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LOST AND FOUND: AN APPLICATION TO SEARCH AND FIND LOST ITEMS

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Abstract

Carrying personal items is a must for everyone, especially to the campus area. It can cause people to lose things, and many lost or found items pile up without the owners. However, to communicate this information, only broadcasts were implemented through chain messages on social media which were considered less effective. Based on these problems, a website-based information system is proposed to assist in managing reports of lost and found items and transactions between finders and searchers of the items. This system has three main functions: inserting data on lost or found items, deleting items that have been returned to their owners, and making claims for items by exchanging messages to each user's account. This system is built using PHP, HTML, CSS, JavaScript and is referred to the waterfall model. This information system can be accessed through a web browser on a device, so there is no need to install many applications because a browser is installed by default there. The purpose of this study is to measure the usability scale. This information system is expected to facilitate interaction for searchers and finders of the items and be a convenient alternative so that cases of lost items in the campus area can be handled effectively and efficiently. Evaluation of the system using the System Usability Scale (SUS) has a score of 77 which means it is acceptable or feasible.

Keywords*: Finder; Information System; Lost Item; Searcher; Usability.*

1. INTRODUCTION

Currently, cases of loss of items have often occurred in the area of a certain campus in Surabaya East Java, whether they were lost intentionally (stolen) or unintentionally [1]. When someone finds or loses an item, it is usually only spread through chain messages via social media, such as Instagram, LINE, or WhatsApp. According to Trisnani [2], the WhatsApp application can be used to communicate messages among community leaders. However, this is considered less effective if the searcher or finder of the item does not have the application to announce it. They must install some of these applications first. Nevertheless, if they only have devices with limited memory, then they need help from other people to announce it, or even worse, they cannot make any announcements at all.

The notification of lost or found items on campus is mainly posted on social media, accommodating news of lost or found items. However, the account of social media platforms is not widely known by the residents or the general public, and even now, it is rarely used, so the news is not up-to-date.

Regardless, popular accounts with announcements usually need an admin to manage, whereas the admin is not always online for twenty-four hours to post the important messages.

In a previous study [3], a system was designed to search for lost or found items at a certain campus in Malang, East Java. The system uses a prototype method in its development and gets from users a 50% percentage of lost items on campus. Users of the system, especially the students, need a system for reporting and finding lost items that all students can access. Tests were carried out on the system using black box testing and got a score of 77.8%, which can be said that the system is acceptable and can make it easier for users to use the system. Another study that discusses the use of usability testing in [4] states that the evaluation of the system using usability is carried out to mainly collect opinions from several respondents and determine the value of the system functionality.

According to [5], the software always develops following current technology. Software development gets more advanced, especially in an internet-related environment [6]. Thus, the development must be concerned with the usability of the system. Furthermore, waterfall is a systematic and sequential model in building software [7][8]. PHP is a widely known dynamic web like used in CLI and GUI. PHP is also good in a wide variety of platforms and easy to transplant [9][10]. Meanwhile, MySQL is a popular software program that's able to organize and manage many pieces of information efficiently while keeping track of how all those pieces of information are related to each other [9][11].

Based on the problems above, the proposed method is in the form of a lost and found information system. The system is called "Lost and Found: An Application for Search and Find Lost Items", which can be accessed through a website, so it only requires a web browser to use it, which is installed by default in a mobile device or smartphone. So, it is expected that this system will make it easier for users to find or search for lost items. The system is principally built using PHP, CSS, JavaScript, and MySQL as the database, based on the waterfall model. Besides, the purpose of this study is to measure the usability scale of our system by using System Usability Scale (SUS).

This paper is organized into four sections. Section I is the introduction, while part II is about the research methodology. Section III explains the result and discussion. Meanwhile, section IV is the conclusion and future work part of this system.

2. RESEARCH METHODOLOGY

In this section, the stages of the research are described in the form of a diagram which states a sequential relationship and has its own work unit.

Figure *1* shows a methodological framework which contains several stages to ease the understanding of this research and to achieve the beneficial results.

