
Design and Build a Public Complaint Feature Via WhatsApp on the Adu.in Website with the Scrum Method (Case Study: West Java DPRD)

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ABSTRACT

The importance of the role of members of the Regional People's Representative Council (DPRD) as representatives of the community requires active involvement in absorbing, accommodating, collecting, and following up on community aspirations and complaints. However, the complaint process often faces obstacles that result in delays in resolving problems, ranging from the complexity of the complaint flow to the difficulty of finding an effective complaint platform. To overcome these challenges, an innovative step was taken, which was to create a website that provides a complaint feature via WhatsApp. The main objective of this initiative is to provide easier access to the community to participate in raising their complaints and complaints. With the WhatsApp complaint platform, it is hoped that the community can quickly and efficiently report problems and provide feedback to the local government. The WhatsApp complaint feature is integrated to minimize technical barriers and facilitate use by the wider community. Through this website, people can easily file complaints, send messages, and provide documentation related to the problems faced. With the implementation of this platform, it is expected that problem-solving can be done more efficiently and responsively. Thus, creating a public complaint website with a complaint feature via WhatsApp is not only a practical solution in dealing with the obstacles of the complaint process but also a significant step in encouraging active public participation in building a transparent and accountable government.

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1. Introduction

Public services, which attempt to meet public needs for goods, services, and administrative services, have an essential role in public administration (Mursalim, 2018). Public services can determine the direction of government policy and provide convenience to the community (Pemerintah Pusat, 2009). Direct community participation, primarily through aspirations, is vital to realizing effective public services (Lubis, 2011).

As a regional representative institution, the Regional People's Representative God has the functions of legislation, budget, supervision, and representation. Although the Act implies a representative function, the main focus lies on legislation, budget, and oversight (Asmawi, 2014). DPRD representation is essential as a form of political accountability of DPRD members to the public at the provincial and district/city levels.

Local governments aim to increase community participation in complaints and public services. However, obstacles in the complaints process, such as late resolution and a need for a practical platform, are challenging. The survey results showed that most respondents felt that public service complaints in West Java could not be adequately resolved, affecting community involvement.

Various public complaint applications, such as LAPOR!, a web-based complaint service system, and an SMS gateway, have been introduced. However, public awareness of these applications still needs to grow. The survey showed that most respondents needed to be aware of any West Java public complaint platforms.

The West Java Provincial DPRD's use of websites with social networking systems and WhatsApp Gateway can increase community involvement. Data from the Ministry of PAN-RB in 2019 shows that as many as 35% of complaints come through the official websites of government institutions. WhatsApp, Indonesia's most widely used instant messaging application, can increase public participation in complaints (DataIndonesia.id, 2023).

By providing a complaint platform through the website and WhatsApp, the public can easily report problems and provide feedback to the government. This is expected to increase public participation in complaints and public services, provide better services, and contribute to developing information and communication technology in Indonesia.

2. Materials and Methods

This research was conducted using the scrum method. In developing the community complaint feature via WhatsApp, scrum provides the flexibility and adaptability to deal with changes and growing complexity. Scrum uses an iterative and incremental approach, where website development is divided into short iterations called sprints. Each sprint focuses on developing, testing, and delivering features to users. This allows product owners and development teams to get feedback quickly and continuously make adjustments.

Scrum

Scrum is a framework that solves complex and ever-changing problems and presents high-quality products creatively and productively based on user requests (Diansyah et al., 2023; Sutherland & Schwaber, 2016). Scrum is an iterative and incremental model that builds software with defined

mechanisms, such as developing software modules in small chunks in an iterative manner. Scrum is designed to increase the productivity of the development process, align individual and organizational goals, define a culture that focuses on performance, support shareholder value construction, have good communication at all levels, and promote clear development and quality of life. Scrum is a very flexible model that can be applied to any project from any industry, whether small or large.

