or services offered by a program to its users [23]. In Figure 2, the Use Case Diagram shows the actions that can be performed on the system at each User level.

For Admins, they can log in, manage Employee user data, manage assignment letters, and view the stages of the supervision process. The Chairman can log in, manage audit findings data, accept or reject audit findings, manage audit revision data, and print NHP reports.

Members have access to log in, manage audit findings data, and manage audit revision data. Both the Technical Controller and the Assistant Responsible Person share the same role, which includes logging in, managing audit findings data, managing audit revision data, and accepting or rejecting audit findings.

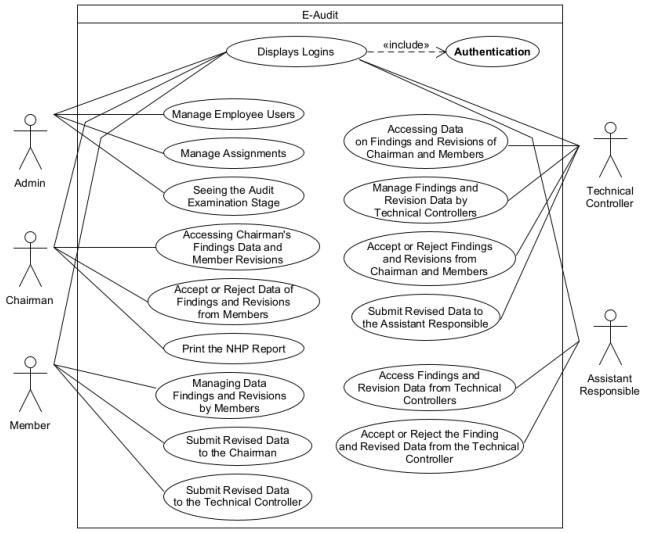


Figure 2. Use Case Diagram Design System

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Journal homepage: https://jurnal.stkippgritulungagung.ac.id/index.php/jipi
ISSN: 2540-8984
Vol. 9, No. 3, September 2024, Pp. 1395-1407

2) Activity Diagram

An Activity Diagram is a UML diagram that utilizes an object-oriented approach to illustrate the workflow of a system, and it can serve as a paradigm for creating information system applications The system in question includes five user levels: 1) admin level, 2) chairman level, 3) member level, 4) technical controller level, and 5) assistant responsible person level, each with varying degrees of access to the system. The CRUD (Create, Read, Update, Delete) procedures for each user activity have been developed with security considerations from the outset [24], [25].

Figure 3 depicts the flow of using the supervisory management information system at the Admin level. Admins can perform CRUD operations on assignment letters, manage employee users, and view inspection findings [26].

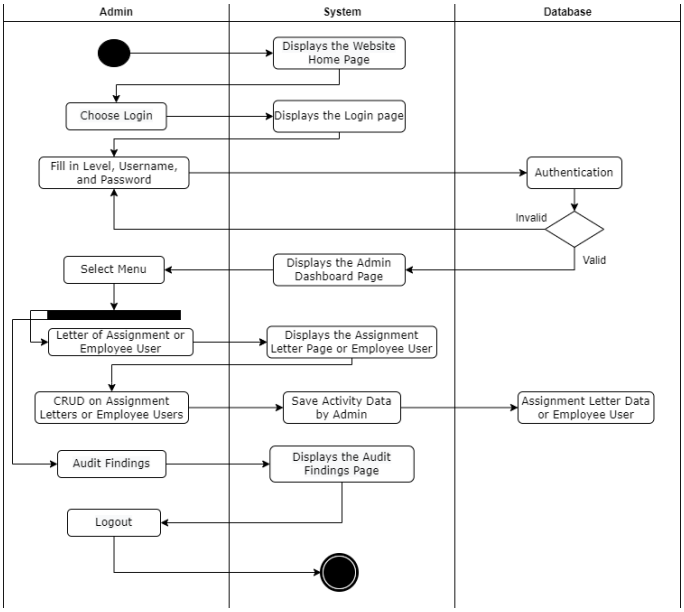
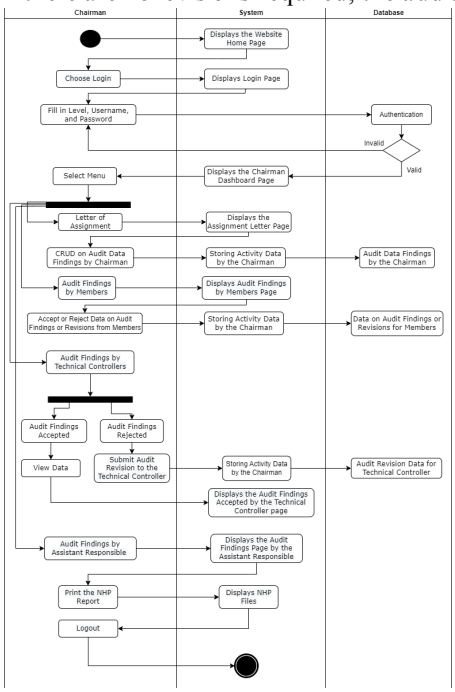
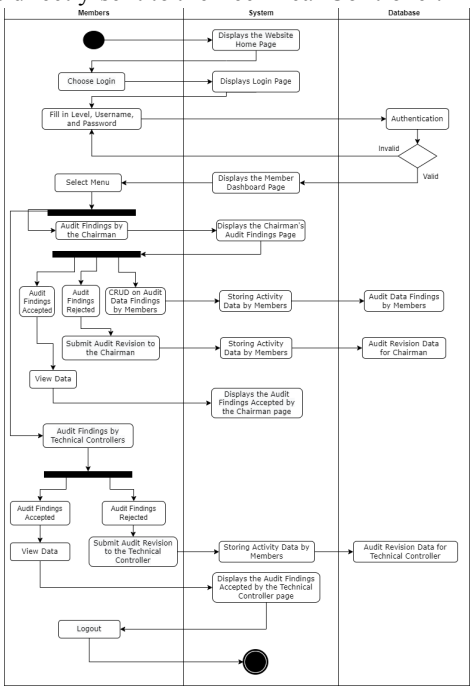


Figure 3. . Admin Activity Design Diagram

The usage flow of the information system at the Chairman level is illustrated in Figure 4. The Chairman utilizes the available assignment letter to submit the audit results.

On the other hand, Figure 5 illustrates the utilization of the information system at the Member level. Members are responsible for carrying out the proposed audit findings provided by the Chairman. Once the Members submit their findings, the data will be reviewed by the Chairman. If the audit data is deemed appropriate, it will be forwarded to the Technical Controller. However, if the Chairman finds any issues, the findings will be rejected and returned to the Members for revision. If there are no revisions required, the audit findings will be directly sent to the Technical Controller.





JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Journal homepage: https://jurnal.stkippgritulungagung.ac.id/index.php/jipi
ISSN: 2540-8984
Vol. 9, No. 3, September 2024, Pp. 1395-1407

Figure 6 illustrates the flow of information system usage at the Technical Controller level. When the findings are accepted by the Technical Controller, they will be forwarded to the Assistant Responsible Person for further processing. However, if the findings are rejected by the Technical Controller, they will be sent back for further review.

Similarly, Figure 7 presents the flow of information system usage at the Assistant Responsible Person level. After receiving the findings from the Technical Controller, the Assistant Responsible Person proceeds with the necessary actions. Subsequently, the Chairman can print the NHP report based on the processed data.

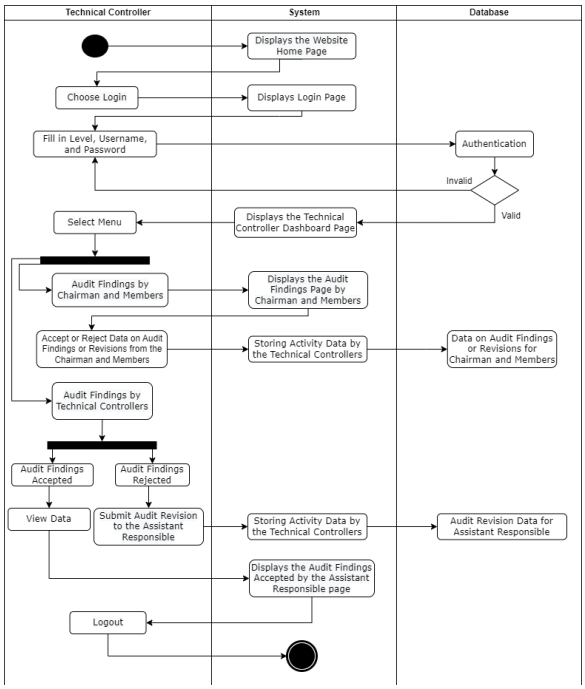


Figure 6. Technical Controller Activity Design Diagram

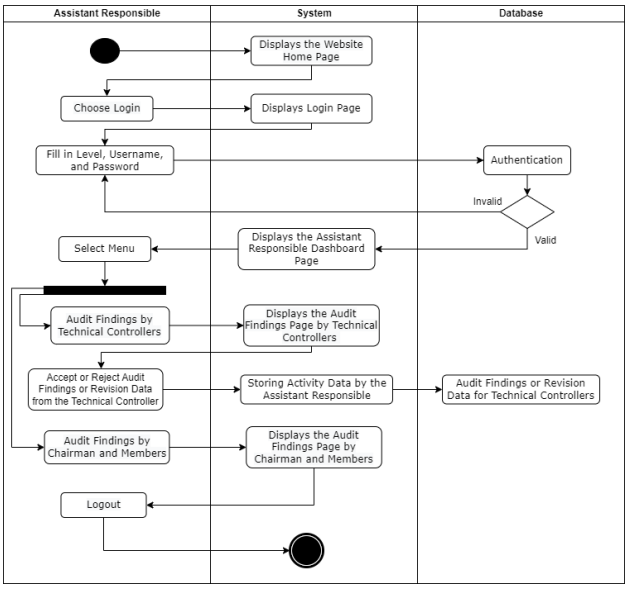


Figure 7. Assistant Responsible Activity Design Diagram

A system that includes relationships between entities and their associations is represented by an Entity Relationship Diagram (ERD) [27]. The ERD architecture consists of entity sets and relationship sets, each of which is equipped with attributes designed to fulfill specific needs [28].

Figure 8 presents the Entity Relationship Diagram (ERD) of a supervisory management information system, which illustrates entities, attributes, and their relationships. The database design utilizes MySQL PhpMyAdmin with tables to store data [29]. The designed database contains several tables that are interconnected or may have no relationships with other tables.

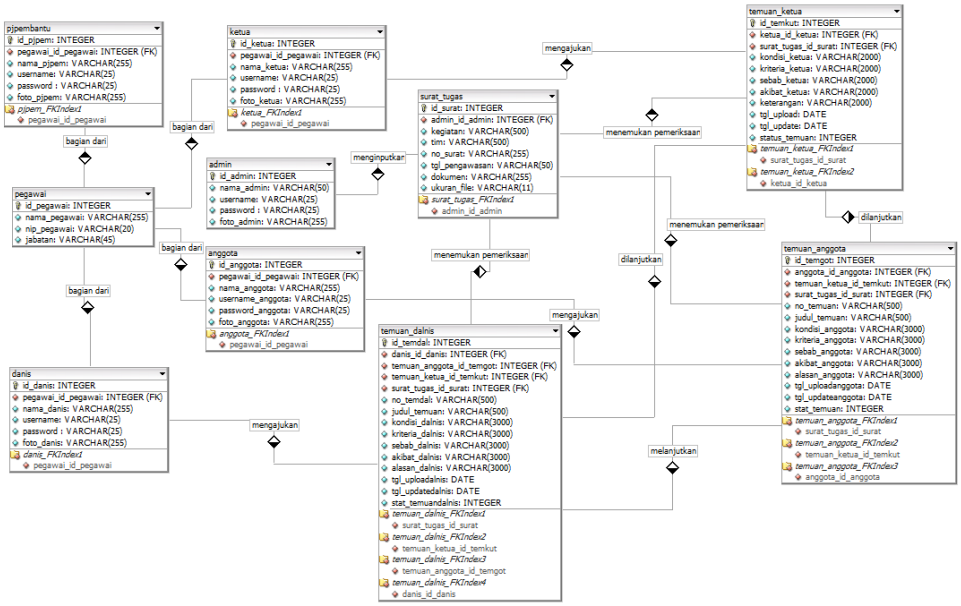


Figure 8. Entity Relationship Diagram (ERD)

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Journal homepage: https://jurnal.stkippgritulungagung.ac.id/index.php/jipi
ISSN: 2540-8984
Vol. 9, No. 3, September 2024, Pp. 1395-1407

4) Wireframe

A wireframe is a visual representation of the system design focusing on the user interface portion, serving as a mockup for implementation. The wireframe for the supervisory management information system guides the final outputs of the system. Figure 9 presents the layout of the landing page, which is the initial appearance of the system. Additionally, Figure 10 depicts the dashboard display, visible after a user successfully logs in. These wireframes provide a clear visual representation of the user interface and aid in the development process of the system.

