



Implementation of Whatsapp Chatbot for Consumer Complaints (Case Study: PT. Kipa Teknologi Indonesia)

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Abstract— The problem currently being experienced by PT Kipa Teknologi Indonesia is that in whatsapp online business activities are often used for customer service purposes due to the large number of customers, it is often difficult for customer service admins to answer one by one messages from customers and again business activities that require customer service to be online for 24 hours make companies often divide customer service admin time into 3 or 4 shifts every day which of course will make the company spend a lot of resources and time. The solution to these problems is one of them with the implementation of chatbot as a digital service in customer service itself is expected to save operational costs, 24-hour customer service and increase interaction with customers who are more proactive so as to cause customer loyalty retention. This research applies SWOT analysis to find out the shortcomings of the existing system. The system design uses UML diagrams and the application of the SDLC method. This system is built in the form of a website with a MongoDB database. The results of customer satisfaction testing using the Weighted Average Factor (WAF) method show a value of 9.8684 which means it falls into the Very Satisfied criteria. The whatsapp chatbot application system for the website-based consumer complaint process with the mongoDb database server has been successfully carried out, so that it can produce chat automation, automatic replies and can serve consumers in a timely manner or real time and the process is in accordance with expectations and improves company performance to be effective and efficient.

Keywords— Customer services, consumer complaints, whatsapp chatbot, online business, Weighted Average Factor.

I. INTRODUCTION

Most people are familiar with the term internet along with the rapid development of technology today. Internet protocols are used to connect various computer networks around the world. It allows users to access different types of information because the internet allows many things, including businesses [1]. In the world of information that consumers want, information technology is very important today. The development of information technology will definitely affect customer behavior and thinking. Consumers' need for relevant, cheap, and easily accessible information is good and correct information quality. The development of information technology is getting more and more rapid, and consumers can now access all the information they need without being limited by space and time [2].

With social development in Indonesia, society will become an information society, namely people who use telecommunications as part of their daily activities. As a result, the demand for telecommunication services in quantity and quality will increase. The condition of the above community can be seen in the daily social activities of the community, where many people of all ages, from children to gods. There are now many devices

that can be used to access the internet from anywhere, whether in the office, at home, or in the car. With the increasing public demand for the internet, telecommunication operators are forced to innovate to meet the demands of the people in Indonesia and around the world [3]. During the use and implementation of information systems, it is possible that various risks may arise that can threaten the sustainability of business processes. Management of the possibility of the emergence of these various risks is something that needs to be considered [4].

Every business or organization has high expectations for providing a good customer experience. Companies can build a good image by considering many aspects, one of which is service. Service is the overall organizational process in shaping the image, internal culture, and communication with the government, the public, and other stakeholders. Any effort made by a person or organization to meet customer needs is called service. Between 2018 and 2025, the rapid growth of technology has placed education as one of the top ten industries in the use of artificial intelligence. The use of chatbots, for example, is becoming a growing trend due to the practicality and advantages it offers, especially along with software development [5].

With the rapid development of technology in today's modern era, humans are increasingly eager to create and integrate technology into everything. As technology becomes more sophisticated, human life will be easier to do. This is what encourages humans to continue to develop technology. WhatsApp is an instant messaging app that works as a replacement for SMS, or short messaging services, on internet-connected mobile devices. Quoted from the 2019 data kominfo.go.id channel, it was found that there are 171 million internet users in Indonesia or 64.4 percent use the internet, of which 83 percent of the 171 million are WhatsApp users. Pay attention to the following fig.1:

