



Enhancement Campus Office Supplies Requests Website Utilizing Rapid Application Development

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Abstract

The web-based office supplies requisition application is a significant step in modernizing office equipment procurement in various organizations, including universities. However, this website encounters problems due to immature planning and less effective implementation. The current website faces some problems with requesting office supplies on campus, where the current process lacks efficiency and transparency in the status of user requests. It often results in discrepancies between the registered stock of office supplies and the actual stock in the warehouse. Our research aims to improve this website using the Rapid Application Development methodology. We also include user feedback when designing this website. The result is a new web-based application that provides a much better user experience when requesting office supplies. This update is expected to increase the efficiency of office equipment request services, provide users with more transparent request status information, and ensure accurate stock availability.

Keywords: Campus Application, Office Supplies Request, User Experience, Website Enhancement.

1. INTRODUCTION

Web-based office supply requests are one of the computerization efforts in the procurement process for office supplies in various organizations, including universities. Implementing computerization in office supplies requests can make it easier for institutions to manage the request website [1]. However, many office supplies requests application face challenges due to immature planning and less effective implementation [2].

Management of requests for office supplies via websites on campus is currently faced with several crucial problems that require immediate attention. Based on interviews with several users on the campus where this research was conducted, it appears that requesting and receiving office equipment is still inefficient. This



problem is further exacerbated by a lack of transparency regarding the status of user requests, which leads to frequent discrepancies between the stock listed on the website and the stock available in the warehouse. The implications of these issues are critical to campus operations. Imperfections in the office supply request process can cause delays and frustration, impacting productivity [3]. Lack of transparency regarding request status causes confusion and potential dissatisfaction among users [4]. Mismatches between listed and actual stock can disrupt inventory management and budgeting [5]. These findings prove that efforts are needed to improve the current website as soon as possible.

Previous research applies solutions to overcome the problem of website enhancement by applying the Rapid Application Development (RAD) method [6]. Generally, RAD has been successfully applied in various industries, including creating a web-based inventory and sales information for drinking water distributors [7], a website for service request management development [8], and a website for office administration to fix discrepancies between physical quantities in the warehouse and the quantities recorded on stock cards [9].

Our solution is to apply the RAD method to solve the problem. The RAD is applied to speed up the development cycle through fast iteration and responsiveness to user input [3]. In the RAD method, development is carried out in stages through a series of short iterations that focus on developing certain web application features [4]. It allows development teams to build applications more efficiently and receive feedback from users quickly to adjust and improve the application according to user needs and preferences.

However, several previous studies have solved this problem in different ways. A Lean Six Sigma approach is applied to improving office moving efficiency on a university campus [10]. Another studied some characteristics of the materials footprint of a university campus [11], managing student accommodation requests [12], or managing campus electricity and heat demand supplies [13]. So, our contribution is to fix the office supply request using RAD. In this study, improving the office supplies request is crucial in supporting better operations within the campus environment. By making these design updates through a website, users will have a better user experience when requesting office supplies.

2. METHODS

Rapid Application Development (RAD) is a methodology that accelerates the development process with short cycles, reducing the time between design and implementation [14]. RAD emphasizes rapid development cycles, user involvement, and feedback, making it suitable for projects with evolving requirements where user satisfaction and quick delivery are crucial [15]. RAD requires developers to interact directly with users and ensure fast results [16]. This

approach enables faster delivery of functional software and quicker adaptation to changing business needs and competitive pressures. RAD Phases are shown in Figure 1.

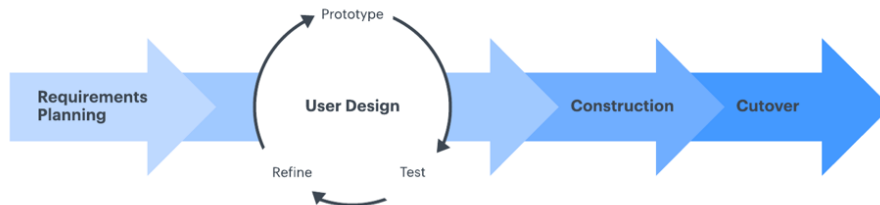


Figure 1. RAD Phases [17]