Figure 9. Wireframe Landing Page

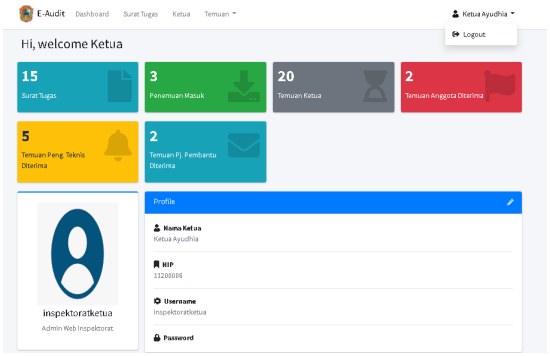


Figure 10. Wireframe Dashboard Chairman

During the coding stage, all website-based designs are implemented. This involves using applications such as Visual Studio Code as the text editor [30], the PHP programming language [31], and the CodeIgniter 4 framework [32]. The MySQL database is managed through XAMPP PHPMyAdmin. The system is accessed and tested using the Google Chrome-based web browser.

Testing is a critical step at this stage to determine the effectiveness of the system in addressing the identified issues. The testing process is based on the system requirements criteria, ensuring that each unit meets its specified demands and fulfills the functional and non-functional requirements [33]. This stage ensures that the developed system functions correctly and efficiently before being deployed for actual use.

D. Integration and System Testing

Testing the system under development is essential to ensure that its functionality works as intended [34]. In this study, both System Usability Scale (SUS) [35] and Black Box Testing are used for system usability testing [36].

Black Box Testing focuses on the application's input and the expected output based on the provided input data. On the other hand, SUS is a popular tool for evaluating how users perceive the usefulness of certain systems and products [37]. The goal of system testing is to determine the success or effectiveness of the developed product [38].

For the SUS test, respondents will be given 10 questions to answer, with 5 response options available. The specific SUS test questions provided to respondents are included in Table 1, and the information scale of the test results is listed in Table 2. The SUS test will help assess the overall usability and user satisfaction with the system.

Table 1. SUS Test Questions

Code	Question
1	I think that I would like to use this system frequently.
2	I think this system complicated to use.
3	I thought the system was easy to use.
4	I think that I would need the support of a technical person to be able to use this system.
5	I found the various functions in this system were well integrated.
6	I thought there was too much inconsistency in this system.
7	I would imagine that most people would learn to use this system very quickly.
8	I found the system very cumbersome to use.
9	I think there are no obstacles to using this system.
10	I needed to learn a lot of things before I could get going with this system.

Table 2. SUS Declaration Information Scale

Response	Point Scale
Strongly Disagree	1
Disagree	2
Neither Agree Nor Disagree	3
Agree	4
Strongly Agree	5

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Journal homepage: https://jurnal.stkippgritulungagung.ac.id/index.php/jipi
ISSN: 2540-8984
Vol. 9, No. 3, September 2024, Pp. 1395-1407

Then calculate the SUS average score using the formula that has been determined and can be seen in equation (1).

$$Average\ Score = \frac{\sum x}{n} \quad (1)$$

Description:
∑ x = Total SUS Score
n = Number of Respondents

E. *Operation and Maintenance*

The process of addressing and resolving systemic issues is known as maintenance. In the Waterfall method, system operation and maintenance are part of the final stages [39]. Maintenance involves taking care of the system after its release. Even though the supervisory management information system has been implemented successfully, it may require updates, improvements, bug fixing, and fine-tuning based on future user requirements.

Maintenance ensures that the system remains efficient, effective, and up-to-date with changing needs. Regular maintenance checks are performed to identify and resolve errors or issues that may affect the system's performance. By maintaining the system, its functionality and usability can be continuously improved, ensuring it meets the needs of users over time.

III. RESULT AND DISCUSSION

The outcome of this study is the development of a supervisory management information system, also known as internal e-audit, which serves to facilitate the Employees performance in reporting audit findings for each activity.

One significant aspect of the system is its adaptability to each user's activity, resulting in varying appearances at different User levels. This ensures that the system's interface is customized and tailored to the specific needs and roles of users, providing a user-friendly and efficient experience for reporting audit findings during their respective activities.

A. *Result*

1) *Login Page*

The page to access this supervisory management information system is the login page. This step involves choosing the appropriate responsibilities for each level, then entering the login and password to log in to the system. The login page view is shown in Figure 11.

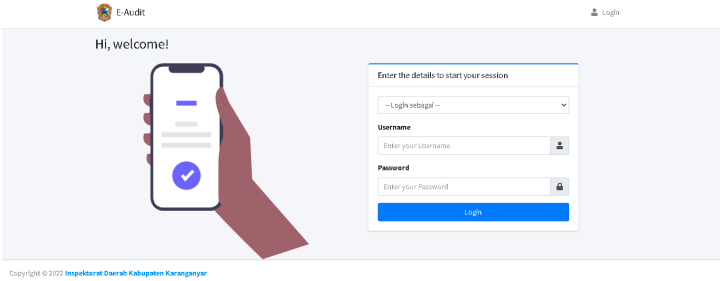


Figure 11. Login Page

2) *Assignment Letter Page*

The assignment letter page is an admin-level page that shows information about newly added assignment letters, including activities, letter numbers, audit teams, audit schedules, and files. Additionally, it has the ability to add, edit, and delete data. The page from the assignment letter is shown in Figure 12.

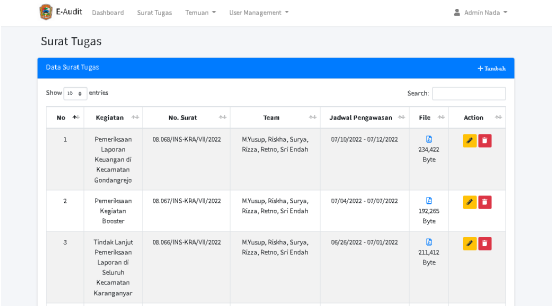


Figure 12. Assignment Letter Page

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Journal homepage: https://jurnal.stkippgritulungagung.ac.id/index.php/jipi
ISSN: 2540-8984
Vol. 9, No. 3, September 2024, Pp. 1395-1407

3) Form Page Submit Audit Findings By Members

The assignment letter number, activity, audit finding number, audit title, condition, criterion, and cause and effect are all shown on the form page, where members can submit their audit findings. The audit process's results are added to this page. The chairman, technical controller, and assistant responsible person levels can all conduct audits. A form for members to report their findings is shown in Figure 13.

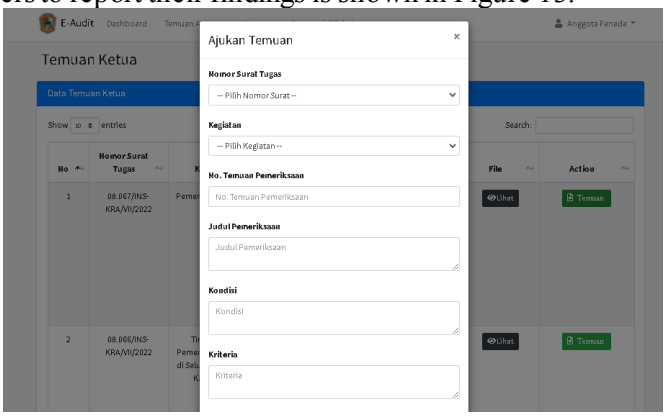


Figure 13. Pages of the Form for Submitting Findings by Members

4) Audit Results Discovery Page to the Chairman

The chairman's page for the discovery of audit findings presents information on audit findings that members have provided. The information on this page includes assignment letter numbers, activities, audit finding numbers, audit titles, members who submit findings, audit filing dates, and actions such as 'view' to see all data, 'accept' to receive reports so that the member's findings are then forwarded to the technical controller, and 'reject' to reject the report so that the member must submit the findings again. Figure 14 shows a discovery that was entered into the chairman.