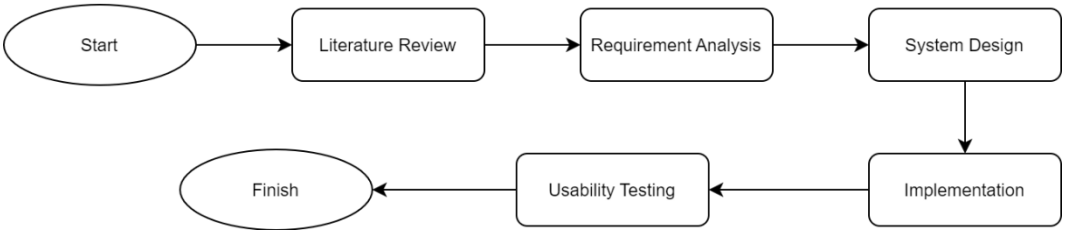

Figure 1. Research stages

2.1. Literature Review

Literature review was carried out by collecting and understanding various references related to research topics originating from various journals, books and internet sources. We particularly conducted a comparative search for system creation methods and steps in creating a system design.

2.2. Requirement Analysis

This stage is carried out by identifying details for the proposed system, finding the constraints and related problems by providing alternative choices and obtaining the solutions to these problems. The problems found, there were many cases of losing and finding items, but there was no web-based management system for this case at a certain campus area in Surabaya, East Java. The information broadcast was manually done via social media which is not everyone has it and the items piled up without anyone taking them due to the uneven information.

2.3. Usability Testing

The quality of a product or software can be interpreted as an experience made by users in interacting with a product or software [12]. Usability can also be referred to as an assessment to assess the attributes of the system by knowing how easy it is to use the interface used on the system [13][14]. The System Usability Scale (SUS) is a likert scale questionnaire to provide a glimpse of whether or not the ease of use of websites, software, hardware, mobile devices, and other technology applications [15]. The development of SUS was carried out in 1986 which provided an assessment from respondents who judged a product [16][17]. The users evaluate the system through the System Usability Scale (SUS) as in Figure 2 below:

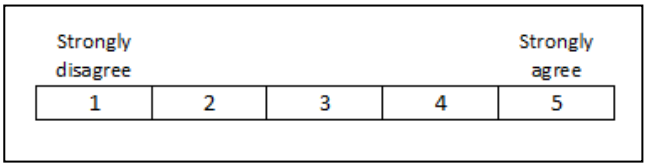

Figure 2. System Usability Scale

In the System Usability Scale, users will be asked several questions and given a scale of 1-5 to be answered based on statements that have been made according to the features in the system. A value of 1 means strongly disagree while a value of 5 strongly agrees. In other words, users can choose a rating using a scale of 1-5, each of which has a "very bad" value up to "very good" value. The product has good usability if the overall score of the calculation is equal to or above 68 [18]. The total respondents who answer SUS questionnaire are better at least 20 people [19]. However, there are several rules in calculating the SUS score, explained below [20]:

1. For each odd numbered question, the score obtained from the user is deducted by 1.
2. For each even numbered question, the score obtained from the user is deducted from 5.
3. The final SUS score is obtained from the sum of the scores for each question which is then multiplied by 2.5 and after that, it is divided by the total number of respondents [12].

Based on the explanation above, it can be written a formula to get the final SUS score where $\bar{x}$ is the average final score, Σx is the sum of calculated SUS scores, and n is the total number of respondents [20], as shown in Equation 1 below. Meanwhile, the overview or status of a SUS final score can be seen in Table 1 [21].

$$\bar{x} = \frac{\sum x}{n} \qquad (1)$$

Table 1. Range score of SUS

Score	Overview
71-100	Acceptable
51-70.9	Marginal
0-50.9	Non Acceptable

This system was tested using the System Usability Scale (SUS) calculation to determine the value of functionality by users. The SUS has 10 default questions which are described in Table 2 below [20]. There are 5 positive and 5 negative questions specifically with 5 answer scale scores, starting from the range of strongly disagree (1) to strongly agree (5). At this stage, some suggestions about the system's quality are obtained to improve the shortcomings that might exist in the system.

