User Acceptance Testing through Blackbox Evaluation for Corn Distribution Information System

Zulkarnaini[1]*, Ayu Firdhayanti[2], Taufik Taufik[3], Bobby Bachry[4]

[1][2]*Institut Informatika dan Bisnis Darmajaya,* [3]*Institut Bakti Nusantara,* [4]*Universitas Negeri Raden Intan Bandar Lampung, Lampung, Indonesia*

[1]zulkarnaini@darmajaya.ac.id

Abstract

Corn Distribution Information System in Bandar Lampung has witnessed a significant surge in interest, highlighting the importance of ensuring system reliability and functionality. This research endeavors to investigate and enhance these aspects through the application of the black box testing approach, focusing on the user-centric perspective of User Acceptance Testing (UAT). Black box testing, a methodology emphasizing system functionality without delving into internal structures, is complemented by UAT to provide comprehensive evaluation. In executing 27 study cases to evaluate the system, 22 patients demonstrated proper functionality, while 5 issues were identified. Notably, 4 issues pertained to the unavailability of the export function to CSV, and 1 patient encountered difficulties with road letter generation facilities. The discussion elucidates that UAT through Black Box proves to be a valuable approach, effectively bridging the methodological gap of traditional black box and providing insightful input from end users. Furthermore, this methodology successfully identified 5 focal points that can serve as development suggestions for the company's system, previously undiscovered. In conclusion, the study underscores the efficiency of integrating UAT with black box in enhancing Corn Distribution Information System's dependability and functionality. Identified issues shed light on areas for improvement, emphasizing the need for ongoing research in system testing methodologies. Future studies are recommended to explore the integration of UAT with white box testing, iterative testing for bug identification, and comprehensive security testing within the system network. This approach ensures a holistic evaluation, addressing potential limitations and contributing to the continuous refinement of the information system.

I. INTRODUCTION

The substantial surge in interest within the Bandar Lampung corn distribution community has accentuated the need to ensure the reliability of the Corn Distribution Information System. Core elements like comfort and system reliability play a crucial role in upholding the system's dependability. In response to this, the research endeavors to meticulously examine and augment the system's reliability and functionality through the application of the black box testing approach. Black box testing, a software testing methodology, focalizes on evaluating a system's functionality without delving into the intricacies of its internal structure [1]. In contrast to white box testing, which scrutinizes internal code and algorithms, black box testing adopts a user-centric perspective. The method systematically examines the input and output generated by the system, ensuring that the software functions as anticipated. By abstracting away from the internal workings, black box testing provides a comprehensive assessment of the system's performance, emphasizing responsiveness and user experience [2]. This approach proves particularly valuable in unearthing potential discrepancies between expected and actual outcomes, thereby contributing to the refinement and optimization of the software [3]. Within the context of the Corn Distribution Information System, user acceptance testing becomes integral to the methodology [4]. This involves conducting tests from the user's standpoint to identify weaknesses and shortcomings for immediate improvement and enhancement [5]. Despite its strengths, black box testing has certain drawbacks, including a lack of in-depth knowledge of the system's internal architecture and a relatively narrow scope for detecting all possible problems

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* Corresponding author

[6]. However, its benefits, such as maintaining objectivity, understanding human interactions, and providing a realistic testing environment, make it a valuable technique to ensure the system meets user expectations. User acceptance testing adds a nuanced layer to the overall testing strategy [7]. This phase involves actual users interacting with the system, evaluating its functionalities, and providing real-world feedback. The goal is to ensure that the system aligns with users' expectations and seamlessly integrates into their workflow. This user-centric approach further enhances the overall reliability and functionality of the Corn Distribution Information System [8].

Despite the effectiveness of black box testing and user acceptance testing, it is crucial to acknowledge their limitations. Black box testing, for all its objectivity, may lack insights into the fundamental workings of the system, and user acceptance testing may not uncover all possible issues [9]. Therefore, the chosen testing methodologies should be tailored to the project's specific requirements and goals[9]. In conclusion, black box testing, augmented by user acceptance testing, stands as an efficient and effective method to guarantee the maximum functionality and reliability of the Corn Distribution Information System [10]. This comprehensive testing approach, grounded in user-centric principles, not only identifies potential issues but also ensures that the system aligns seamlessly with user expectations and real-world usage scenarios [11]. As the research unfolds, the integration of these testing methodologies becomes pivotal in enhancing the Corn Distribution Information System's dependability and overall user satisfaction.