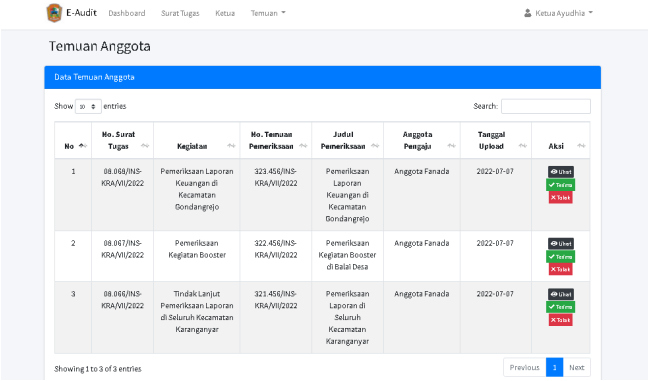


Figure 14. Audit Results Discovery Page to the Chairman

5) Audit Findings Accepted By Technical Controller page

The audit findings page received by the technical controller displays a record of the audit findings that have been received. The data on this page consists of assignment letter numbers, activities, audit finding numbers, audit titles, members who submit findings, audit filing dates, and actions which include 'view' to view complete data and 'share' to share or forward the findings to the assistant responsible. Figure 15 is an invention drawing accepted by the technical controller.

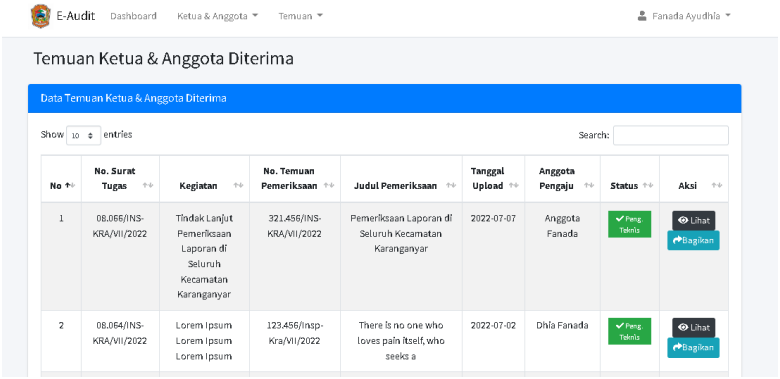


Figure 15. Discovery Page Received By Technical Controller

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Journal homepage: https://jurnal.stkippgritulungagung.ac.id/index.php/jipi
ISSN: 2540-8984
Vol. 9, No. 3, September 2024, Pp. 1395-1407

6) Page of Audit Findings Rejected by the Assistant Responsible

The audit findings page that was rejected by the assistant responsible displays a data from the audit findings that have been rejected. The data on this page consists of assignment letter numbers, activities, audit findings numbers, audit titles, members who submit findings, audit filing dates, actions which include 'view' to see complete data and 'findings' to edit which part which still needs to be revised, as well as data on reasons for rejection. Figure 16 is an image of the discovery being rejected by the assistant responsible.

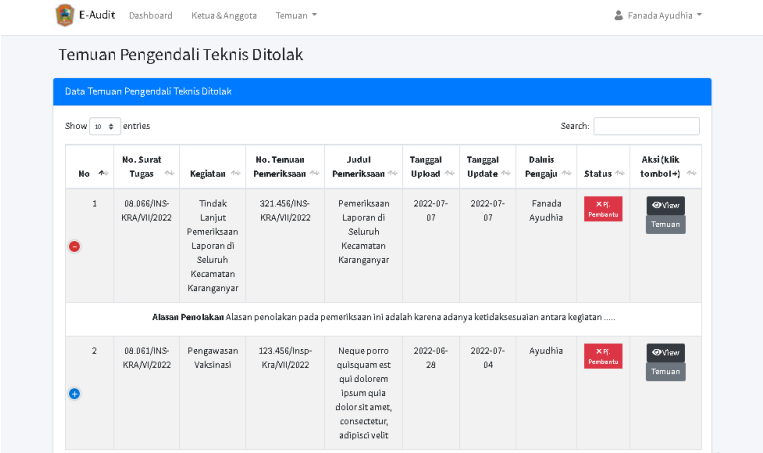


Figure 16. Discovery Page Rejected by Assistant Responsible

7) NHP Print Final Report Data Page

The NHP print final report data page displays a final data that has been corrected by the assistant responsible person. The data on this page consists of the assignment letter number, activity, audit finding number, audit title, audit filing date, status regarding the report received by the assistant responsible person, actions which include 'view' to view complete data and 'print' includes print in order to print the final report of the audit. Figure 17 is an image of the NHP final print report data.

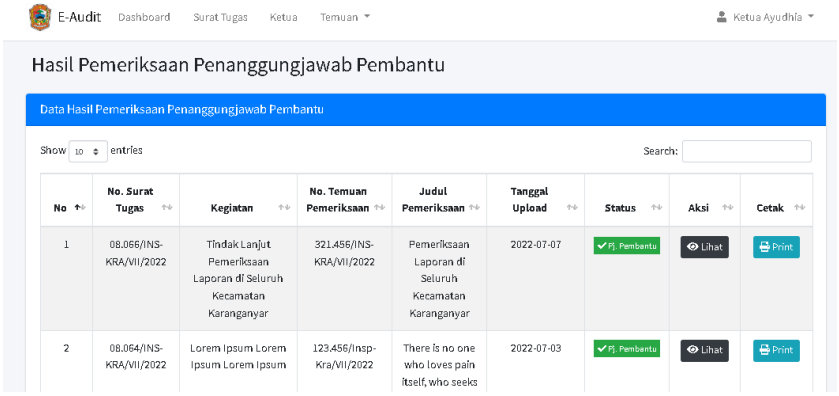


Figure 17. NHP Print Final Report Data Page

8) NHP Report Print Page

The printed page of the NHP report is the end of the process in this system, which is to see the final results of an audit, which will later be asked for approval from the leadership. The data on this page consists of location, day, date, month, year, number of audit findings, audit title, conditions, criteria, causes and consequences of audit findings, as well as the real name of the head of the inspectorate. NHP report print page, shown in Figure 18.