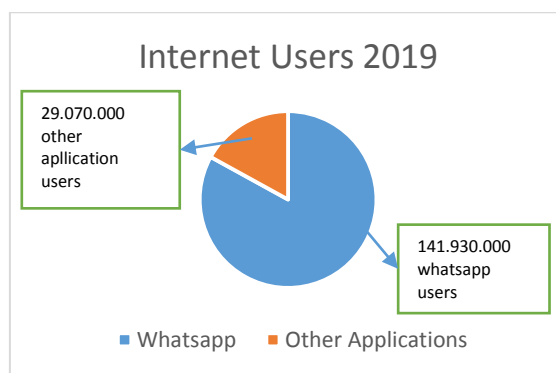


Fig.1 Graph of internet users 2019

WhatsApp is widely used in campus or business environments to communicate informally between employees to talk about various projects or tasks, as well as to share information between employees across departments and projects. PT. Kipa Teknologi Indonesia was established in 2019, is a company engaged in digital products to help MSMEs. has an office that only exists in Malang. PT. Kipa Teknologi Indonesia has several internship partners with other large companies regarding the needs of the equipment concerned. In information technology, there is the so-called automation process, which is a technique to replace human labor with machines that allow the process to be carried out more easily without the need for human supervision.

One of the technologies that can be applied is the creation of a chatbot application that can automatically answer every question asked by each customer related to the complaints they feel. Currently, WhatsApp technology, especially chatbots, has been widely used in various fields, such as education, e-commerce, government, companies, and the public. In April 2021, WhatsApp users worldwide were the most compared to any other social media platform [6]. Through Whatsapp chatbot, several customer service services can be done more flexibly. Simply send chat input to the customer service number and it will be answered immediately according to the request. With this Whatsapp chatbot, direct customer service can be done online and work for 24 hours.

In the era of technology 4.0 development, WhatsApp chatbots are essential for digital transformation and communication speed. The chatbot responds to user queries by talking to humans through text and voice. Chatbots are virtual assistants that companies today use such as Spotify and Sephora to study consumer behavior and answer questions. Chatbots allow human resources to concentrate on larger, qualitative work while improving the business with less effort. In addition, they help automate replies to similar questions. Replying to questions is no longer limited to office hours and can be accepted in seconds [7]. Chatbots are suitable for answering common and frequent questions with almost the same answers [8].

Chatbots are basically created to help users program. Google Colab is a web-based application provided by the Python programming language. It can be accessed through any device, both desktop and mobile. However,

the small appearance of Google Colab's interface on mobile devices makes it quite difficult to use [9]. With so many users in Indonesia, conversational platforms are the right place to create automated note-taking tools that use chatbots. This is because more and more internet users are using chatbots. 1.8 million chatbots are projected to be used to interact with customers in 2021 [10]. Chatbots are usually used on various social media platforms such as Facebook, Telegram, LINE, WhatsApp, and many more with a rule-based system because they do not require a training process such as the Natural Language Processing (NLP) approach [11]. Chatbots have many advantages, such as reducing human error, providing faster and automated responses, and being accessible whenever you are online. While chatbots usually don't have better interactions because the answers are pre-arranged. Chatbots are currently being created and continue to be developed [12].

Although WhatsApp Bots have a lot of potential, not many people know how effective they are in serving the community. There is no answer to the question of how these bots affect interactions with the community and the level of user satisfaction with the services provided. There are also concerns about the bot's ability to handle complex questions and provide personalized responses [13]. One of the parts of the company that plays an important role in customer service is Customer Service (CS). The services provided are aimed at the digital world through the use of AI technology. The time to respond to customer complaints and needs is often a special concern if customer service is done face-to-face. This is because customer service will immediately respond to customer complaints or needs in real-time. Chatbot development is needed to be able to create digital responses. CS is an important benchmark in determining customer satisfaction in terms of complaints or problems [14].

The problem currently being experienced by PT Kipa Teknologi Indonesia is that in whatsapp online business activities are often used for customer service purposes because of the large number of customers, it is often difficult for customer service admins to answer one by one messages from customers and again business activities that require customer service to be online for 24 hours making the company often divide the customers service admin time into 3 or 4 shifts every day which of course will make the company spend a lot of resources and time. Service is a sequence of actions or activities that occur in direct physical interaction of a person with a machine or other person, and serves to meet customer needs [15]. The goal with the implementation of chatbot as a digital service in customer service itself is expected to save operational costs, 24-hour customer service and increase interaction with customers who are more proactive so as to cause customer loyalty retention. This can be reinforced from several surveys of around 800 businesses using chatbots, it is estimated that by 2020 almost 80% of businesses will experience an increase in their revenue.