2.1. Requirement Planning Phase

The Requirement Planning phase in RAD is crucial for understanding and defining project requirements and gathering user needs, business objectives, and specifications [18]. It covers functional requirements (functionality) and non-functional requirements (development/operational constraints) [19]. Benchmarking guides tactical and strategic decisions [20], ensuring all critical requirements are met early. The outcome is a well-documented set of requirements that form the foundation for subsequent phases. An interview with a staff member at Multimedia Nusantara University will be conducted to reveal several issues with the office supply request process. The output of this phase is categorized into functional and non-functional aspects. The goal is to create a website that enhances efficiency, usability, and security in the office supply request process.

2.2. User Design Phase

During the User Design phase, the focus is on building the website design based on requirements. UML diagrams effectively visualize and communicate design aspects [21]. Diagrams like use cases, activity, sequence, and class diagrams will be created using Canva, a user-friendly online design tool ideal for beginners and experienced designers [22]. Canva's flexibility and ease of use streamline the design process, making it perfect for creating intuitive and informative visuals. This phase involves iterative collaboration with end-users to refine the interface and ensure it meets their needs. The outcome will be a well-designed user interface and a clear understanding of user interactions with the website.

2.3. Construction Phase

In the Construction phase, the actual software development occurs. Figma, a popular design tool, will be used for its collaborative features and rich functionality, allowing multiple contributors to work together [23]. The

development team will create functional features based on previous user interface designs and requirements, using rapid iterations to refine the website. Continuous testing and quality assurance will be integrated to address issues early. The outcome will be a new website with a subset of fully built features.

2.4. Cutover Phase

The Cutover phase transitions to production, including testing, deployment, and readiness. User Acceptance Testing (UAT) ensures the website functions as expected and addresses defects, with documentation confirming user satisfaction [24]. The User Acceptance Test (UAT) results, collected from several participants, offer insights into the effectiveness and user satisfaction of the new website.

3. RESULTS AND DISCUSSION

3.1 Requirement Planning

An interview was conducted with a staff member at Multimedia Nusantara University to understand user needs for submitting office supplies on campus. The staff highlighted inconsistencies between requested items and actual stock, noting cases where available inventory was empty. He also mentioned the lack of notifications during the retrieval process and the manual collection of supplies. Additionally, he pointed out the issue with the pick-up schedule, as supplies cannot be requested late in the afternoon (4:00-5:00 PM) due to closing time constraints. These insights indicate areas for improving the efficiency and usability of the supply request process. After interviewing an end-user and creating benchmarking, the requirements can be defined as functional and non-functional.

1) Functional Requirements

The website should allow users to request the collection of office supplies on the same day or the next day, enabling them to choose the preferred collection time. If a user requests office supply collection after working hours, the website should automatically schedule the collection for the next day. Additionally, the website should display the real-time availability of office supplies and provide users feedback regarding the status of their requests. The website will verify that the selected office supply is available at the collection time by ensuring intuitive operation.

2) Non-functional Requirements

The website should be designed to be user-friendly and intuitive, ensuring ease of use for all users. Furthermore, it should be accessible from various devices and platforms, promoting flexibility and convenience. The website must implement

robust security measures to safeguard user data and other sensitive information. By combining user-friendly design, accessibility across devices, and stringent security protocols, the website aims to provide users with a smooth and secure experience.

3.2 User Design

The diagram in Figure 2 of the website has eleven use cases for three actors: the Lecturer, the Administration Staff, and the Gapura UMN Website. The use case consists of login, OS Request, OS Request List, Accept/Reject Request List, Email Notification, Retrieval Confirmation, Stock Reduction, Data Validation, Quantity Limitation, Check Request Status, and Update Request Status.