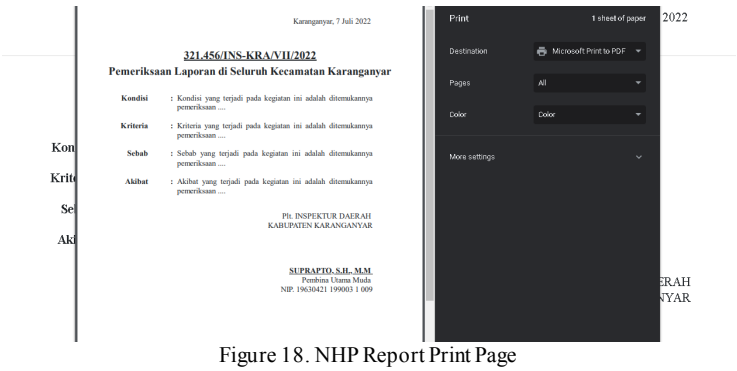


Figure 18. NHP Report Print Page

JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)
Journal homepage: https://jurnal.stkippgritulungagung.ac.id/index.php/jipi
ISSN: 2540-8984
Vol. 9, No. 3, September 2024, Pp. 1395-1407

B. Discussion

1) Black Box Testing

Black Box testing in software engineering is a method of testing that focuses on verifying the functionality and correctness of a program without knowledge of its internal workings. Testers treat the program as a "black box," examining its external behavior and inputs without needing to know its internal code or structure [40].

In the context of the supervisory management information system, black box testing is being used to ensure that all system features are functioning correctly and fulfilling their intended roles [41]. Employees of the Inspektorat Daerah Kabupaten Karanganyar participated in the black box testing process. The results of the black box testing are presented in Table 3, providing valuable insights into the system's performance and usability. This testing approach helps identify any issues or discrepancies in the system's behavior and functionality, contributing to the overall quality and reliability of the system.

Table 3. Result of Black box Testing

Num.	Testing	Test Case	Output	Valid
1	Multilevel User Login	a) Press the Login button.	Displays the Login page.	Valid
		b) Enter the User Level, Username and Password correctly according to the position.	System Login successfully.	Valid
		c) Enter the wrong User Level, Username and Password.	The system fails to Login, and displays a Login error notification. Then, the system clears the login form.	Valid
2	Logout	Press the Logout button.	System Logout successfully.	Valid
3	Assignment Letter (Activity, Letter Number, Audit Team, Execution Date, and Assignment Order File)	a) Add assignment letter data.	Assignment letter data successfully stored in the database.	Valid
		b) Edit assignment letter data.	Assignment letter data in the database has been successfully changed.	
		c) Deleting assignment letter data.	Assignment letter data in the database was successfully deleted.	
4	Submission of Audit Findings by the Chairman (Conditions, Criteria, Causes, Effects, Information)	a) Adding data on audit findings by the chairman.	Data audit findings successfully stored in the database.	Valid
		b) Editing the audit findings data by the chairman.	The audit findings data in the database has been successfully changed.	
		c) Deleting data on audit findings by the chairman.	Audit findings data in the database was successfully deleted.	
5	Submission of Audit Findings or Revisions by Members (Audit Finding Number, Audit Title, Condition, Criteria, Cause, Effect)	a) Add data to audit findings or revisions.	Data audit findings successfully stored in the database.	Valid
		b) Edit data on audit findings or revisions.	The audit findings data in the database has been successfully changed.	
		c) Delete data on audit findings or revisions.	Audit findings data in the database was successfully deleted.	
6	Submission of Audit Findings or Revisions by Technical Controller (Audit Finding Number, Audit Title, Condition, Criteria, Cause, Effect)	a) Add data to audit findings or revisions.	Data audit findings successfully stored in the database.	Valid
		b) Edit data on audit findings or revisions.	The audit findings data in the database has been successfully changed.	
		c) Delete data on audit findings or revisions.	Audit findings data in the database was successfully deleted.	
7	Audit Findings on the Chairman, Technical Controller, and Assistant Responsible	a) Choose the audit discovery menu.	Displays data on audit findings.	Valid
		b) Press the accept button.	Data audit findings successfully received.	
		c) Press the reject button and click edit/revise to provide reasons for audit rejection.	Audit findings data was successfully rejected.	
8	Audit Findings Accepted	Select the Accepted Audit Findings menu.	Displays the Accepted Audit Findings page.	Valid
9	Audit Findings Rejected	a) Select the Rejected Audit Findings menu.	Displays the Audit Findings Rejected page.	Valid
		b) Press the audit findings/revisions button		
10	NHP report	Press the print button	Print NHP final report.	Valid

Based on the test findings presented in Table 3, it is evident that all functions of the supervisory management information system are operating as intended. The successful outcome of the testing indicates that the system meets all its menu criteria and fulfills the specified functional requirements.

The fact that the system's functions are working correctly and meeting their intended objectives demonstrates the success of the supervisory management information system. The system's capability to address the identified issues and deliver the desired features contributes to its overall effectiveness and usability, making it a valuable tool for the Inspektorat Daerah Kabupaten Karanganyar in monitoring and managing audit processes.

2) System Usability Scale (SUS) Testing

The System Usability Scale [42] is one of the techniques used to assess the usefulness of a system. During the testing phase, questionnaires with 10 questions were distributed to end users to gather their feedback and assessments on the system's usability.

Given the importance of usability in government websites [43], this testing stage involved distributing 10 questionnaires to 36 workers of the Inspektorat Daerah Kabupaten Karanganyar. The objective was to determine the level of user comfort and efficiency while utilizing the supervisory management information system.

The survey findings were processed by scoring the responses on a scale, where odd-numbered questions reduced the score by 1, and even-numbered questions reduced the score by 5. The total score was then calculated by multiplying the sum of the 10 questions by 2.5. The average usability score was determined by dividing the total score by the number of respondents, providing valuable insights into how well users perceived and interacted with the system. After calculating the average value, make a comparison using the System Usability Scale (SUS) value interpretation as shown in Figure 19 [44].

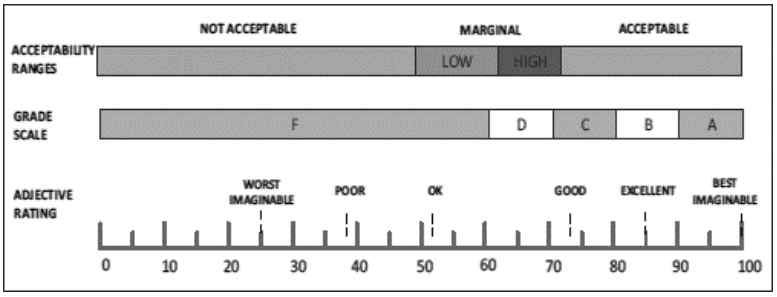


Figure 19. Determination of SUS Assessment Results

Based on test calculations using the System Usability Scale (SUS), the graphic calculation in Figure 20 shows that the 36 respondents had results with varying scores. In the score range of 50-59, there were 8% of respondents; 60-69, there are 28% of respondents; 70-79, there are 34% of respondents; 80-89, there are 26% of respondents; and 90-100, there are 4% of respondents. So the supervisory management information system obtained an average score of 71.86.

