Journal of Information System and Technology Research

journal homepage: https://journal.aira.or.id/index.php/jistr/

Development of a Church Asset Management System with an Agile Approach in the Pasundan Christian Church

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ARTICLE INFO

Article history:

Received Jun 20, 2025
Accepted Sept 9, 2025
Available online Sept 30, 2025

Keywords:

Church asset management
Web-based system
Agile Scrum
Non-profit IT systems
Black-box testing

ABSTRACT

The Manual asset management still used at the Pasundan Christian Church Kampung Sawah Congregation has led to various challenges, including recording errors, data duplication, and limited capabilities for real-time reporting and monitoring. This study aims to design and develop a web-based asset management information system to enhance accuracy, efficiency, and transparency in church asset administration. The system development process adopts the Agile methodology with a Scrum approach, enabling iterative and collaborative development between the development team and stakeholders. The Scrum method includes stages such as User Story, Product Backlog, Sprint, Sprint Backlog, and Daily Scrum. The system is web-based, developed using PHP as the programming language and MySQL as the database. The framework used is PHP. The system comprises 14 core features, including asset recording, modification, deletion, search, printing, and management of asset borrowing and returning. Three types of users are identified: the Household Commission as the primary administrator, the Church Council as borrowers, and the Pastor as a passive user. Testing was conducted using the black-box method to evaluate the performance of each feature. The results show that all 14 features (100%) functioned as expected. Overall, the system successfully improves reliability and transparency in asset management and supports a more organized and efficient organizational service.

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1. INTRODUCTION

Asset management is a crucial element in maintaining operational sustainability and efficiency, including within non-profit institutions such as churches [1][2]. Effective asset management practices encompass not only accurate data recording but also systematic and timely monitoring, maintenance, and reporting [3]. However, in reality, many churches still rely on manual methods such as using Microsoft Excel and handwritten records, which present limitations in data integration, are prone to input errors and duplication, and do not support real-time reporting.

At Pasundan Christian Church Kampung Sawah Congregation, this manual approach has led to various issues, including data loss, input errors, duplicated information, limited asset tracking capabilities, and difficulties in generating accurate and timely reports. These challenges directly impact transparency and accountability in the church's asset management.

To address these issues, this study aims to design and develop a web-based asset management information system to replace the existing manual procedures. The uniqueness of this study lies in the application of the Scrum methodology an Agile approach that emphasizes iterative development, team collaboration, and continuous improvement. Implementing Scrum within a church context is an innovative approach, as it introduces an adaptive and structured framework for system development, which is rarely utilized in religious organizations.

Through the adoption of Scrum, the system is expected to enhance asset tracking accuracy, accelerate reporting processes, reduce operational errors, and improve user satisfaction. Overall, the system aims to support a more professional, efficient, and organized approach to church asset management.

The study's significant contribution lies in its focus on building an asset management information system tailored to the context of religious non-profit organizations an area that remains underexplored in information technology research [4]. This study also offers a practical contribution by helping churches address operational challenges through an inclusive and user-friendly technology solution [5].

A key innovation in this research is the adoption of the Scrum methodology, part of the Agile framework, for system development [6][7]. Scrum was chosen for its support of iterative and collaborative processes, enabling continuous involvement of stakeholders at each development stage [8][9]. This approach ensures that the system aligns closely with user needs, remains adaptable to change, and can be enhanced progressively over time [10].

This study enhances the academic foundation by referencing prior research on asset management information systems, including web and Android-based applications for inventory and lost item reporting using the Waterfall method [11], systems developed with the Spiral model [12], and graphical-based approaches utilizing RUP [13]. Several studies also critique the limitations of Excel in managing projects and assets [14]15][16], while others explore the use of modern frameworks such as Laravel and Extreme Programming (XP) to improve operational efficiency 17][18].

However, to strengthen the relevance of this review, greater emphasis is placed on research specific to asset management in non-profit organizations, particularly those that adopt Agile methodologies to address dynamic operational needs and stakeholder collaboration. The system developed in this study focuses on core features such as item addition, editing, deletion, printing, categorization, and asset borrowing management. User roles are clearly defined: the Budget Committee or Facilities Commission (KRT) acts as the main administrator with full control over asset allocation; congregation members serve as borrowers with limited access; and pastors function as passive users with viewing rights only.