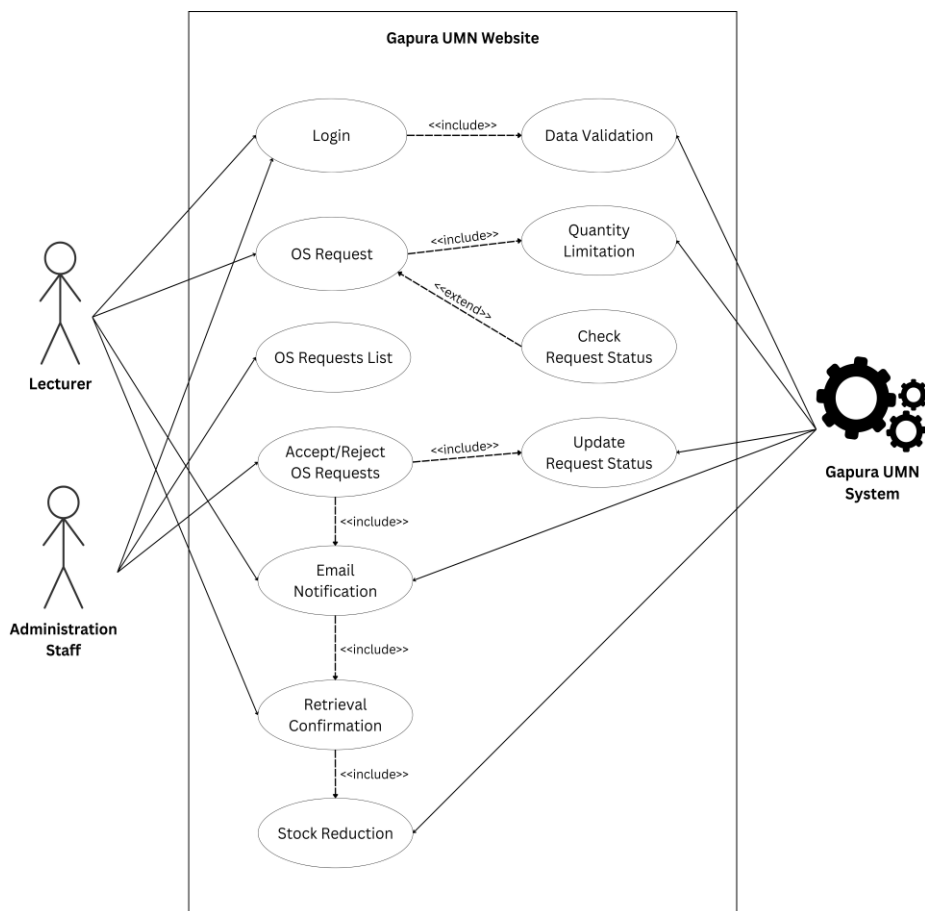


Figure 2. Office Supplies Request Use Case Diagram

The office supplies request - sequence diagram (Figure 3) explains how the Lecturer can request new office supplies through the website. They must complete the request form, including the item type, amount, and pick-up schedule. If the amount exceeds the limit, the Website will show an error message, and the Lecturer will have to input the amount again. After completing the form, the Website will confirm the completion with the Lecturer, then they can submit the form, and the request will be added to the list.