In line with research on consumer complaint chatbots, Aji [16] argues that live chat assistance services are handled by one officer every day, just like face-to-face support services. Taxpayers can contact the officer through their WhatsApp, and the officer will respond through their smartphone or through a link to <https://web.whatsapp.com> website. The chatbot is built using chatbot creator apps, such as AutoResponder for WhatsApp from AutoResponder.ai (Germany) and WhatAuto Reply-App from Bringar Apps (Michigan, USA), both of which are available on the google playstore.

In the data collection stage, Hanif [6] argued that secondary data collection from previous references and journals on chatbot development. These references can come from previous research published in various journals, books, proceedings, blogs, websites, and online libraries. This is done to gain an understanding of the various concepts and theoretical foundations that will be used when creating chatbots for academic services in college. In Mahendra's research [3], at the stage of designing the system design using Unified Modelling Language (UML) which in this study used Usecase Diagram, Activity Diagram, Class Diagram, Sequence Diagram which will later produce a document called software requirements.

The researcher agrees with Suryana[7] that Visual Studio Code is the main IDE for the project. VS Code was chosen because it is lighter and has a rich market of extensions. Angular 9 was then chosen as the framework for creating web templates. AngularJS is supported in most contemporary browsers and is supported by many online forums.

II. RESEARCH METHOD

A. Data Sources

a. Primary Data

The primary data in this study was obtained from the results of interviews conducted by asking directly to CEO David Rusdianto, Director of Operations, Head of Division, Head of R&D and HR. The information and data include the customer service team, how the communication channels that have been built, how the process of recording problems complained about by customers through various available connections, how the problem analysis process, how the problem solving process and how the communication process with customers regarding solutions to problems that have previously been complained about.

b. Secondary Data

Secondary data from this study is obtained from records from reports, books, and scientific journals related to this research. Data is obtained from the literature media about theories about the objects used in the creation of the application, so that this application can be used as an application based on the correct theory.

B. Data Collection Techniques

1. Literature Study Method

The researcher conducts a literature study by looking for references from books and scientific journals related to the research being studied. In this case the data collection is by; get from archives, reports, recordings that have been collected by others. The purpose of this literature study is to strengthen the ideas or opinions that exist in the research.

2. Observation Method

That is a method to obtain data by making direct observations, analyzing and systematically recording the customer service process online through the WhatsApp application with an 8-hour x 3 work system.

3. Interview Method

The interview was conducted with direct questions and answers to find information by asking for information from CEO David Rusdianto, Director of Operations, Head of Division, Head of R&D and HR.

C. Research Flow Diagram

The Flow Diagram is used as a reference standard for the research stages, which is described as a diagram that is equipped with explanations for each stage. These are the steps taken from the beginning to the end of the study: Notice in the following fig. 2:

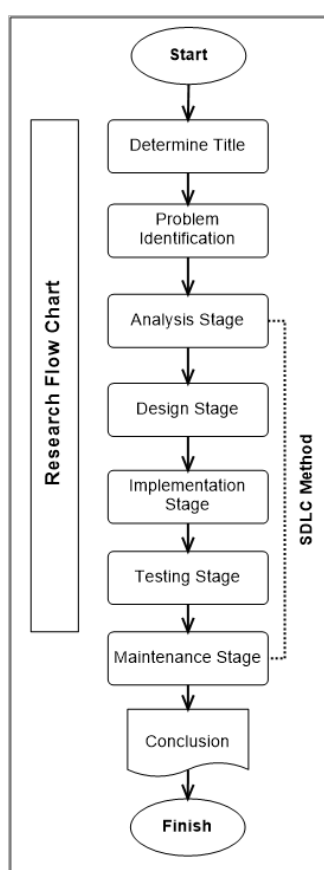


Fig.2 Research Flowchart

The explanation of each flow includes the following:

1. Define a title

This is the first step, which is to find the subject and title of the research.

2. Identify problems

is a stage in understanding the current problem using techniques such as interviews and literature studies, and the results are used to determine the amount of data required.