2. RESEARCH METHOD

2.1 Data Collection Methods, Research Instruments, and Testing Methods

This research employs a qualitative approach aimed at gaining an in-depth understanding of the development of a web-based asset management system. Qualitative research is a systematic approach to exploring social and cultural phenomena in depth [19].The researcher chose the qualitative approach to delve into user experiences and needs regarding the implemented system. The results of this approach are derived from data collection activities, including interviews, observations, and literature studies.

This research employs the Agile methodology as a guide to achieve its defined objectives and outcomes. Agile is an approach consisting of several steps for analyzing and designing systems, and it does not hinder the development process [20]. Its primary goal is to enhance user satisfaction and accelerate implementation [21]. Agile is based on the principle of short development cycles, allowing developers to quickly adapt to changes. This approach is well-suited for research on designing a web-based asset management system, with the observation site located at Pasundan Christian Church Kampung Sawah Congregation.

One of the Agile methods adopted in this research is Scrum, which provides a development and management framework grounded in Agile principles. The implementation includes several key stages: Sprint Planning, which defines the goals and scope of each sprint; Daily Scrum, which monitors development progress regularly; Sprint Review, which evaluates the outcomes at the end of each sprint to gather feedback; and Sprint Retrospective, which improves the process based on lessons learned from previous sprints [22].

System development was carried out over three sprints, each lasting two weeks. The first sprint focused on requirements analysis and user interface design. The second sprint involved developing core asset management features and integrating the database. The third sprint was dedicated to system testing to ensure functionality and readiness for deployment [23][24].

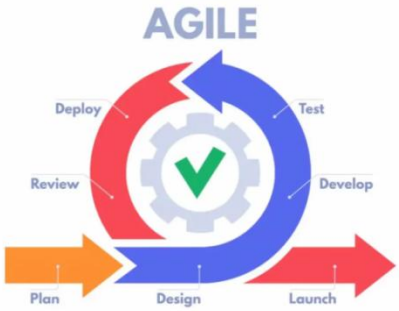

Figure 1. Agile Method

The black box method is used to test each feature of the website in software testing. It focuses on testing the software's functionality, allowing testers to evaluate how the system responds to various specific inputs in each form to determine whether it meets the planned specifications. The black box method is frequently used to test multiple aspects of software, including functionality, performance, and security [25].

Asset management is essential in organizations or companies for storing critical asset data, such as inventory items. Many organizations still rely on manual systems for various reasons, such as incomplete inventory data recording, inefficient asset check-in/out notifications, and frequent asset damage. Proper asset management can significantly improve productivity and efficiency [26]. Asset management refers to the administration of resources, including how assets are acquired, utilized, and eventually decommissioned. It plays a vital role in maintaining the continuity of asset inventory.

UML is a modeling language used to design, document, and describe software systems. UML includes four types of diagrams. A Use Case Diagram aims to visualize interaction relationships between the system and involved actors, such as admins and users [11]. An Activity Diagram serves to visualize the workflow within the system being developed [11]. A Sequence Diagram illustrates the interactions between objects in a system [27]. A Class Diagram describes the structure of a system by detailing each class, including its attributes and methods [27].

2.2 Research Stages

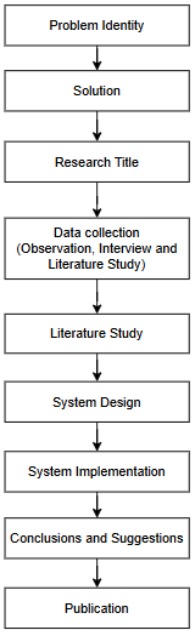

Figure 2. Research Stages

The figure above illustrates the research stages. Below is an explanation of each stage:

At the initial stage, the researcher identifies problems found at Gereja Kristen Pasundan. The focus is on issues in asset management, which is still done manually using Excel.

In the solution stage, the researcher examines the issues present in the manual system used at the observation site. To address these challenges, the researcher proposes a web-based system to improve the efficiency and effectiveness of the current asset management process.

In the research title stage, the researcher determines a research title that reflects the problems in the asset management system. The title selection is based on identifying the core issue within the system, with the goal of finding an effective solution through research.

In the Data Collection stage, the researcher collects data through observation, interviews, and literature studies to support the development of the asset management system design.