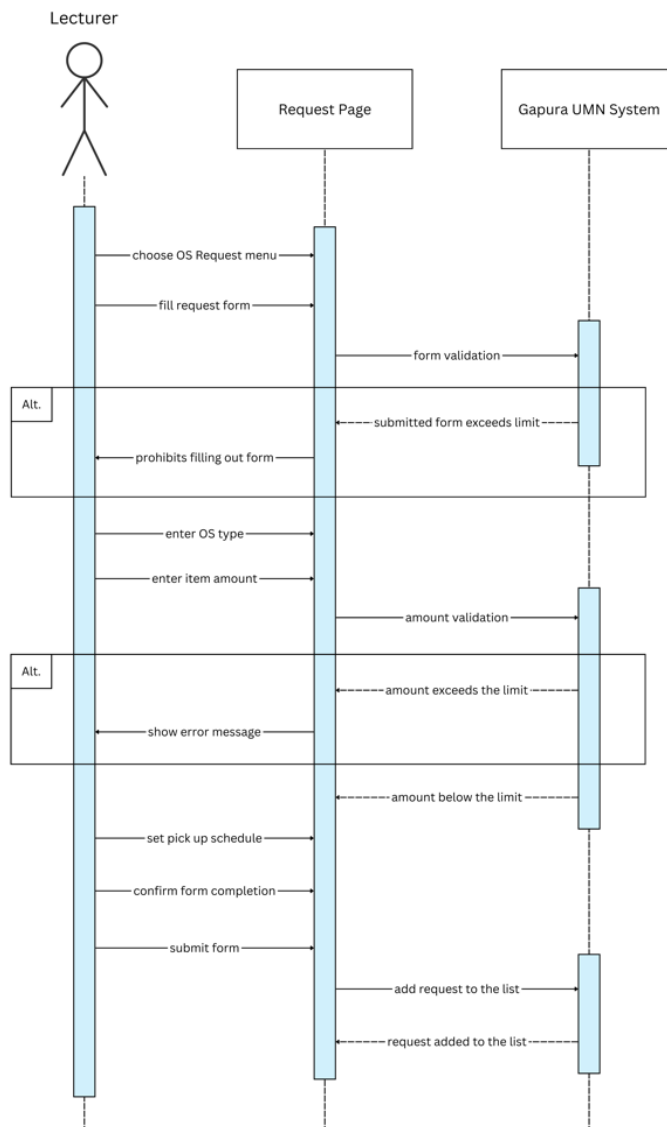


Figure 3. Office Supplies Request Sequence Diagram

Figure 4 shows the class diagram of the office supplies request, their attributes, and their relationships. There are five classes: Lecturer class, AdministrationStaff class, OSRequest class, OSStock class, and Request Status class. The Lecturer class represents lecturers who interact with the Website to initiate and manage requests. AdministrationStaff, on the other hand, embodies the administrative personnel responsible for overseeing and facilitating the entire request process. OSRequest class encapsulates the details of individual office supplies requests, specifying the type and quantity of items requested. The OSStock class manages the inventory of available office supplies, keeping track of stock levels to ensure a seamless fulfillment process. Lastly, the Request Status class provides insights into a request's various stages, offering a systematic overview of the request lifecycle. This class diagram is a foundational guide for developers, stakeholders, and end-users, clearly representing the architecture and the interactions between different components.

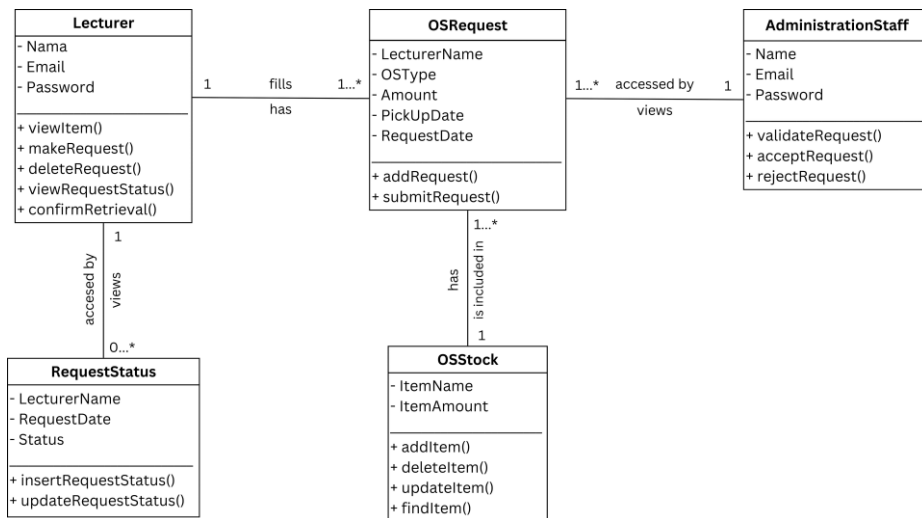


Figure 4. Office Supplies Request Class Diagram

3.3 Construction

The login view will appear, and a page will be displayed to fill in the user's email and password (Figure 5). Access will be denied if users log in without entering any email or password. Log in via SSO is also optional if you use other alternatives. Users cannot sign up for the website since the account comes from a university email. The 'Request New Office Supplies' page will appear if the 'Request New Office Supplies' menu was previously selected. In addition, Figure 6 shows what users can request when filling in the form requesting office supplies, such as the

desired office supplies type, how many are needed, and the time to pick up the items available on the calendar.