Table 2. List of SUS questions

ID	Questions
Q1	I think that I would like to use this system frequently.
Q2	I found the system unnecessarily complex.
Q3	I thought the system was easy to use.
Q4	I thought the features in this application are not working properly.
Q5	I would imagine that most people would learn to use this system very quickly.
Q6	I thought the features presented do not make it easier for users to search for lost items
Q7	I think other users will be helped by this application.
Q8	I think that I would need the support of a technical person to be able to use this system.
Q9	I think I can use the features on this application well.
Q10	I needed to learn a lot of things before I could get going with this system.

3. RESULT AND DISCUSSION

This section mainly discusses about requirements analysis, system design, implementation, and usability testing in detail for the development process of lost and found information system.

3.1. Requirement Analysis

There is a system architecture that describes the flow of transactions from the server and client sides on a website system, as illustrated in Figure 3. Users on the client side can access the business processes provided by the server. Business logic is a piece of software that consists of business processes that define the sequence of actions or operations in an application [22]. In this system, there are two categories of items: lost and found. Static pages are displayed to give important information that can be read only by the users. Otherwise, a user can carry out business processes on dynamic pages by registering, logging into the system, creating and editing lost or found posts, claiming items, and exchanging direct messages related to an item with other users.

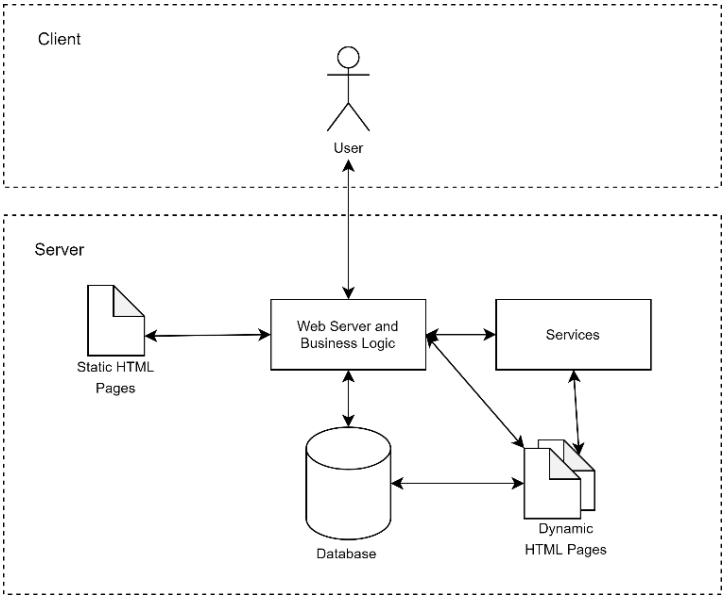

Figure 3. System architecture

3.2. System Design

In the process of system design, it mainly discusses the usage of use case diagrams and the physical data model as the core of this phase.

3.2.1. Use Case Diagram

Figure 4 shows a use case diagram that has two actors, each actor has their own role. The first role is the finder/searcher where they are the main character and do the main purpose in the development of this system. Secondly, an admin whose the foremost task of maintaining the database of the system which can be done once in a while.