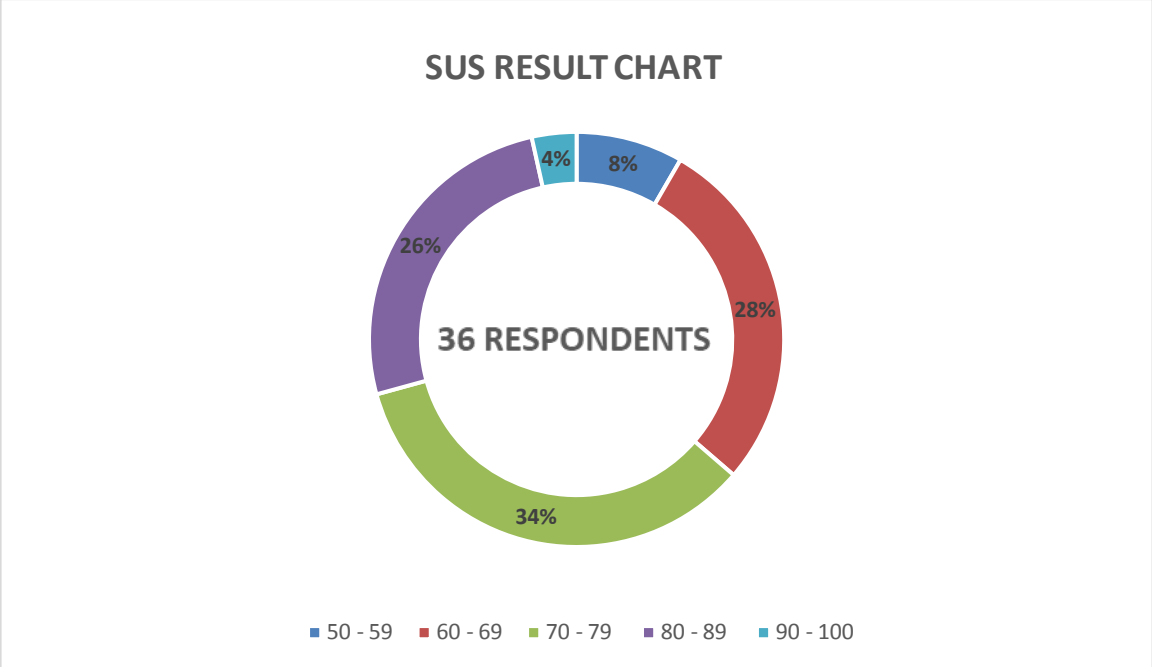


Figure 20. SUS Result Chart

It can be concluded from Figure 19, that the average score is in the "C" or "GOOD" category, which indicates that the system has been well received by users.. This positive evaluation of the system's usability suggests that it meets user expectations and provides a satisfactory user experience. The system's "GOOD" rating signifies

that it effectively fulfills its intended purpose and offers a user-friendly interface, contributing to its potential for successful implementation and user adoption within the Inspektorat Daerah Kabupaten Karanganyar.

The research we conducted succeeded in implementing a supervisory management information system that facilitated the performance of employees at the Inspektorat Daerah Kabupaten Karanganyar. References from research conducted by Putri et al. [13] and Setyaningsih et al. [14] form a strong foundation for our research methods. By referring to the two studies, we can design a system that fits the needs and successfully fulfills the research objectives.

IV. CONCLUSION

The completion of the system development project for the Inspektorat Daerah Kabupaten Karanganyar has resulted in the successful implementation of a website-based internal supervision management information system. This system facilitates efficient reporting of audit findings by employees, eliminating the need for individual submissions to the auditor's room. Black box testing has confirmed the proper functioning of all features, leading to a commendable average SUS score of 71.86, indicating a "GOOD" rating and user satisfaction. The implications of this system include improved time and personnel efficiency, transparent audit-related information, real-time monitoring, and enhanced post-audit planning. Despite its success, suggestions for improvement include refining the login process and incorporating additional features to align with technological advancements and user needs. In conclusion, the system has proven effective but holds potential for further enhancements to meet evolving requirements.

ACKNOWLEDGMENT

Praise the authors and pray to the presence of Allah SWT. for all the grace so that this research has be successfully completed. Many thanks to the professors at Universitas Muhammadiyah Surakarta who tested this method and the Inspektorat Daerah Kabupaten Karanganyar who made it possible for the study data to be collected. Also acknowledged are the members of the JIPI team who contributed to the publication of this journal. Hopefully, by sharing this journal it can be of good use to others and can be used for further research.

REFERENCES

[1] G. A. C. Rompas[1], B. . Tewal, and L. O. H. Dotulong, "PENGARUH GAYA KEPEMIMPINAN, PENGAWASAN, DAN DISIPLIN KERJA TERHADAP KINERJA PEGAWAI PADA DINAS PERHUBUNGAN KABUPATEN MINAHASA TENGGARA," *J. EMBA J. Ris. Ekon. Manajemen, Bisnis dan Akunt.*, vol. 6, no. 4, Oct. 2018, doi: 10.35794/EMBA.V6I4.20919.

[2] P. Bhagawati, "Websites and social media technologies as implements of E-Governance: A study of North East India," *Indian J. Sci. Technol.*, vol. 13, no. 31, pp. 3188–3197, Aug. 2020, doi: 10.17485/IJST/V13I31.1016.

[3] E. Pawan, R. H. . Thamrin, P. Hasan, S. H. Y. Bei, and P. Matu, "Using Waterfall Method to Design Information System of SPMI STIMIK Sepuluh Nopember Jayapura," *Int. J. Comput. Inf. Syst.*, vol. 2, no. 2, pp. 34–39, May 2021, doi: 10.29040/IJCIS.V2I2.29.

[4] R. B. Walde and A. K. Yadav, "Blockchain Technology for e-Government," *Int. J. Res. Appl. Sci. Eng. Technol.*, vol. 10, no. 8, pp. 1698–1703, Aug. 2022, doi: 10.22214/IJRASET.2022.46487.

[5] B. M. MULYO, "IMPLEMENTATION OF MANAGEMENT INFORMATION SYSTEM WEBSITE-BASED LETTER ARCHIVES," *J. Electr. Eng. Comput. Sci. VOL 6 NUMBER 1, JUNE 2021*, vol. 6, no. 1, pp. 963–968, 2021, Accessed: Oct. 23, 2021. [Online]. Available: https://jeecs.ubhara.ac.id/index.php/JeecsV6N1/article/view/184

[6] M. A. Londa, Y. A. Wee, and M. Radja, "Implementasi Sistem Informasi Monitoring Disposisi Surat Masuk dan Surat Keluar Berbasis Website," *MATRIK J. Manajemen, Tek. Inform. dan Rekayasa Komput.*, vol. 21, no. 2, pp. 379–388, 2022, doi: 10.30812/matrik.v21i2.1443.