3. Analysis Stage

This stage is the stage of analyzing the needs of the system to be built with the strategic planning analysis method to monitor and evaluate the environment, both internal and external environments. It is essential to gather the information necessary to build the system thoroughly. This information must support all the elements necessary to achieve an outcome that meets all the requirements associated with the design of the system to be included [17].

4. Design Stage

In this system design stage, the design of the system display, system data input, output devices, and system database design are carried out. This stage uses UML diagrams (usecase diagrams, activity diagrams, sequence diagrams, and class diagrams), and the output will provide an explanation of the system that has been created [18].

5. Implementation Stage

Application design determines the implementation of the system. This process begins by assessing the needs of supporting devices, such as Visual Studio code and MongoDB for data storage. MongoDB is better for data management than SQL. Further understanding is needed because the features of SQL databases are different [19].

6. Testing Stage

The system testing stage is carried out to determine the suitability of the application system with the test design stage using the black box testing method. If the testing results are not in accordance with the planning stage, it will return to the problem identification stage. However, if it is in accordance with the planning stage, then the conclusion will be continued. The training process of the model algorithm is paid great attention and is run repeatedly to ensure high accuracy and low error value [20]. In addition, validation of the proposed method is carried out. Method or model validation is essential to test the reliability of the model [21].

7. Maintenance Stage

To address minor issues or the addition of new features, a system maintenance stage is required.

8. Conclusion

This stage is the stage of withdrawing the results of all stages of research that has been carried out.

D. SDLC Development Method

Researchers prefer SDLC as a system development method. SDLC was chosen because it is considered easy in terms of problem identification and also in terms of system design according to their needs. Fig.3 is an overview of the waterfall model according to Pressman [22]:

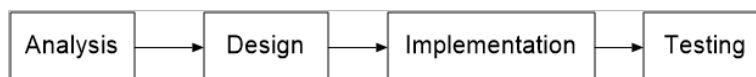


Fig.3 Stages of SDLC Waterfall model according to Roger Pressman

E. SWOT Analysis

SWOT analysis is the process of identifying strengths, weaknesses, opportunities, and threats that affect business performance. Suppliers, government documents, customers, bankers, and other business associates are some of the external sources of information about opportunities and threats. Many businesses use scanning services for newspaper scrolling, internet research, and analysis of trends relevant in the country and around the world [25]. SWOT analysis is a powerful tool in strategy analysis because it allows strategists to maximize strengths and opportunities. It serves as a tool to minimize organizational weaknesses and suppress the impact of the threat posed.

The following is an explanation of each variable in the SWOT analysis:

1. Strengths

The characteristics or abilities that make a company better than its competitors are called strengths. The built organization has an edge compared to other companies in the market due to their specialized expertise. Businesses need products, skills, and other advantages to compete with competitors. Therefore, when planning a business, it is important to consider the current needs of the market. The company's overview, financial resources, and strategic location are some of the strengths [25].

2. Weaknesses

In carrying out organizational functions, weakness is a challenge that must be faced by a person, with all limitations or shortcomings from various factors. Signs of weakness in the organization include lack of adequate facilities and infrastructure, management incompetence, failure of effective marketing, and consumer unattractiveness to the products produced [25].

3. Opportunities

Opportunity is a state of affairs that is happening today and can be taken advantage of by businesses. For example, changes in rules, changes in market competition, and so on [25].

4. Threats

Threats are various indications in an unfavorable environment, which if not eliminated will hinder or jeopardize business performance. Some examples of these threats include the proliferation of competing companies, economic crises, and so on [25].

III.RESULTS AND DISCUSSION

A. SWOT Analysis Results

After conducting research by distributing questionnaires to 20 respondents consisting of CEO David Rusdianto, Director of Operations, Head of Division, Head of R&D and HR related to the online customer service process through the proposed WhatsApp application, it will then be analyzed and compared. In this analysis stage, the researcher will analyze the old system based on 4 SWOT variables (Strengths, Weaknesses, Opportunities, and Threats) and compare it with the proposed new system.

This SWOT analysis can help companies to better plan their chatbot implementation strategy. By knowing the strengths, weaknesses, opportunities, and threats faced, companies can identify the best way to implement consumer complaint services through WhatsApp chatbots effectively.