II. METHODS

Blackbox testing is a type of software testing that focuses on assessing a system's functioning without considering its internal workings. This kind of testing doesn't need a thorough technical grasp of the internal implementation to guarantee security and optimal performance of a system. In this study, we do blackbox testing using a 4-step procedure show figure 1.
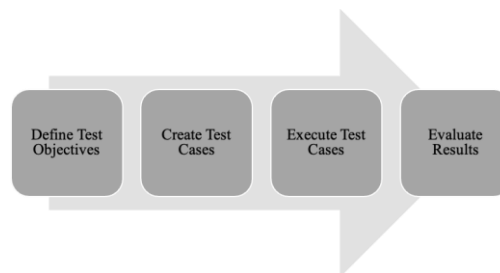

Fig. 1 Blackbox Testing Steps

A. *Define Test Objectives*

In this phase, the focus is on precisely articulating the goals and scope of the testing endeavor. This involves a collaborative effort among stakeholders to clearly identify specific functionalities, features, or behaviors within the system that require scrutiny. By thoroughly examining project requirements and functional specifications, the testing team ensures a comprehensive understanding of what needs to be evaluated. The defined objectives serve as a strategic guidepost, aligning the testing process with overarching project goals and minimizing ambiguity. Additionally, this phase lays the groundwork for creating meaningful test cases, providing a systematic and purposeful approach to subsequent testing activities. It establishes a cohesive vision for the testing effort, ensuring that the testing team's focus remains targeted and aligned with the most critical aspects of the system [12].

B. *Create Test Cases*

In the second phase, meticulous attention is given to crafting a comprehensive set of test scenarios following the defined objectives. Testers systematically develop detailed test cases that span various conditions, inputs, and user interactions, serving as a roadmap for evaluating the system's functionalities [13]. These cases are designed to simulate real-world scenarios, encompassing both positive and negative conditions, and are structured to uncover potential vulnerabilities in the system. The goal is to construct a robust suite of test cases that align with the established objectives, providing a thorough and targeted assessment of the system's capabilities. The quality of these test cases significantly influences the effectiveness of the overall testing process, ensuring a systematic and focused approach to validating the system's functionalities.

C. *Execute Test Cases*

In this pase, the meticulously crafted test cases are put into action as testers interact with the system, mirroring end-user behavior. This phase involves the systematic execution of each test case, including the input of data, execution of functions, and observation of system responses [14]. Testers carefully document any deviations from expected behavior, errors, or unexpected outcomes. The execution phase is critical for uncovering defects or irregularities in the system's functionality, providing valuable insights into how the system performs under various

conditions [15]. The thorough and methodical execution of test cases is pivotal in ensuring the reliability, stability, and overall quality of the software being evaluated.

D. Evaluate Results

In the evaluate results phase, testers scrutinize the outcomes of the executed test cases, analyzing recorded observations to identify any discrepancies or deviations from expected behavior. This critical step involves categorizing and prioritizing issues based on their severity and impact on the system's functionality [16]. Testers assess the overall performance, reliability, and adherence to specifications, ensuring that the system meets the defined objectives. The evaluation phase plays a crucial role in providing actionable insights to developers and stakeholders, guiding subsequent efforts to address and rectify identified defects or weaknesses in the system [17]. It serves as a pivotal checkpoint to determine the system's readiness for deployment and highlights areas that may require further refinement or enhancement.

III. RESULTS

The testing activities aimed to evaluate the functionality, security, and dependability of the Bandar Lampung-designed and produced web-based system. By using the black box testing methodology, we identified possible security vulnerabilities, examined features, and assessed system responsiveness from the user's viewpoint. This approach made it possible to conduct a thorough evaluation beyond internal system architecture and concentrated on how well the system interacted with users and satisfied predetermined standards.