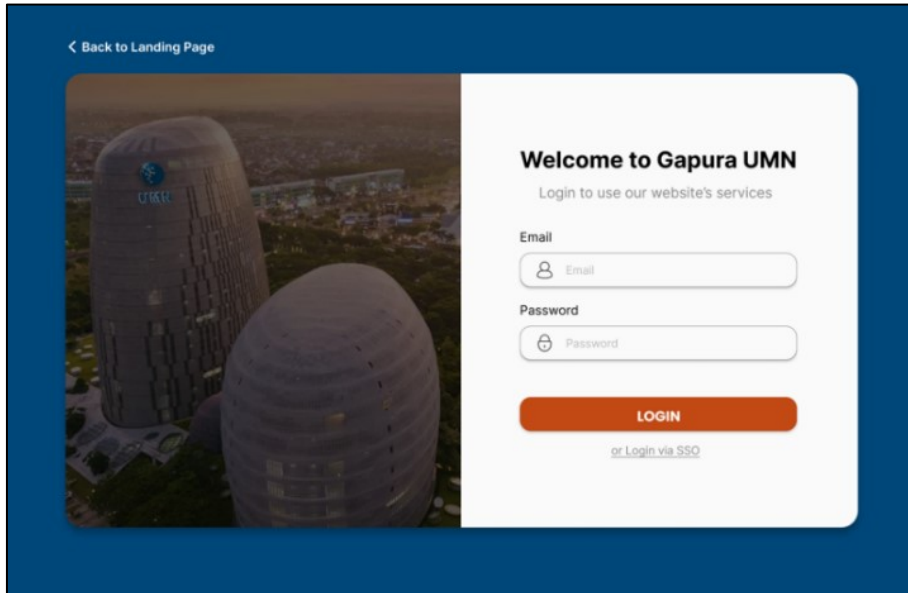


Figure 5. Login Page

Type	Stock
Battery (AA)	20
Battery (AAA)	9
Binder Clip	12
Board Marker	50
Calculator	5
Envelope (A4 Brown)	7
Envelope (F4 Brown)	60
Envelope (A4 White)	23

Figure 6. Request New Office Supplies Page

Figure 7 illustrates the action if users click the 'Submit' button. A dialog will appear to confirm the request. A notification will inform us that an office supplies request has been sent if confirmed.

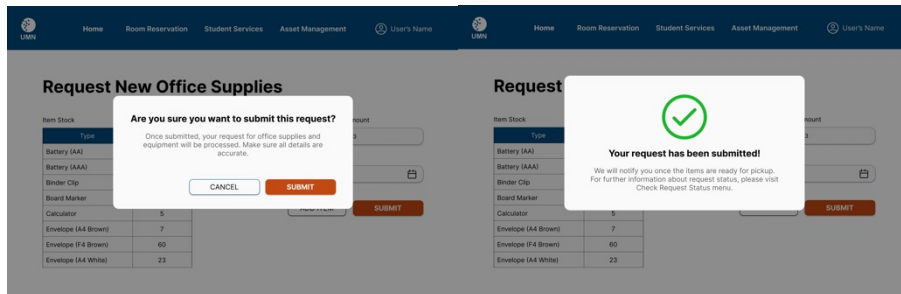


Figure 7. Confirmation Dialog and Completed Message

Request List is a menu that allows you to view and manage the list of office supplies requests. As shown in Figure 8, staff can make decisions for one or more requests on this page by pressing the 'Accept Request' or 'Reject Request' button.