In the literature review stage, the researcher conducts a literature review to broaden understanding. This includes studying various aspects of system design and development using the Agile method with a Scrum approach. The literature review helps the researcher understand Scrum practices, Agile methodologies, and technologies suitable for asset management systems in a church context. It also plays a key role in helping the researcher design effective, efficient features that meet the church's asset needs.

In the system design phase, the researcher designs and develops a web-based asset management system for Gereja Kristen Pasundan Jemaat Kampung Sawah. The previous system relied on Excel, which was prone to errors and time-consuming. The new system includes a user-friendly interface for users such as elders and pastors and integrates essential features. The database schema is designed to store data efficiently and securely. The Agile method with a Scrum approach is

used to streamline the asset management development model. As a result, the system simplifies and organizes the church's asset management process more efficiently.

In the system implementation stage, the researcher implements the Church Asset Management System based on the previously developed design. This design is critical for building an effective system aligned with feedback and suggestions. After completing the design, the researcher continues with the coding process, building the website using Visual Studio and a suitable programming language. A system testing phase is conducted to ensure that the web-based asset management system functions properly and meets user needs.

At conclusion and suggestions stage, the researcher concludes that the design and development of the web-based asset management system have been successfully carried out according to plan. The system facilitates asset storage and provides borrowing and returning features accessible to elders and pastors at any time. The researcher also offers suggestions for further development, such as incorporating a communication system to enhance interaction among users.

In the publication stage, the researcher carries out the publication process. Due to the confidential nature of the assets, the asset management system is published locally—meaning access is limited to the church environment. Only the Budget Committee (KRT) as Admin, along with Elders and Pastors, are granted access.

3. RESULTS AND DISCUSSION

3.1 Use Case diagrams

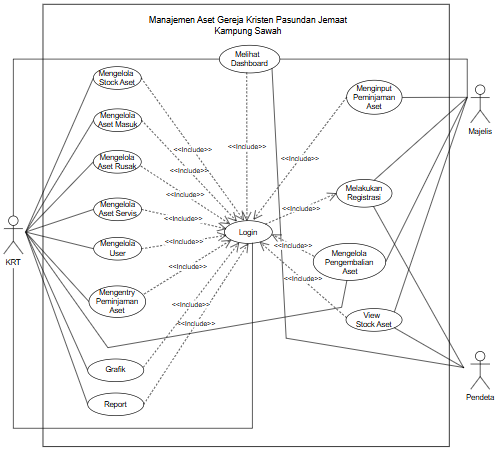

Figure 3. Use Case

The image above illustrates a web-based asset management system design modeled using a use case diagram involving three actors: the Budget Committee (KRT), Elders, and the Pastor. The KRT acts as the administrator responsible for managing assets, such as adding, editing, or deleting asset data. The Elders can view asset stock and borrow available assets. Meanwhile, the Pastor has limited access, which is restricted to checking asset availability only.

3.2 Class Diagram

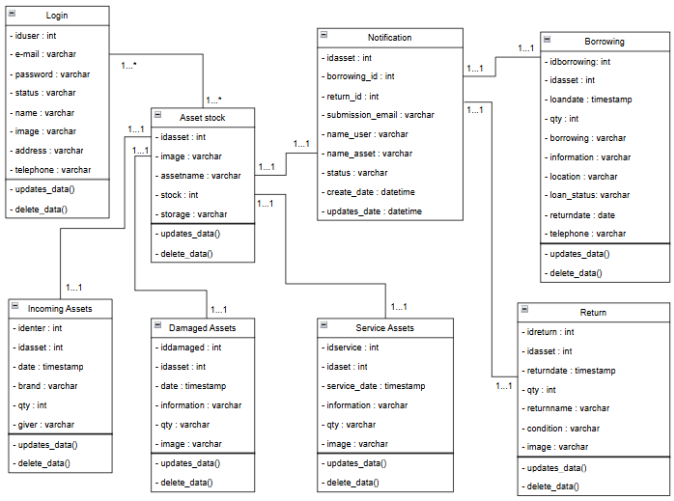

Figure 4. Class diagram

The image above is a web-based church asset management class diagram. Class diagrams are very important for asset management because they store asset data.