A. Login Admin Pages

The Admin Login Page secures access to the system by validating the admin's email and password. Users are directed to the Home Page if the credentials entered are valid, and a notification will appear in case of any errors. The primary objective is to authenticate and authorize administrative access, ensuring that only authorized personnel can log in and access the system. This security measure not only safeguards sensitive information but also provides a seamless and user-friendly experience by guiding users to the Home Page upon successful login or providing clear alerts in case of authentication failures. The careful validation process enhances the overall security posture of the system, aligning with best practices for user authentication in web-based applications.
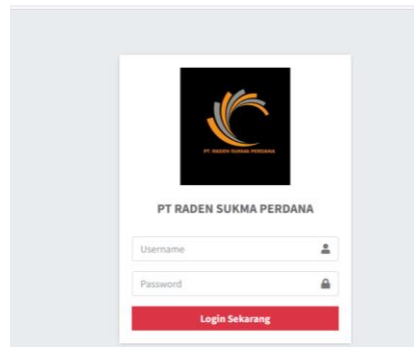

Fig. 2 Admin Login Page

The test results are outlined in Table 1.

TABLE 1
ILLUSTRATES THE TESTING OUTCOMES FOR THE ADMIN LOGIN PAGE

No	Test Cases	Input	Output Target Goals	Results
1	Entering valid admin email and password.	Email: admin@example.com, Password: admin123	Redirect to the Home Page.	Valid
2	Entering an email that is not registered.	Email: salah@email.com, Password: admin123	Warning for incorrect email/password.	Valid
3	Entering an incorrect password.	Email: admin@example.com, Password: salah123	Warning for incorrect email/password.	Valid
4	Attempting to log in without providing an email and password.	Email: , Password:	Warning for providing both email and password.	Valid
5	Trying to log in with only the email filled.	Email: admin@example.com, Password:	Warning for providing only the password.	Valid
6	Trying to log in with only the password filled.	Email: , Password: admin123	Warning for providing only the email.	Valid

According to the test exploration, the Admin Login Page validates credentials successfully. On the other hand, resolving unforeseen situations and sending out more educational warning messages are highly recommended.

We advise implementing strict password preservation policies and providing more precise login instructions to improve security and user experience.

B. Admin Homepage

This page serves as the system's main page, accessible only to users with admin-level privileges. We want to test whether this page can be accessed by users with admin privileges and those without admin privileges.

Fig. 3 Admin Homepage

The test results are outlined in Table 2.

TABEL 2
TEST RESULTS ON THE ADMIN HOME PAGE

No	Test Cases	Input	Output Target Goals	Results
1	Displaying the home page after login.	-	Home Page Accessible by Admin	*Valid*
2	Displaying the home page after login with a non-Admin email.	-	Home Page Inaccessible	*Valid*
3	Copying the admin page link to a new browser tab to bypass the login check.	-	Home Page Inaccessible, redirected to the login page	*Valid*

According to the test execution, strong user validation has prevented unwanted access to the main page, ensuring it is adequately secured. On the other hand, if unauthorized efforts are made to access the admin system, the system is advised to activate a pop-up warning.

C. Category Data Page

This page functions as a feature for adding product category-related data. The input, update, and removal of functionalities for the data are the main focus of this testing phase.
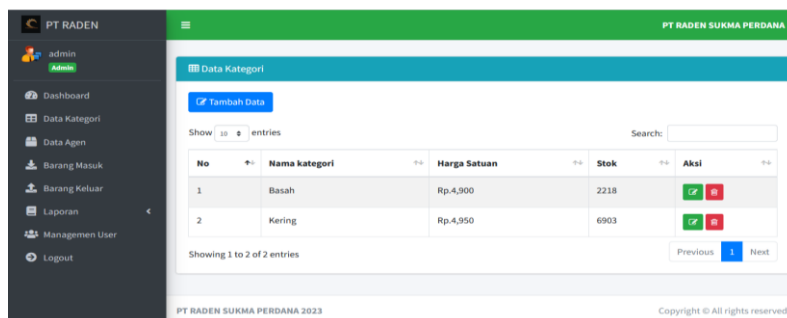

Fig. 4 Input Product Category Page

The test results are outlined in Table 3.