Based on the analysis and discussion that was admitted, it was agreed to create a system that can automatically answer the problems that have been experienced by consumers. WhatsApp chatbot was chosen because most Indonesia people use the WhatsApp application as a medium to communicate. The WhatsApp chatbot system that is created has several menus that can be chosen by consumers according to the needs and problems that are most often experienced. The system will automatically respond with an answer that corresponds to the selected menu.

The following are the results of the SWOT analysis:

1. Strengths

The following Table 1 shows the results of the strength analysis of the proposed new system from this study:

Table 1
Strengths Analysis results

Parameters	Current System	Proposed System
Strengths	Company Reputation: If the company has a good reputation, customer trust can be relied upon as a strength to implement a consumer complaint service through WhatsApp chatbot. Financial Resources: If the company has sufficient financial resources, these can be used to develop and support the implementation of WhatsApp chatbot. Qualified IT Team: If the company has a competent IT team, this can be a strength to develop, manage, and maintain the WhatsApp chatbot efficiently.	Efficiency: Chatbots can provide instant and automated responses, eliminating the need to wait for a response from a human customer service staff. Scalability: Chatbots can handle multiple requests simultaneously without compromising the quality of service. 24/7 availability: Chatbots can provide round-the-clock customer service, without being tied to specific business hours or time zones. Cost Savings: Using chatbots can reduce the need for human customer service staff, resulting in cost savings in the long run. Consistency: The chatbot provides a consistent response and is not affected by emotions or fatigue.

2. Weaknesses

Table 2 below shows the results of the weaknesses analysis of the proposed new system from this research:

Table 2
Results of weaknesses analysis

Parameters	Current System	Proposed System
Weaknesses	Lack of Technical Knowledge: If a team or organization has a lack of technical knowledge in chatbot development, this can be an obstacle to adopting the technology. Inadequate Technology Infrastructure: If a company's technology infrastructure is inadequate to support chatbots, this can become an obstacle in its implementation. Human Resource Limitations: If a company has human resource limitations, such as insufficient workforce, chatbot implementation may become more difficult.	Limitations of Capabilities: Chatbots may not be able to handle complex questions or issues or that require deep understanding or human judgment. Reliance on Clear Input: Chatbots rely on a precise understanding of customer input. If the question or request is unclear, the chatbot may generate an unsatisfactory response. Difficulties in Context Recognition: Chatbots can have difficulty understanding the context and nuances of a conversation, resulting in irrelevant or incorrect responses.

3. Opportunities (Peluang)

Table 3 below shows the results of the opportunity analysis of the proposed new system from this research:

Table 3
Opportunities analysis results

Parameters	Current System	Proposed System
Opportunities	Improved Customer Service Efficiency: Using WhatsApp chatbots can improve customer service efficiency by providing quick and automated responses to consumer complaints. Increased Customer Engagement: Chatbot implementations can improve customer engagement by providing a more interactive and responsive experience. Innovative Image Enhancement: Adopting new technologies such as chatbots can improve a company's image as an innovative and progressive company.	Improves Customer Service: Chatbots can improve the speed and responsiveness of customer service, improving customer satisfaction and the overall experience. Data Collection and Analytics: Chatbots can collect data about customer preferences and needs, which can be used to understand trends, create more customized products or services, and make data-driven business decisions. Usage across Multiple Channels: Chatbots can be integrated with various platforms and channels, such as websites, mobile apps, or social media platforms, to provide consistent customer service across those channels.

4. Threats (Ancaman)

The following Table 4 shows the results of the threat analysis of the proposed new system from this study:

Table 4
Results of Threats Analysis

Parameters	Current System	Proposed System
Threats	High Cost of Implementation: The cost of developing, training, and maintaining a chatbot can be a threat, especially if the company has budget constraints. Customer Resistance to New Technology: Customers may be resistant to the use of chatbots, especially if they prefer to interact with humans in handling their complaints. Intense Competition: If competitors are already adopting chatbot technology, not following this trend may cause companies to lose customers and profits.	Technical Errors or Failures: Chatbots can experience technical errors or failures, which can disrupt the user experience and cause frustration. Lack of Personalization: Chatbots tend to provide generic responses and cannot provide the personalized experience that human interaction can provide. Rising Customer Expectations: As technology advances, customers may have increasingly high expectations of chatbot capabilities, and failing to meet those expectations can lead to customer disappointment.