User Acceptance Testing (UAT)

User Acceptance Testing (UAT) in software development ensures that the solutions developed match the needs and expectations of the end user. UAT is not only about verifying software stability or meeting technical requirements but also about the effectiveness of using solutions in the context of everyday activities (Otaduy & Diaz, 2017). Engaging users in the UAT process provides an accurate view of the system's functionality and ease of use (Klein, 2003; Sualim et al., 2016). With detailed feedback, UAT ensures that user perspectives and needs are well integrated into solution development.

Black Box Testing

Blackbox testing is a testing method that evaluates software functions regardless of the internal structure or implementation of the source code. This method ensures that all software functions run correctly according to predetermined functional needs (Sulistyanto & SN, 2014). The black box testing process begins with establishing the functional specifications of the software, followed by designing test data based on those specifications. Test data is used to evaluate software functions during execution. During testing, the output or response of the software is checked to ensure conformity with pre-established expectations and functional requirements (Nurudin et al., 2019). This approach allows the software performance evaluation from the end-user's perspective without requiring an in-depth understanding of the software's specific programming language and internal structure (Nidhra & Dondeti, 2012).

Load Testing

Load testing is a type of non-functional testing that is important for evaluating the performance of a system in various possible situations. The goal is to prevent system failures by identifying obstacles that can cause applications to take too long to load or even fail to access. The load testing method involves an assessment of performance by an external system that performs repeated transactions to the application, allowing the identification of application bottlenecks and the presentation of the quality of its operations (Demashov & Gosudarev, 2019). This process involves putting a load on software systems with varying levels of users to evaluate system responsiveness in various usage scenarios. The primary purpose of load testing is to measure system performance under varying loads, including situations where many users use the system simultaneously or traffic spikes. This test measures system response time, CPU, memory, bandwidth utilization, and overall performance. By performing load testing, we can identify performance issues such as slow response times or system failures when user load increases (Pargaonkar, 2022).

3. Results and Discussions

System development is carried out using the scrum method. The following are the results of developing a complaint feature via WhatsApp that will be received and replied to using auto-reply.