TABLE 3
TEST RESULTS ON CATEGORIES

No	Test Cases	Input	Output Target Goals	Results
1	Performing data input.	Click to input category data.	Data entered into the database.	Valid
2	Performing data deletion.	Delete category data.	Data deleted from the database.	Valid
3	Performing data update.	Update category data.	Data updated from the database.	Valid
4	Search column.	Enter category data search.	Search successful.	Valid
5	Export to CSV Function	Click Export to CSV	Feature not Avaliable	Not Avaliable

Based on the validation results, it is found that all functions run correctly. The system can respond to data input and delete and update data. However, we recommend adding a print function to the .csv format in the data category menu therefore that it can be a separate report for evaluation and audit if needed.

D. Agency Data

On this page, it serves to add the data of agents who partner with the company. The feature on this page is that you can enter the agent's name, username, phone number, address, and email. This page has an update and delete data function.
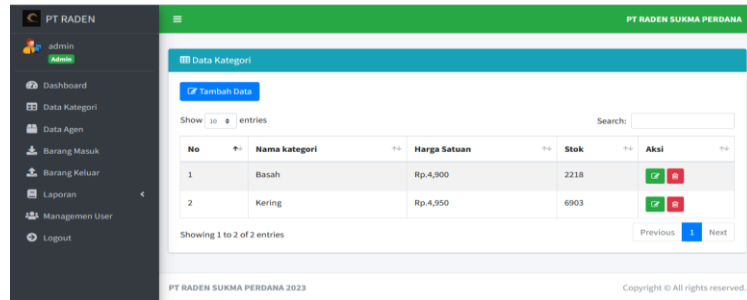

Fig. 4 Input Agents Data Page

The test results are outlined in Table 4.

TABLE 4
TEST RESULTS ON AGENTS

No	Test Cases	Input	Output Target Goals	Results
1	Performing data input.	Click to input category data.	Data entered into the database.	Valid
2	Performing data deletion.	Delete category data.	Data deleted from the database.	Valid
3	Performing data update.	Update category data.	Data updated from the database.	Valid
4	Search column.	Enter category data search.	Search successful.	Valid
5	Export to CSV Function	Click Export to CSV	Feature not Avaliable	Not Avaliable

Based on the data in table 4, all functions are running as needed. We can input, delete, update, and search data in the search boxes. However, this page does not have to export data to CSV. Therefore, we cannot create separate data reports for audit or evaluation.

E. Incoming Goods

The incoming goods menu functions to document all received items, capturing details such as the transaction number, date, category, sender information, license plate number, net weight, unit price, and total price. This system also includes a report printing function and update and delete functionalities.
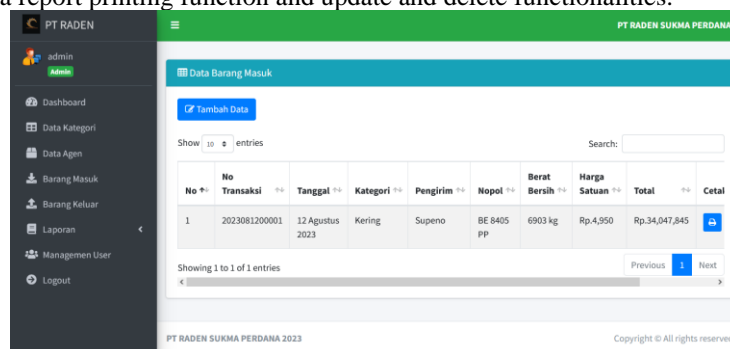

Fig. 5 Incoming Goods

The test results are outlined in Table 5.

TABLE 5
TEST RESULTS ON INCOMING GOODS

No	Test Cases	Input	Output Target Goals	Results
1	Performing data input.	Click to input category data.	Data entered into the database.	Valid
2	Performing data deletion.	Delete category data.	Data deleted from the database.	Valid
3	Performing data update.	Update category data.	Data updated from the database.	Valid
4	Search column.	Enter category data search.	Search successful.	Valid
5	Print Function	Click Print	Succesfully Printed	Valid
6	Export CSV	Import CSV	Not Avaliable	Not Avaliable

From Table 5, it can be inferred that all system functions are operational, including the printing function. However, the system lacks a data export function to the CSV format. Therefore, the data cannot be reprocessed.