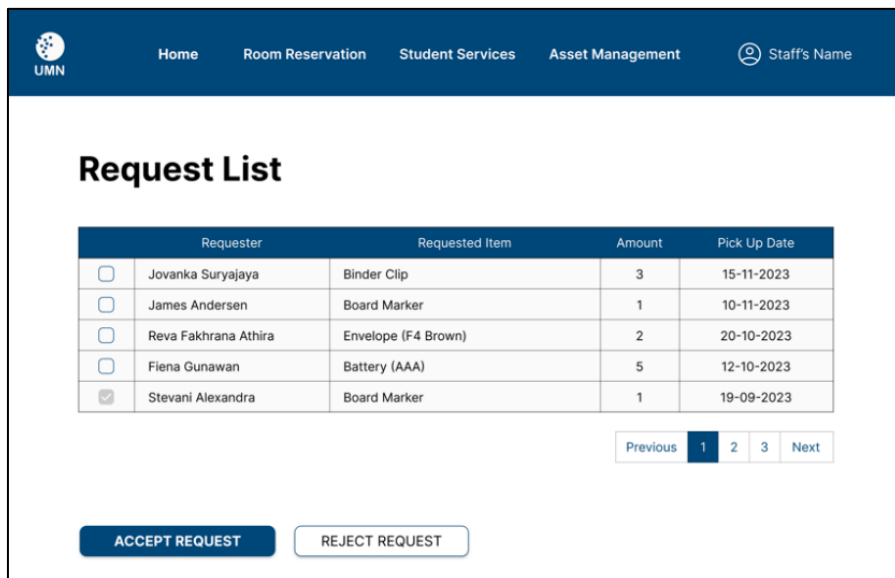


Figure 8. Request List Page

In the Check Request Status menu (Figure 9), users can view the submission history and each submission's status. If the user wants to cancel the request, the user can click the 'Cancel Request' button. If the user previously submitted several types of goods in one form, each type is displayed separately in this menu.

Meanwhile, Figure 10 shows the message when the user clicks the 'Confirm Retrieval' button. This dialog will appear to confirm the retrieval. It will show a 'thank you' message if confirmed.

	Requested Item	Amount	Pick Up Date	Status
<input type="checkbox"/>	Board Marker	1	19-09-2023	Cancelled
<input checked="" type="checkbox"/>	Battery (AAA)	5	12-10-2023	Completed
<input type="checkbox"/>	Envelope (F4 Brown)	2	20-10-2023	Ready to Pick Up
<input type="checkbox"/>	Board Marker	1	10-11-2023	Approved
<input type="checkbox"/>	Binder Clip	3	15-11-2023	Pending

Previous 1 2 3 Next

CONFIRM RETRIEVAL CANCEL REQUEST Not receiving your request?

Figure 9. Check the Request Status Page

Are you sure you have received the items?
Please ensure that you have received all the items listed in your request. Your confirmation helps us maintain accurate records and ensures your satisfaction with the provided items.

CANCEL CONFIRM

Thank you for using our services!
If you have any concerns or discrepancies, please contact our support team.

Figure 10. Confirmation Retrieval Dialog and Completed Message

3.4 Cut Over

The User Acceptance Test (UAT) results were gathered through feedback from 29 participants via a Google Form. These results provide valuable insights into the effectiveness and user satisfaction of the website. Using a scale of 1 to 5, where one denotes "Strongly Disagree," and five represents "Strongly Agree," participants shared their opinions on various aspects of the interface and user experience based on the eleven questions. The result summary of each question (presented as a Statement) is shown in Table 1 below.

Table 1. User Acceptance Test

Statement	1	2	3	4	5	Average
The interface creates a positive first impression for users.	-	-	7.40%	14.80%	77.80%	4.70
The user interface is intuitive, making it easy for users to navigate through different sections.	-	-	3.70%	25.90%	70.40%	4.67
The key features and information can be located without difficulty.	-	-	3.70%	22.20%	74.10%	4.70
The common actions (logging in, submitting a request, or checking the status) are accessible.	-	-	3.70%	11.10%	85.20%	4.82
The information presented on each page is clear and easily understandable.	-	-	7.40%	14.80%	77.80%	4.70
The purpose and functionality of various features can be comprehended without ambiguity.	-	-	0.00%	14.80%	85.20%	4.85
The design and layout across different pages are consistent.	-	-	7.40%	18.50%	74.10%	4.67
The text sizes, colors, and contrast are suitable for easy readability.	-	-	0.00%	7.40%	92.60%	4.93
The flow of the office supplies request can be followed quickly.	-	-	7.40%	18.50%	74.10%	4.67
The error dialog interfaces are clear and helpful in guiding and correcting any issues.	-	-	11.10%	18.50%	70.40%	4.59
The overall user interface and experience of the website satisfied the needs of end users.	-	-	0.00%	11.10%	88.90%	4.89