3.3 System Implementation and Output

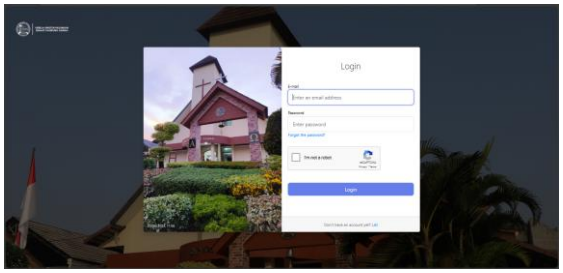

Figure 5. Login

The image above is the login system page created to enter the dashboard page. Before entering the dashboard page, the user creates an account first so that they can access the main menu, namely the dashboard. If you already have one, fill in your email address and password.

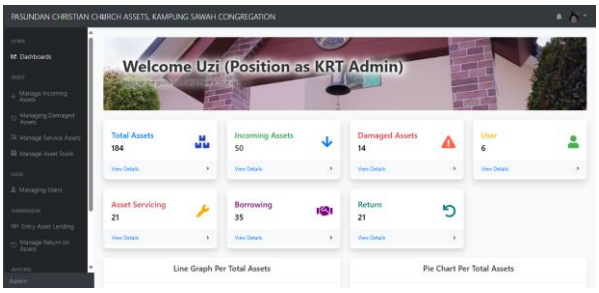

Figure 6. Dashboard page

The Dashboard displays a summary of assets and activities to make monitoring and navigation easier based on user roles.

Figure 7. Login Assets Page

The image above is the system page for managing incoming assets that come from outside such as donors or purchases. This system page can only be accessed by KRT as Admin. If an asset is given or purchased, the KRT fills in the data to be added to the currently available assets.

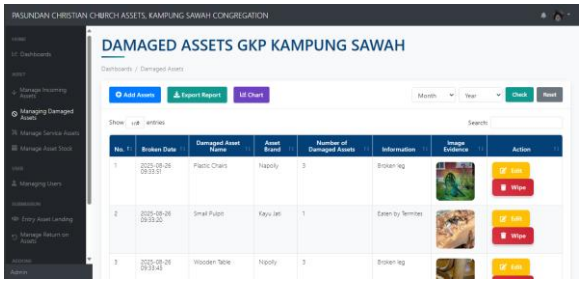

Figure 8. The Assets Page is Broken

The image above is the Damaged Assets system page. This page is used to record assets that are in poor condition, damaged, or unfit for use. If there are assets that are damaged or do not meet standards, KRT can report it via this page by including proof of damage.

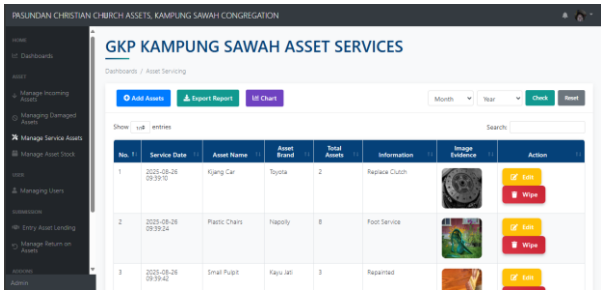

Figure 9. Service Assets Page

The image above shows the Service Asset System page. This system page is used to input the assets required for service when the issue is not considered serious. The Service Asset System page is managed by KRT as the administrator.

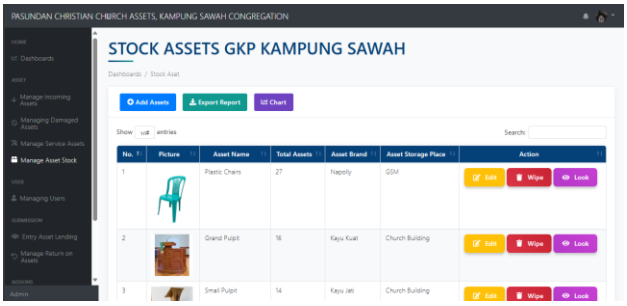

Figure 10. Asset Management Page

The asset management page displays complete asset data to monitor, record and manage inventory efficiently.

Figure 11. Asset Lending Page

The image above is the system page for inputting asset lending. This system is only used by the assembly. Before borrowing assets, the panel fills out an asset lending form. After filling it in, the panel waits for approval from the household head, whether the loan is allowed or not.

Figure 12. Return on Assets page

This page records asset returns, updates status, and ensures inventory condition and completeness.