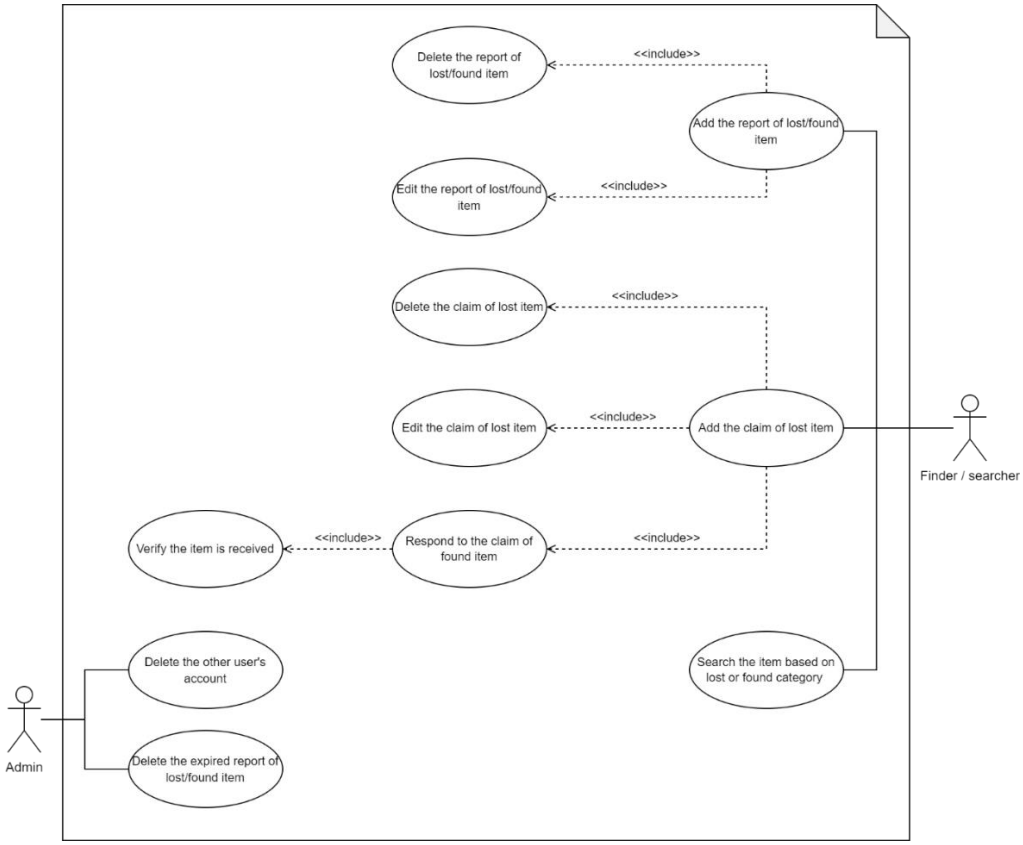

Figure 4. Use case diagram of lost and found website

3.2.2. Physical Data Model

After focusing on how to create a logical or conceptual data model, and prerequisite estimation are stored where it belongs, the data usage was reviewed to transform the logical model into a physical data model that would meet user performance requirements [23]. This lost and found system has a database structure as shown in Figure 5 below and simply consists of four tables, namely user, item, message, and transaction.

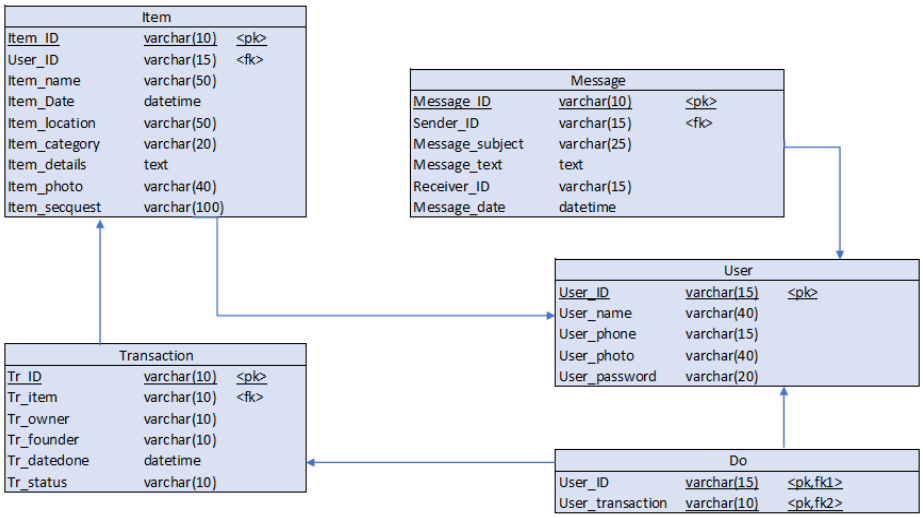

Figure 5. Physical data model of lost and found website

3.3. Implementation

In the process of implementation, it mainly discusses the sitemap and detail per page of the lost and found website.

3.3.1. Sitemap

A sitemap is a list that contains the important pages of a website application and is useful for making it easier to identify or navigate a website. It represents an explicit specification of the design concept and knowledge organization of a website and is therefore considered as the website's basic ontology. It not only presents the main usage flows for users, but also hierarchically organizes concepts of the website [24]. This system has a sitemap as shown in Figure 6.