B. System Implementation

The following is the user interface of the WhatsApp chatbot application.

1. Login Page

In the following fig.4 is the result of the implementation of the admin login page, where there is a user id and password and a Login button.

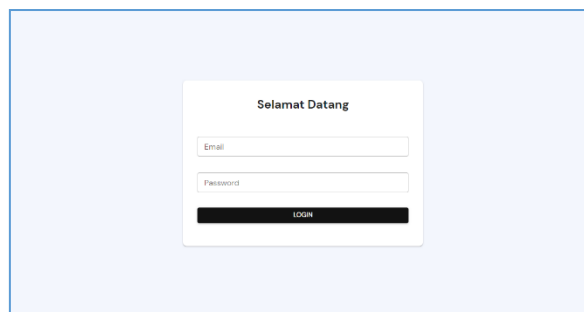


Fig.4 Login Page

2. Device Page

In the following fig.5 is the result of the implementation of the device page, on the far right there is an add account button to add a new account. Then on the left is the account that has been registered before.

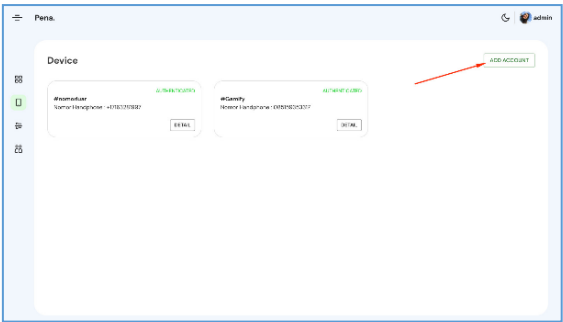


Fig.5 Device Page

3. Automation/Rules Page
- In fig.6 below is the result of the implementation of the automation page, where in the upper left there is an add rule button to add a new rule under which there is a list of rules that have been recorded. The right side contains information forms related to rules.

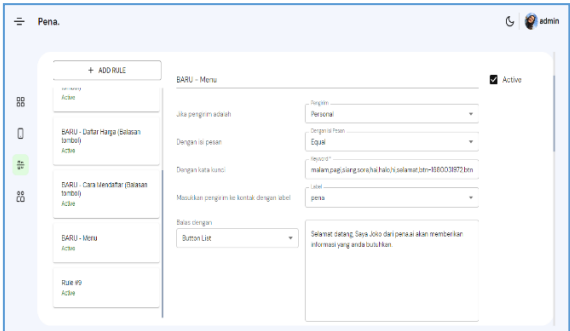


Fig.6 Automation/Rules Page

4. Contact Page
- In fig.7 below is the result of the implementation of the contact page, where at the top right there is a contact import button and export contact and then at the bottom there is an add contact button to create a new contact, label and add new label. At the bottom of the table is a table that displays contact data along with edit and delete buttons.

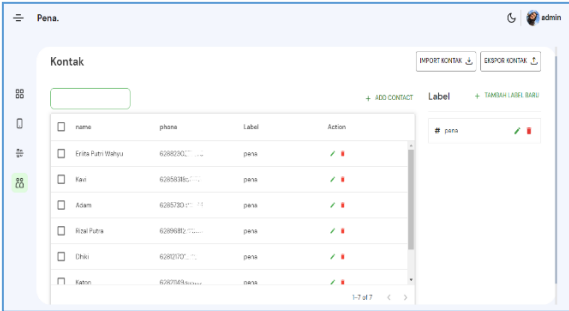


Fig.7 Contact Page

5. Response
- In fig.8 below is the result of the implementation of the whatsapp bot, where this display is an example of the response generated on the customer's whatsapp.