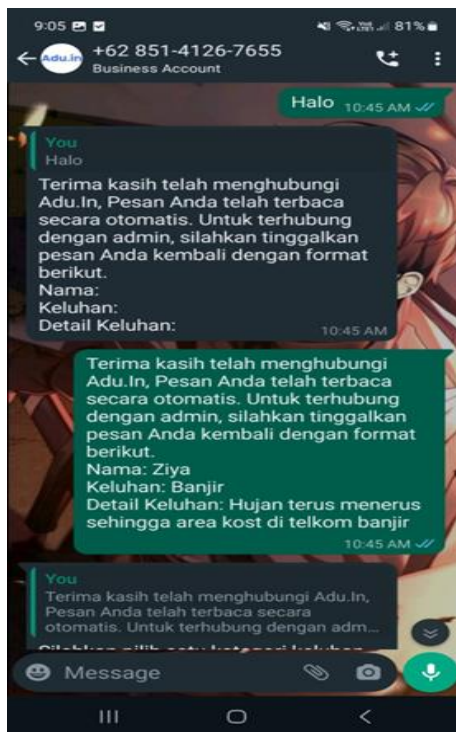


Figure 1 Results of Developing the Complaint Feature via WhatsApp

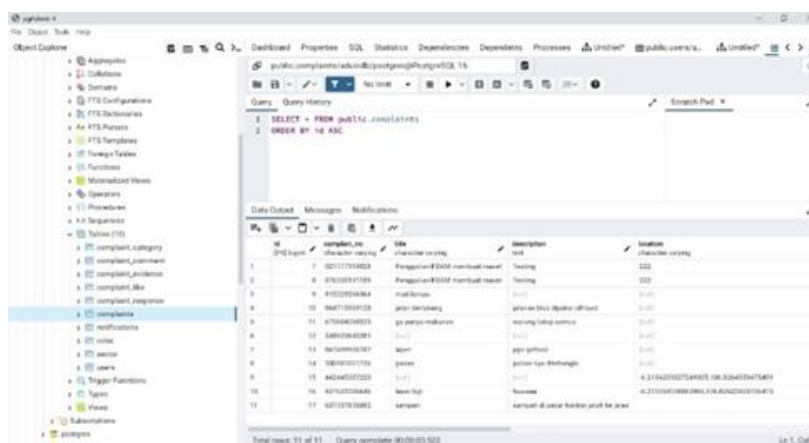


Figure 2 Database of Complaint Features Through WhatsApp

Next, the resulting system is tested using User Acceptance Testing (UAT) and Blackbox Testing.

Sprint 1

Sprint 1 will be conducted from October 16 to November 10, 2023. In this sprint, the WhatsApp chatbot was developed using Node.js, libraries from WhatsApp-web.js, and Website features to redirect users to WhatsApp.

The results of the sprint review are shown in Table 1 below, which contains the sprint backlog and the review status or description.

Table 1 Sprint Review 1

No.	Backlog	Information
1.	Display WhatsApp features on the website	As needed
2.	Redirect the WhatsApp icon to the WhatsApp app	As needed
3.	Generate WhatsApp QR code for admin	As needed
4.	Create a reply message to a specific number	As needed
5.	Display WhatsApp features on the website	As needed

Sprint retrospectives are conducted to evaluate performance during the sprint period. The results of the sprint retrospective can be seen in Table 2 below.

Table 2 Sprint Retrospective 1

No.	Question	Answer
1.	What is going well in this sprint?	All product backlogs can be adequately resolved.
2.	What could have gone better in this sprint?	<ul style="list-style-type: none"> - Working on the backlog and making reply messages to a specific number takes a while because one needs to find the correct logic and techniques to get the expected results. - The team's communication method to deal with deficiencies in product backlog work has failed.
3.	What can we do differently in this sprint	Increase the intensity of communication between team members.

Sprint 2

Sprint 2 will be conducted from November 11 – 25, 2023. In this sprint, a WhatsApp chatbot was developed using Node.js, libraries from WhatsApp-web.js, and WhatsApp features on the website to receive and send messages.

The results of the sprint review can be seen in Table 3 below, which contains the sprint backlog and the review status or description.

Table 3 Sprint Review 2

No.	Backlog	Information
1.	Create a reply message to a message template	As needed
2.	Save a template message	As needed
3.	Create a reply message to select a complaint category	As needed
4.	Save a selection of complaint categories.	As needed

Sprint retrospectives are conducted to evaluate performance during the sprint period. The results of the retrospective sprint can be seen in Table 4 below.

Table 4 Sprint Retrospective 2

No.	Question	Answer
1.	What is going well in this sprint?	Predefined product backlog completed successfully.
2.	What could have gone better in this sprint?	Because Whatsapp's development features and the main website are separate, code adjustments are needed to integrate the database.
3.	What can we do differently in this sprint?	Communication between team members is smoother, and backlog work is on target.

Sprint 3

Sprint 3 will be conducted from November 26 to December 31, 2023. In this sprint, a WhatsApp chatbot was developed using Node.js, libraries from WhatsApp-web.js, and WhatsApp features on the website to receive image and location formats and send messages.

The results of the sprint review can be seen in Table 5 below, which contains the sprint backlog and the review status or description.

Table 5 Sprint Review 3

No.	Backlog	Information
1.	Create a reply message to request a photo	As needed
2.	Save submitted photos	As needed

3.	Create a reply message to request location-sharing	As needed
4.	Save a shared location	As needed
5.	Create a reply message to confirm that the complaint has been received	As needed

Sprint retrospectives are conducted to evaluate performance during the sprint period. The results of the sprint retrospective can be seen in Table 6 below.