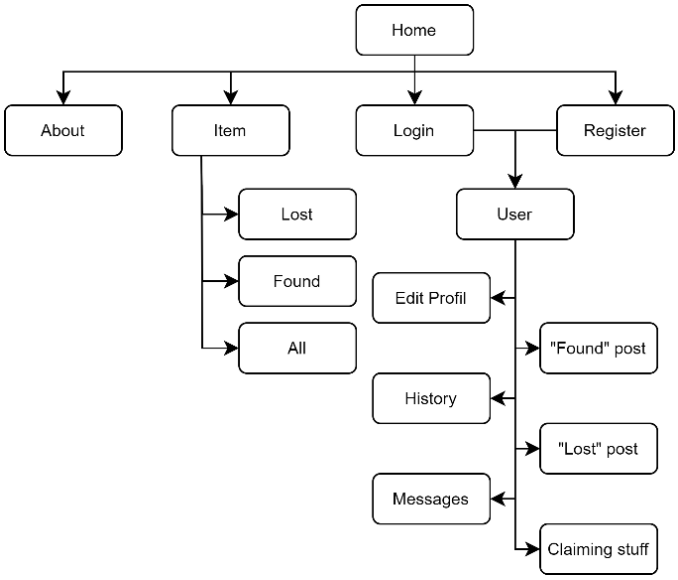

Figure 6. Sitemap of lost and found website

3.3.2. User Interface

This section primarily explains the details of each important user interface in the form of website pages that have been built by our team.

a) Home page of Lost and Found

Figure 7 shows the start page marked with the name of this application. The menu on the home page are: register, found items, lost items, contact, login, keywords, and about.

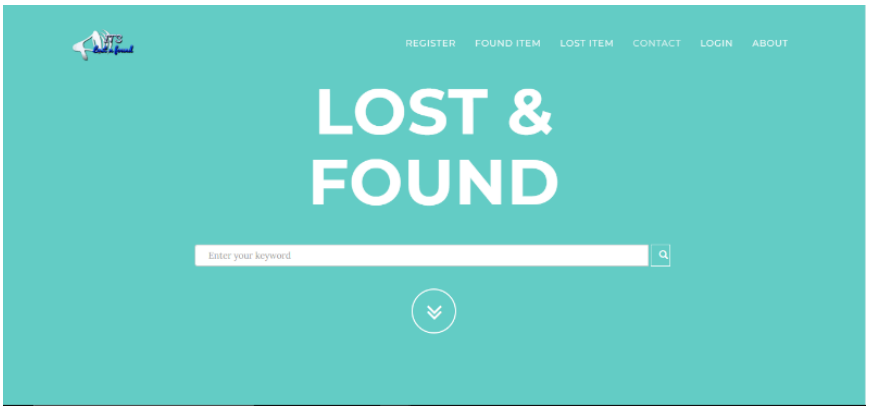

Figure 7. Lost and found home page

b) Page of the lost and found items

On the menu of lost and found items, a list of images of lost and found items that have been uploaded by website users is displayed which can be seen in Figure 8.

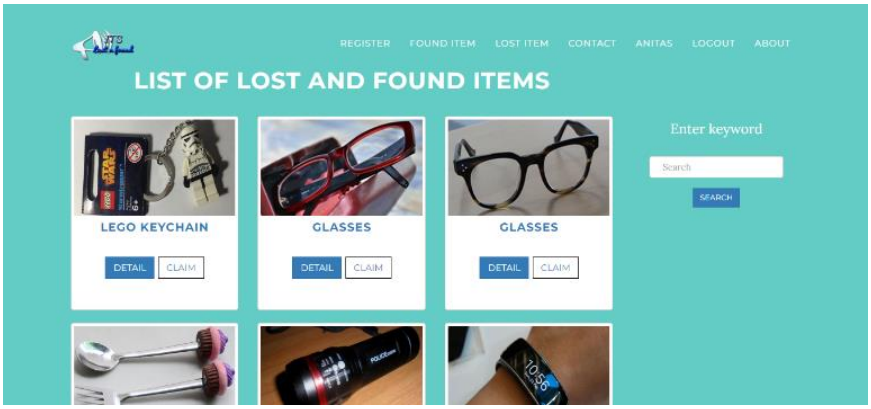

Figure 8. Page of the lost and found items

c) Page of the item's detail

The users can view more complete information by accessing item details as shown in Figure 9. Here are the complete information: name of item, category, location, date and time where it was last found or lost, and additional note or detail information about the item.