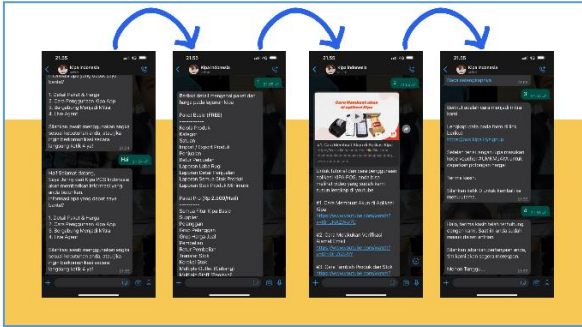


Fig.8 Response Page on Customer Whatsapp

C. System Testing

1. Blackbox Testing

Blackbox testing is a software testing technique that tests the functionality of an application outside of its internal structure or working. Testers find valid and invalid inputs and produce correct outputs, as shown in table 5 below:

Table 5
Blackbox Testing Results

No	Tested menu	Test Case	Expected result	Test Result	Conclusion
1	Login Page	Username box is not filled in text	Login unsuccessful	Accepted	Valid
		Password box is not filled with text		Accepted	Valid
		The Login button is pressed		Accepted	Valid
		The Username box is filled with the text 'admin'	Login unsuccessful	Accepted	Valid
		Password box is not filled with text			Valid
		The Login button is pressed			Valid
		Username box is not filled in text	Login unsuccessful	Accepted	Valid
		The Password box is filled with the text 'admin'			Valid
		The Login button is pressed			Valid
		The Username box is filled with the text 'admin'	Login is successful, a dashboard menu appears	Accepted	Valid
		The Password box is filled with the text 'admin'			Valid
		The Login button is pressed			Valid
2	Dashboard Page	Show number of sent messages	Displays the number of messages sent	Accepted	Valid
		Show number of auto-replies	Displays the number of automatic replies	Accepted	Valid
		Show total incoming messages	View the total number of incoming messages	Accepted	Valid
3	Device Page	Add device account	Successfully add a new device account	Accepted	Valid
		Edit device account	Successfully update your device account information	Accepted	Valid
		Delete device account	Successfully delete the device account	Accepted	Valid
		View details	Successfully display device account information details	Accepted	Valid
4	Automation Page	Add new rule	Successfully save new rule data	Accepted	Valid
		Edit rule	Successfully update data rules	Accepted	Valid
		Delete rule	Successfully deleting a data rule	Accepted	Valid
5	Contact Page	Import contacts	Successfully import contacts	Accepted	Valid
		Export contact	Successfully export contacts	Accepted	Valid
		Add contact	Successfully add a new contact	Accepted	Valid
		Add new label	Successfully add a new label	Accepted	Valid
		Edit contact	Successfully update contact data	Accepted	Valid
		Delete contact	Successfully delete contact data	Accepted	Valid
6	Logout button	Exit the system and return to the login page.	Log out of the system and return to the login page.	Accepted	Valid

2. Weighted Average Factor (WAF) Testing

The following is a list of questionnaire questions to measure customer satisfaction using the Weighted Average Factor (WAF) method based on the factors mentioned:

- a. Response Speed
 - How quickly do we respond to your complaint? (1.1)
 - How satisfied are you with our speed in handling complaints? (1.2)
- b. Solution Quality
 - How effective are the solutions we provide to resolve your complaint? (2.1)
 - How satisfied are you with the quality of complaint resolution we provide? (2.2)
- c. Staff Attitude and Friendliness
 - How good is the attitude and friendliness of our staff in serving you? (3.1)
 - How satisfied are you with the attitude and friendliness of our staff? (3.2)
- d. Ease of Complaint Process
 - How easy is the complaint process we provide? (4.1)
 - How satisfied are you with the ease of the complaint process that we provide? (4.2)
- e. Clarity of Information
 - How clear is the information we provide regarding the handling of your complaint? (5.1)
 - How satisfied are you with the clarity of the information we provide? (5.2)
- f. App view:
 - How satisfied are you with the look and interface of this consumer complaint service application? (6.1)
 - Is the app's interface easy to understand and intuitive to navigate? (6.2)
 - What is your overall impression of the visual appearance of this application? (6.3)
- g. Flexibility:
 - How easy can you use the features in this app? (7.1)
 - Is the app flexible enough to meet your needs in filing a complaint? (7.2)
 - What do you think about the ease of accessing and interacting with this application? (7.3)
- h. Usability:
 - How easy can you understand and navigate inside this app? (8.1)
 - Is the flow of using this application intuitive and efficient? (8.2)
 - Overall, what is the ease of use of this app? (8.3)
- i. Performance:
 - How quickly does the app respond and provide feedback on your complaints? (9.1)
 - Does this application run stably without experiencing any annoying issues/bugs? (9.2)
 - How do you assess the speed and accuracy of this application in handling complaints? (9.3)
- j. Overall Satisfaction:
 - Overall, how satisfied are you with your experience using this consumer complaint service app? (10.1)
 - Does this app meet or exceed your expectations in filing complaints? (10.2)
 - How likely are you to continue using this app in the future? (10.3)