F. Outcoming Goods

In the outgoing goods system, every outgoing item is documented, including details such as the item number, date, category, sender information, license plate number, net weight, unit price, total price, and the outgoing goods delivery letter.
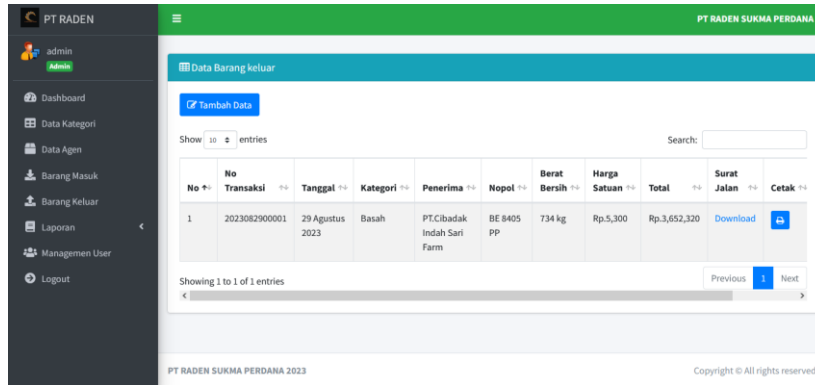

Fig. 6 Outcoming Goods

The test results are outlined in Table 6.

TABLE 6
TEST RESULTS ON OUTCOMING GOODS

No	Test Cases	Input	Output Target Goals	Results
1	Performing data input.	Click to input category data.	Data entered into the database.	Valid
2	Performing data deletion.	Delete category data.	Data deleted from the database.	Valid
3	Performing data update.	Update category data.	Data updated from the database.	Valid
4	Search column.	Enter category data search.	Search successful.	Valid
5	Print Function	Click Print	Succesfully Printed	Valid
6	Export CSV	Import CSV	Not Avaliable	Not Avaliable

The results in Table 6 indicate that the system's essential functions are working well. However, two additional parts that should be present in the system are not available here: the ability to export data to CSV and the function to generate distribution delivery notes from the system. We recommend the inclusion of these two functions, allowing the company to process data in specialized software such as Excel for auditing and reporting purposes. Additionally, the system is advised to incorporate an automated feature for generating delivery notes, ensuring centralized data management for all delivery notes within the system.

G. Results Evaluation

From the 27 study cases we ran to evaluate, it was found that 22 patients were running well or valid; however, 5 issues were unavailable in the system where 4 points were unavailable for the export function to CSV, and 1 patient was unavailable for road letter generating facilities.

IV. DISCUSSION

User Acceptance Testing (UAT), when conducted through the Blackbox Testing methodology, has proven to be an effective approach for bridging the methodological gap inherent in traditional blackbox testing, which typically limits its scope to the evaluation of pre-existing features. This approach not only enhances the testing process but also ensures a more comprehensive assessment of the system's functionality. Furthermore, UAT is particularly effective in extracting valuable insights regarding potential additional features from the perspective of end users, thereby enhancing the system's alignment with user requirements and expectations. Significantly, this testing method has enabled the identification of five key focal points that offer substantial recommendations for the further development of the company's system. These focal points, previously undiscovered, provide critical insights into areas of improvement, underscoring the value of UAT in developing systems that are not only technically sound but also closely aligned with user needs.

V. CONCLUSIONS

Furthermore, in our recommendations for future research related to testing information systems, we emphasize the potential integration and extension of user acceptance and blackbox testing. Firstly, an intriguing avenue for

exploration involves the amalgamation of user acceptance testing with white box testing. This integration could offer a more comprehensive understanding of both the user interface and the underlying code structure, leading to more robust and user-friendly systems. Secondly, it is advisable to conduct iterative testing processes to meticulously search for bugs or program errors that might impede the system's functionality. Such repeated testing ensures the reliability and stability of the system under various scenarios. Lastly, an essential aspect of future research should include security testing within the system's network. This is particularly crucial in an era where data security and integrity are paramount, and would contribute significantly to the overall robustness of the information system.

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