[7] R. E. D. Ramadhana and A. Fatmawati, "Sistem Informasi Manajemen Keuangan Di Pondok Pesantren Adh-Dhuha," *J. Tek. Inform.*, vol. 1, no. 2, pp. 93–99, 2020, doi: 10.20884/1.jutif.2020.1.2.20.

[8] R. Lerdorf and K. Tatroe, *Programming PHP*. O'Reilly Media, Incorporated, 2002. [Online]. Available: https://books.google.co.id/books?id=7OjvOmol3CcC

[9] J. Duckett, *PHP & MySQL: Server-side Web Development*. Wiley, 2022. [Online]. Available: https://books.google.co.id/books?id=Z4ShuQEACAAJ

[10] T. Koerniawati and A. J. Gundo, *IMPLEMENTASI TEKNOLOGI WORDPRESS UNTUK PEMBANGUNAN WEBSITE*. Uwais Inspirasi Indonesia, 2023. [Online]. Available: https://books.google.co.id/books?id=xXGwEAAAQBAJ

[11] A. Abdul Wahid Sekolah Tinggi Manajemen Informatika dan Komputer Sumedang, "Analisis Metode Waterfall Untuk Pengembangan Sistem Informasi", Accessed: Feb. 15, 2024. [Online]. Available: https://www.researchgate.net/publication/346397070

[12] H. Gomaa, *Software Modeling and Design: UML, Use Cases, Patterns, and Software Architectures*. Cambridge University Press, 2011. [Online]. Available: https://books.google.co.id/books?id=TqZi-hAX17YC

[13] M. P. Putri and B. Bobby, "Sistem Informasi Manajemen Proyek PT. Samudera Perkasa Konstruksi Berbasis Web," *MATRIK J. Manajemen, Tek. Inform. dan Rekayasa Komput.*, vol. 20, no. 1, pp. 85–96, Sep. 2020, doi: 10.30812/MATRIK.V20I1.716.

[14] G. Setyaningsih, H. Fitra, H. Karomatunnisa, and P. Pandanarum, "Aplikasi Monitoring Laporan Aduan Masyarakat pada Desa Kedunggede Kecamatan Lumbir," *MATRIK J. Manajemen, Tek. Inform. dan Rekayasa Komput.*, vol. 20, no. 1, pp. 183–192, Sep. 2020, doi: 10.30812/MATRIK.V20I1.829.

[15] N. Ria Letuna and M. A. Ineke Pakereng, "PENGEMBANGAN APLIKASI SISTEM INFORMASI MONITORING DAN EVALUASI STUNTING BERBASIS ANDROID (STUDI KASUS: KABUPATEN TIMOR TENGAH SELATAN)," *JIPI (Jurnal Ilm. Penelit. dan Pembelajaran Inform.*, vol. 8, no. 4, pp. 1339–1350, Nov. 2023, doi: 10.29100/jipi.v8i4.4135.

[16] N. Ismail, M. H. A. Wahab, W. N. A. A. W. M. Asri, and H. Azmi, "HARMONIZATION OF LINEAR-SEQUENTIAL LIFE CYCLE AND USE CASE DIAGRAM AS DEVELOPING MODELS OF E-TAHFIZ SYSTEM," *Int. J. Adv. Comput. Syst. Softw. Eng.*, vol. 2, no. 2, pp. 1–7, Apr.