This website received high average ratings across multiple aspects in UAT, indicating intense user satisfaction. The interface creates a positive first impression, with an average rating of 4.70, and navigation is intuitive, with a rating of 4.67. Key features and information are easy to find, with a rating of 4.70. Common actions such as logging in, sending requests, and checking status were

straightforward, with an average rating of 4.82. Information clarity and understandability received a rating of 4.70, while the purpose and functionality of the feature were understood without ambiguity with a rating of 4.85. The design and layout are consistent, with a rating of 4.67, and text readability received the highest rating of 4.93. The office supply request flow is easy to follow, with a 4.67 rating, and error messages are clear and helpful, with a 4.59 rating. Overall, the UI meets the needs of end users with an impressive average rating of 4.89. This high level of satisfaction reflects the website's success in aligning with user expectations and requirements.

3.5 Discussion

The goal of improving the office supply requisition through web application enhancement was achieved through the Rapid Application Development (RAD) method, which accelerates the development process and allows effective integration of user input. User input is critical in designing user-friendly interfaces that meet needs and address specific problems. The result is a new web-based application that simplifies the office supply request process, improves user request status tracking, and ensures accurate inventory management with real-time stock availability updates.

The new website enhancement has improved office supply request services' efficiency through automation, real-time inventory tracking, a user-friendly interface, transparent request status tracking, efficient approval workflows, and scheduled collection times. Efficiency can be increased through such steps as automation reduces manual involvement, real-time inventory tracking provides accurate and up-to-date information, a user-friendly interface makes it easier for users to use, transparent request status tracking provides clear visibility to users, workflow Streamlined approvals speed up the approval process, and scheduled pickup times to optimize pickup setup.

The transparency in the user interface design ensures a positive first impression by being intuitive. When the UI is intuitive and enables users to locate key features and information easily, it fosters transparency by providing users with a straightforward view of the Website functionalities. Clear and understandable information presentation, consistent design elements, and error dialog interfaces that guide users effectively all contribute to transparency by reducing ambiguity and ensuring that users can easily comprehend and interact with the Website. In essence, a well-designed UI enhances transparency by making the Website's workings and available actions transparent and accessible to users.

The intuitive and accessible user interface design ensures that users can quickly and accurately update stock information, reducing errors and improving data

accuracy. Clear information presentation, consistent design elements, and helpful error dialogs further enhance the accuracy of stock updates in the system.

The acceptance of high ratings in UAT and the success of this website demonstrate that the website interface effectively meets user needs and expectations. Positive conclusions drawn from good first impressions, intuitive navigation, easy access to essential features, and clear information communication indicate that the interface is well-designed and user-friendly. High scores for information readability, understanding of purpose, consistent design, and text readability reinforce a positive user experience. An easy-to-follow office supply request flow and clear, helpful error messages create a smooth user experience. Overall, the implication is that the success of this website in UAT indicates that it is likely that this interface will be welcomed by users when fully rolled out, potentially increasing user satisfaction, engagement, and possibly higher retention rates.

4. CONCLUSION

By leveraging the Rapid Application Development (RAD) methodology, this study has significantly improved the campus website's efficiency in handling office supply requests. The new website encompasses various functionalities, including user login, office supply (OS) requests, request lists, request approval/rejection, email notifications, retrieval confirmation, stock reduction, data validation, quantity limitation, request status checks, and status updates. These enhancements have automated the supply request process, provided real-time inventory tracking, and ensured a user-friendly interface. The transparent design and intuitive navigation contribute to a seamless user experience, effectively guiding users and improving the accuracy of stock updates. User acceptance testing (UAT) results were overwhelmingly positive, with high average ratings across multiple aspects, indicating strong user satisfaction. The interface's intuitive navigation, clear presentation of information, and easy-to-follow request flow received particularly high scores. Despite these strengths, the website could benefit from additional guidance tools and more detailed confirmation messages to further enhance user understanding and satisfaction. The UML sequence diagram highlights potential areas for improvement, such as minimizing user frustration during the retrieval confirmation process by incorporating preventive measures. Overall, the website's user interface meets user needs with an impressive average rating, confirming its effectiveness in streamlining the office supply request process.

ACKNOWLEDGEMENT

Facilities and funding from Universitas Multimedia Nusantara support this research.

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