WAF Calculation Steps:

- 1) Determination of the weight of each factor
 - Factor 1 : Response Speed (P1=6) □ Weight Factor 1 = $6/100 = 0.06$
 - Factor 2 : Solution Quality (P2=5) □ Weight Factor 2 = $5/100 = 0.05$
 - Factor 3 : Staff Attitude and Friendliness (P3=3) □ Weight Factor 3 = $3/100 = 0.03$
 - Factor 4 : Ease of Complaint Process (P4=9) □ Weight Factor 4 = $9/100 = 0.09$
 - Factor 5 : Clarity of Information (P5=8) □ Weight of Factor 5 = $8/100 = 0.08$
 - Factor 6 : Application display (P6=10) □ Weight Factor 6 = $10/100 = 0.1$
 - Factor 7 : Flexibility (P7=15) □ Weight Factor 7 = $15/100 = 0.15$
 - Factor 8 : Usability (P8=18) □ Weight Factor 8 = $18/100 = 0.18$
 - Factor 9 : Performance (P9=20) □ Weight Factor 9 = $20/100 = 0.2$
 - Factor 10 : Overall Satisfaction (P10=6) □ Weight Factor 10 = $6/100 = 0.06$
- 2) Calculate the Weighted Average Factor (WAF) value for each factor with the formula: $WAF = (\text{Factor weight}) \times (\text{Factor assessment value})$
- 3) Calculate the total Weighted Average Factor (WAF) by adding all WAF values for each factor.
- 4) Calculate the average Weighted Average Factor (WAF) by dividing the total WAF by the number of factors measured. The results are in the following table 6:

Table 6
Final WAF Results

Factor	Total Value
Factor 1	10,08
Factor 2	8,45
Factor 3	6,45
Factor 4	15,75
Factor 5	14,16
Factor 6	29,7
Factor 7	39,3
Factor 8	47,34
Factor 9	58,2
Factor 10	17,28
Average	9,8684

Based on the final result, the average value of WAF as the level of customer satisfaction in the consumer complaint service system is 9.8684 which means that it is included in the Very Satisfied criterion.

IV. CONCLUSIONS

Based on the results of the research that has been carried out, conclusions can be drawn, among others: The WhatsApp chatbot application system for the website-based consumer complaint process with the mongoDb server database has been successfully built with Next.js programming language. The results of functional tests or black boxes show 100% compliance, then the WhatsApp chatbot application that has been made valid and can be used by companies to improve service and increase customer satisfaction. The WhatsApp chatbot application system is able to automate chatting, automatic replies and can serve consumers in a timely or real time 24 hours non-stop, as well as the process is in accordance with expectations and improves company performance to be effective and efficient. Based on the results of customer satisfaction testing using the Weighted Average Factor (WAF) method with 10 influencing factors on the consumer complaint service system, whatsapp chatbot has a final score of 9.8684 which means it is included in the Very Satisfied criteria. In order to maximize its use in the future, there are several suggestions to the next researcher, namely The use of different design methods is possible to obtain a different result so that comparisons can be made, this program can still be added with other facilities to support the consumer complaint service process which is expected to be one of the advantages in terms of company services.

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