2021, Accessed: Oct. 23, 2021. [Online]. Available: https://journal.scientiaca.org/index.php/ijacsse/article/view/200
[17] K. Anam, B. Asyhar, K. Saddhono, and B. W. Setyawan, "E-SIP: Website-based scheduling information system to increase the effectivity of lecturer's performance and learning process," *Ing. des Syst. d'Information*, vol. 26, no. 3, pp. 265–273, 2021, doi: 10.18280/ISI.260303.
[18] N. B. Naseri and N. Nurgiyatna, "Sistem Informasi Pemesanan Makanan Berbasis Client Server di Kopi We Salatiga," *JITU J. Inform. Technol. Commun.*, vol. 5, no. 1, pp. 1–12, 2021, doi: 10.36596/jitu.v5i1.497.
[19] G. T. Kurniaji, M. F. E. 'Ammar, and Y. S. Nugroho, "The Development of UMS Building Catalogue Information System," *Ultim. J. Tek. Inform.*, vol. 14, no. 1, pp. 13–19, Jul. 2022, doi: 10.31937/TI.V14I1.2525.
[20] M. V. Al Hasri and E. Sudarmilah, "Sistem Informasi Pelayanan Administrasi Kependudukan Berbasis Website Kelurahan Banaran," *MATRIK J. Manajemen, Tek. Inform. dan Rekayasa Komput.*, vol. 20, no. 2, pp. 249–260, 2021, doi: 10.30812/matrik.v20i2.1056.
[21] R. P. M. D. Labib, S. Hadi, and P. D. Widayaka, "Low Cost System for Face Mask Detection Based Haar Cascade Classifier Method," *MATRIK J. Manajemen, Tek. Inform. dan Rekayasa Komput.*, vol. 21, no. 1, pp. 21–30, Nov. 2021, doi: 10.30812/MATRIK.V21I1.1187.
[22] R. Reuter, T. Stark, Y. Sedelmaier, D. Landes, J. Mottok, and C. Wolff, "Insights in students' problems during UML modeling," in *2020 IEEE Global Engineering Education Conference (EDUCON)*, 2020, pp. 592–600. doi: 10.1109/EDUCON45650.2020.9125110.
[23] A. N. Afif, F. Noviyanto, S. Sunardi, S. A. Akbar, and E. Aribowo, "Integrated application for automatic schedule-based distribution and monitoring of irrigation by applying the waterfall model process," *Bull. Electr. Eng. Informatics*, vol. 9, no. 1, pp. 420–426, Feb. 2020, Accessed: Oct. 24, 2021. [Online]. Available: https://beei.org/index.php/EEI/article/view/1368
[24] K. Košťál, P. Helebrandt, M. Belluš, M. Ries, and I. Kotuliak, "Management and Monitoring of IoT Devices Using Blockchain," *Sensors 2019, Vol. 19, Page 856*, vol. 19, no. 4, p. 856, Feb. 2019, doi: 10.3390/S19040856.
[25] F. Chahyadi, A. Mahargarika, E. Suswaini, M. Raja Ali Haji, and J. Politeknik Senggarang, "Absensi Daring Berbasis Android Mengunakan Real-Time Token dan Berbasis Lokasi," *J. Sustain. J. Has. Penelit. dan Ind. Terap.*, vol. 10, no. 2, pp. 53–58, Nov. 2021, doi: 10.31629/SUSTAINABLE.V10I2.3663.
[26] U. Rahardja, Q. Aini, M. D. A. Ngadi, M. Hardini, and F. P. Oganda, "The blockchain manifesto," in *2020 2nd International Conference on Cybernetics and Intelligent System (ICORIS)*, 2020, pp. 1–5. doi: 10.1109/ICORIS50180.2020.9320798.
[27] P. I. Meuthia, L. W. Suwarsono, and A. N. Aisha, "Perancangan Blueprint Sistem Informasi Mekanisme Kinerja Bidang Penunjang Dosen Berdasarkan Tel-U POINT Di Fakultas Rekayasa Industri Universitas Telkom Menggunakan Waterfall Model," *InfoTekJar (Jurnal Nas. Inform. dan Teknol. Jaringan)*, vol. 4, no. 1, pp. 126–132, 2019, doi: 10.30743/infotekjar.v4i1.1585.
[28] M. M. HIDAYAT, M. N. HAMIDAH, and R. W. PRASTYAWAN, "DECISION SUPPORT SYSTEM FOR SELECTING ORDER TYPES USING THE SAW-AHP METHOD," *J. Electr. Eng. Comput. Sci. VOL 5 NUMBER 2, DEC 2020*, vol. 5, no. 2, 2020, Accessed: Apr. 19, 2023. [Online]. Available: https://jeecs.ubhara.ac.id/index.php/JeecsV5N2/article/view/176
[29] S. S. K. Ramanathan, R. F. K. Basha, and A. Banu, "A novel face recognition technology to enhance health and safety measures in hospitals using SBC in pandemic prone areas," *Mater. Today Proc.*, vol. 45, pp. 2584–2588, 2021, doi: 10.1016/j.matpr.2020.11.336.
[30] A. Del Sole, *Visual Studio Code Distilled*. 2021. doi: 10.1007/978-1-4842-6901-5.
[31] P. Li, W. Meng, K. Lu, and C. Luo, "On the feasibility of automated built-in function modeling for PHP symbolic execution," *Web Conf. 2021 - Proc. World Wide Web Conf. WWW 2021*, pp. 58–69, 2021, doi: 10.1145/3442381.3450002.
[32] S. Prykhodko, I. Shutko, and A. Prykhodko, "Early Size Estimation of Web Apps Created Using Codeigniter Framework By Nonlinear Regression Models," *Radioelectron. Comput. Syst.*, vol. 2022, no. 3, pp. 84–94, 2022, doi: 10.32620/reks.2022.3.06.
[33] D. Hariyanto *et al.*, "WATERFALL METHOD IN WEBSITE-BASED MOTORCYCLE RENT INFORMATION SYSTEM DESIGN AND SERVICES," *J. Teknol. Inf. Univ. Lambung Mangkurat*, vol. 7, no. 1, pp. 63–68, Apr. 2022, doi: 10.20527/JTIULM.V7I1.119.
[34] B. Soewito, F. E. Gunawan, and I. P. Rusli, "The use of android smart phones as a tool for absences," *Procedia Comput. Sci.*, vol. 157, pp. 238–246, Jan. 2019, doi: 10.1016/J.PROCS.2019.08.163.
[35] R. J. Holden, "A Simplified System Usability Scale (SUS) for Cognitively Impaired and Older Adults," *Proc. Int. Symp. Hum. Factors Ergon. Heal. Care*, vol. 9, no. 1, pp. 180–182, 2020, doi: 10.1177/2327857920091021.
[36] E. Viglianisi, M. Dallago, and M. Ceccato, "RESTTESTGEN: Automated Black-Box Testing of RESTful APIs," *Proc. - 2020 IEEE 13th Int. Conf. Softw. Testing, Verif. Validation, ICST 2020*, pp. 142–152, 2020, doi: 10.1109/ICST46399.2020.00024.
[37] M. Mol *et al.*, "Dimensionality of the system usability scale among professionals using internet-based interventions for depression: A confirmatory factor analysis," *BMC Psychiatry*, vol. 20, no. 1, pp. 1–10, 2020, doi: 10.1186/s12888-020-02627-8.
[38] K. Septyanto, M. A. Hamid, and D. Aribowo, "Pengembangan E-Learning Berbasis Website Menggunakan Metode Waterfall," *ELINVO(Electronics, Informatics, Vocat. Educ.*, vol. 5, no. 1, pp. 89–101, 2020, doi: 10.21831/elinvo.v5i1.31054.
[39] S. Herawati, Y. D. P. Negara, H. F. Febriansyah, and D. A. Fatah, "Application of the Waterfall Method on a Web-Based Job Training Management Information System at Trunojoyo University Madura," *E3S Web Conf.*, vol. 328, p. 04026, 2021, doi: 10.1051/e3sconf/202132804026.
[40] B. H. Rambe *et al.*, "UML Modeling and Black Box Testing Methods in the School Payment Information System," *J. Mantik*, vol. 4, no. 3, pp. 1634–1640, Nov. 2020, doi: 10.35335/MANTIK.VOL4.2020.969.PP1634-1640.
[41] W. N. Fadhilah and M. Maryam, "Development of Library Information System Web-based of SMA Negeri 1 Mojolaban Sukoharjo," *Emit. J. Tek. Elektro*, vol. 21, no. 2, pp. 78–86, Aug. 2021, doi: 10.23917/EMITOR.V21I2.13719.
[42] N. C. Wibowo, T. L. M. Suryanto, M. Billah, and F. Annas, "Evaluating the Usability of Virtual Tour Application Using the System Usability Scale (SUS) Method," *IJCONSIST JOURNALS*, vol. 3, no. 2, pp. 1–7, Jun. 2022, doi: 10.33005/IJCONSIST.V3I2.65.
[43] A. Ilyas, S. H. Wajid, and A. Muhammad, "Usability Evaluation of E-Government Website: A Use of System Usability Scale," *Pakistan J. Eng. Technol.*, vol. 5, no. 1, pp. 11–15, Mar. 2022, doi: 10.51846/VOL5ISS1PP11-15.
[44] B. H. Harjono and N. Setiyawati, "EVALUASI VALUE PROPOSITION DAN PERCEIVED VALUE APLIKASI E-WALLET MENGGUNAKAN UX HONEYCOMB, UX QUESTIONNAIRE, DAN SYSTEM USABILITY SCALE (STUDI KASUS: OVO, DANA, DAN SHOPEEPAY)," *JIPI (Jurnal Ilm. Penelit. dan Pembelajaran Inform.*, vol. 7, no. 3, pp. 969–980, Aug. 2022, doi: 10.29100/JIPI.V7I3.3159.G1347.