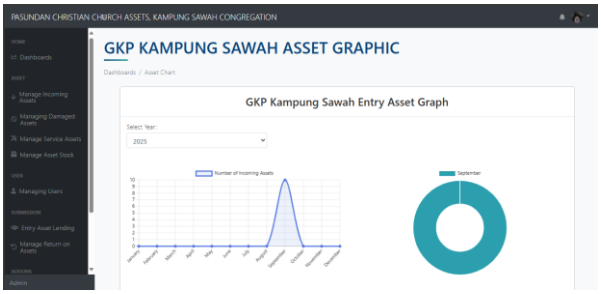

Figure 13. Chart

The image above is the asset graph system page. This graph can only be accessed by KRT as admin. fill in the graph, calculate the amount of available stock of assets, calculate the number of assets borrowed during the month and calculate incoming assets.

Figure 10. Report

The report page presents complete asset data that can be filtered, printed and exported as needed.

3.4 Black Box Asset Management System

Table 1. KRT Admin Black Box Asset Management System Testing Table

No	Menu	Process	Status
1	Login	Enter your email address and password	Succeed
2	Main page	User has successfully logged in. after that the system redirects to the main page	Succeed
3	Manage incoming assets	Fill in data on assets purchased or received from donors or congregations	Succeed
4	Manage damaged assets	Fill in asset data that is not suitable for use	Succeed
5	Manage service assets	Fill in asset data that requires service	Succeed
6	Manage asset stock	Fill in and check asset stock availability	Succeed
7	Managing Users	Fill in the user names to be able to access	Succeed
8	Entering Asset Loans	Inputting asset loan approval	Succeed
9	Manage return on assets	Check whether the assets are good or not	Succeed
10	Chart	View the asset availability graph	Succeed
11	Reports	View all assets and can be exported	Succeed
12	Log out	Exit the page and return to the login menu	Succeed

Table 2. Assembly Black Box Asset Management System Testing Table

No	Menu	Process	Status
1	Login	User enters email address and password	Succeed
2	Home Page	User has successfully logged in. after that the system redirects to the main page	Succeed
3	View asset stock	See the availability of asset stock to borrow	Succeed
4	Asset Loan Application	Fill in data on borrowing assets for religious purposes	Succeed
5	Submission of Asset Return	Fill in data on the return of assets that have been used for worship	Succeed
6	Log out	Exit the page and enter the login page	Succeed

Table 3. Pastor's Black Box Asset Management System Testing Table

No	Menu	Process	Status
1	Login	User enters email address and password	Succeed
2	Home Page	User has successfully logged in. after that the system redirects to the main page	Succeed
3	View asset stock	View asset stock availability	Succeed
4	Log out	Exit the page and enter the login page	Succeed

4. CONCLUSION

Researchers have successfully designed and developed a web-based asset management information system for Gereja Kristen Pasundan Jemaat Kampung Sawah using the Agile development methodology (Scrum). This system was created to address issues in asset management that were previously handled manually using Microsoft Excel, which was prone to data duplication, input errors, and limited reporting capabilities. The developed system includes 14 core features, covering functions such as recording, editing, deleting, searching, printing, and managing asset loans and returns. Functional testing using the black-box method showed a 100% success rate, with all 14 features operating optimally. The system has proven effective in enhancing operational efficiency, data accuracy, and transparency in asset management processes. With the implementation of this system, church asset governance is expected to become more structured, accountable, and supportive of more professional service delivery. The researchers hope that the web-based asset management system adopted by Gereja Kristen Pasundan Jemaat Kampung Sawah will continue to be developed sustainably. Future enhancements are expected to refine the current system and open opportunities for adding new features tailored to the church's organizational needs. As asset management becomes increasingly organized and efficient with support from the church and improvements in technical capabilities the web based asset management system has the potential to become a strategic tool for realizing transparent and responsible governance, ultimately supporting optimal ministry services.

5. ACKNOWLEDGEMENTS

The author, E.C.P., extends heartfelt gratitude to all parties who have supported and assisted in the preparation of this research. Sincere thanks are conveyed to Mrs. Bias Yulisa Geni, S.Kom., M.Kom., as the academic advisor, for her patience, guidance, direction, and invaluable feedback throughout the research process. The author also expresses appreciation to the Gereja Kristen Pasundan Jemaat Kampung Sawah for their cooperation and willingness to serve as the research subject. Furthermore, the author is deeply grateful to family and friends who have continuously provided moral support and motivation. It is hoped that this work will offer meaningful benefits and serve as a positive contribution to the development of information systems, particularly in the field of digital asset management.

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