Figure 9. Page of the item's detail

d) Page for claiming an item

The users can claim an item that posted by a searcher or a finder by answering a very specific security question related to the item physically. This process is purposely to make sure if the item in question is truly related to one of them, as shown by Figure 10.

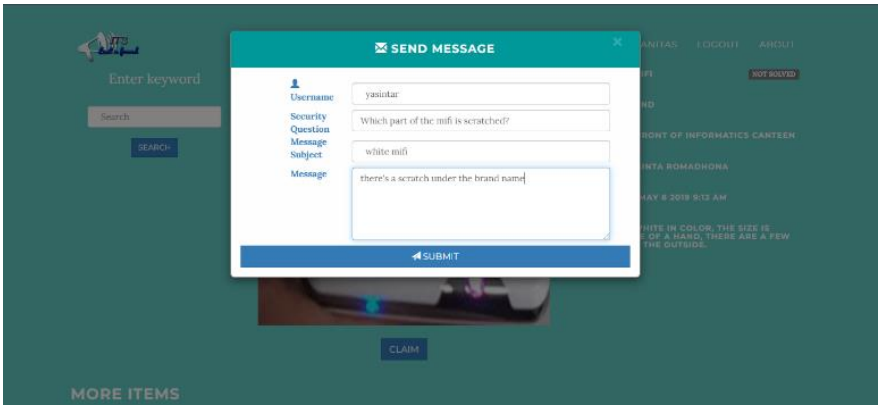

Figure 10. Page for claiming an item

e) Page for direct message

If a user has made a claim for an item, then the claim message will be received by the intended user. Both of the users can communicate with each other by exchanging messages to ensure the items in question, as shown in Figure 11.

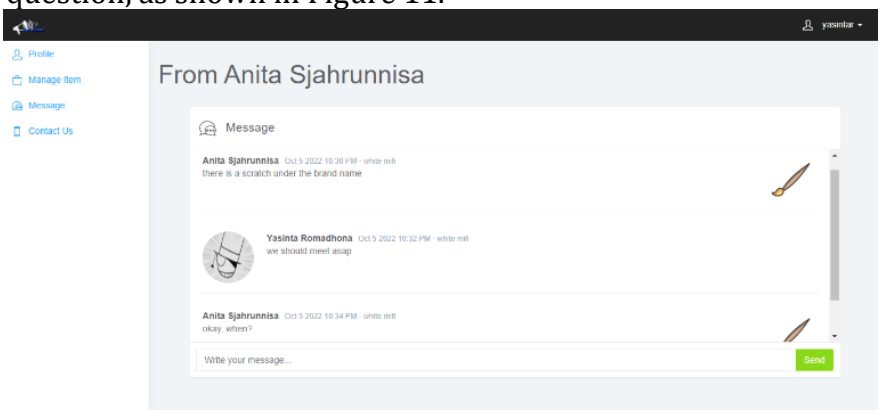

Figure 11. Page for direct message

f) Page for adding an item

The users can post some required information of lost or found item by filling in the form consists of name, picture, location, datetime, description, and security question, as shown in Figure 12 below.

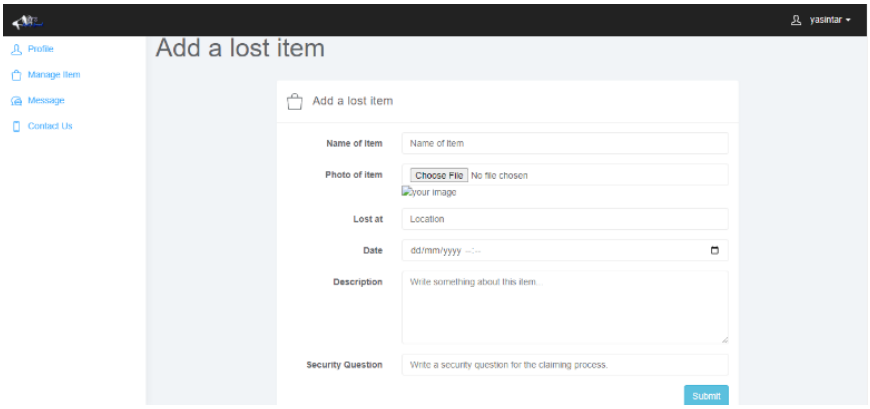

Figure 12. Page for adding an item

3.4. Usability Testing

The source of the research data used was to take a sample of 25 students in a certain campus area for answering questions about usability that had been applied to the Lost and Found website. The formula for calculating the SUS score can be seen in Equation 2, and the list of questions for respondents is shown in Table 3. Here are the stages of System Usability Scale testing as follows:

1) The users filled out an online form after directly using and assessing the functionality of lost and found website.
2) The total users or respondents are 25 people.
3) Each respondent is marked as R1-R25 respectively.

$$SUS\ Score = \sum \begin{pmatrix} (Q1-1)+(5-Q2)+(Q3-1)+(5-Q4)+(Q5-1)+ \\ (5-Q6)+(Q7-1)+\ \ (5-Q8)+(Q9-1)+(5-Q10) \end{pmatrix} \times 2.5 \qquad (2)$$

The following are the calculation stages for Lost and Found website using the System Usability Scale (SUS):

1) After getting the answers from users by filling out the online form, a score of 10 questions is obtained.
2) Then, it is calculated by following Equation 2 based on the score of each question for each respondent.
3) Odd numbered questions are marked as 1, 3, 4, 7, and 9. Each of the obtained score is deducted by 1.
4) Even numbered questions are marked as 2, 4, 6, 8, and 10. Each of the obtained score is subtracted from 5.
5) From the scores obtained, all of them are added up and then multiplied by 2.5, as shown in Equation 3.
6) From the score obtained, it is divided by the total number of all respondents, as shown in Equation 3.
7) The result is a final score from the System Usability Scale for Lost and Found websites.

Table 3. Calculation result

Respondent	Calculation Result

	Total	Value
R1	36	90
R2	27	67.5
R3	36	90
R4	29	72.5
R5	30	75
R6	27	67.5
R7	30	75
R8	27	67.5
R9	28	70
R10	28	70
R11	35	87.5
R12	33	82.5
R13	30	75
R14	33	82.5
R15	32	80
R16	29	72.5
R17	32	80
R18	28	70
R19	33	82.5
R20	31	77.5
R21	32	80
R22	31	77.5
R23	32	80
R24	30	75
R25	31	77.5
Total Value		770

The total score obtained from all questions Q1 to Q10 on respondents value R1 to R25 is 770. Then, the final score for this system feasibility is as follows:

$$SUS\ Score = 770 \times 2.5 = \frac{1925}{25} = 77 \quad (3)$$

As shown in number 3, the result obtained from testing the system is 77 and it is considered as “Acceptable” or “Feasible”.

4. CONCLUSION

The purpose of this research is to build a management system to overcome the problem of lost and found items in a campus area, as well as to test its usability to the users, and to get some input for future improvements. Based on the implementation phase, we have sucessfully built a website-based management system for lost and found item in a campus area. Furthermore,

based on the System Usability Scale (SUS) calculation undertaken for twenty-five users, the total score for usability testing of the system was 77. Based on the researchs [20][25], a SUS score above 68 would be considered above average, and anything below 68 is below average. With these results, it can be concluded that this website-based information system is feasible and can be used quite well by the users.

The development recommendations for this system can be made on the direct message feature. The direct message feature can be added by using GPS to make it easier to return items and developing an image or video upload feature to make it easier to confirm items. Moreover, this system can be developed using the MVC (Model, View, Controller) concept to make it easier to modify and maintain, as well as using a larger database capacity.

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