Table 6 Sprint Retrospective 3

No.	Question	Answer
1.	What is going well in this sprint?	All backlog products can be completed.
2.	What did not go well in this sprint	Difficulty saving submitted images and locations.
3.	What can we do differently in this sprint	Working on the product backlog is more disciplined.

Testing

After each development phase, each sprint performs system testing using Blackbox Testing and User Acceptance Testing.

Table 7 Blackbox Testing Sprint 1 (admin)

No. Test	Scenario	Test Case	Expected Results	Test Results	Status
T.01	Run the program code to bring up the QR Code	Run the program on the admin computer	Bring up the QR Code	The program runs, and the QR Code appears	Passed
T.02	Link your WhatsApp account to the program	Scan QR Code	WhatsApp devices can be linked to the program	WhatsApp account successfully connected	Passed

Table 8 Blackbox Testing Sprint 1 (user)

No.	Scenario	Test Case	Expected Results	Test Results	Status
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T.01	Looking for the WhatsApp icon on the main page	Access Adu.in the website	Find the WhatsApp icon on the main page	WhatsApp icon found	Passed
T.02	Move a website page to a WhatsApp page	Pressing the Whatsapp icon on the main page	The page moves to the WhatsApp page	The page moves to the WhatsApp page	Passed
T.03	Send a message for the first time	Send a "hi" or "hello" message	The system receives the message and sends an autoreply	The reply message contains the format obtained	Passed

Table 9 Blackbox Testing Sprint 2

No. Test	Scenario	Test Case	Expected Results	Test Results	Status
T.0 1	Enter messages according to the format	Name: participant name complaint: participant complaint details: participant complaint details	The system receives the message and sends an autoreply	The reply message contains the category	Passed
T.0 2	Choose a category based on the reply message	Fill categories with numbers	The system receives the choice of the desired category	A reply message with an image submission request was obtained	Passed

Table 10 Blackbox Testing Sprint 3

No. Uji	Scenario	Test Case	Expected Results	Test Results	Status
T.01	Submit an image of proof of complaint.	Take pictures directly through the WhatsApp camera.	The system receives the image. It sends an autoreply.	A reply message with a location delivery request was obtained	Passed
T.02	Send a complaint location point	Share your location from WhatsApp features	The system receives the transmitted location point	A reply message with confirmation was obtained	Passed

From the results of black box testing, all features can meet the needs and can be used by users properly.

Table 11 UAT Sprint 1 (admin)

ID	Question	Value				
		1	2	3	4	5
P1	Does the program run properly?	-	-	-	1	3
P2	Can the QR Code be seen in the terminal?	-	-	-	-	4
P3	Can WhatsApp devices be linked to the program?	-	-	-	1	3

Table 12 UAT Sprint 1 (user)

ID	Question	Value				
		1	2	3	4	5
P1	Does WhatsApp button/icon look easy to find?	-	-	-	-	5
P2	Can after clicking the WhatsApp button/icon be redirected to WhatsApp service?	-	-	-	1	4
P3	Do you get an automatic reply message after sending "hello," "hi," or "excuse me"?	-	-	-	1	4
P4	Is the automatic reply message to send complaint data easy to understand?	-	-	-	-	5

Table 13 UAT Sprint 2

ID	Question	Value				
		1	2	3	4	5
P1	Does it take your name, complaint, and complaint details after filling in your name, complaint, and details that you get an auto-reply message to select a category?	-	-	-	-	5
P2	Is the reply message for selecting a category easy to understand?	-	-	-	1	4
P3	Is the category selection easy to understand?	-	-	-	1	4
P4	Does it happen that after selecting a category, you get a reply message to submit an image?	-	-	-	-	5
P5	Is the reply message to sending the image easy to understand?	-	-	-	1	4

Table 14 UAT Sprint 3

ID	Question	Value				
		1	2	3	4	5
P1	Does it take a message after sending a picture that you get a message to send me your location?	-	-	1	-	4
P2	Is the reply message easy to understand?	-	-	-	1	4
P3	Did you get an automatic reply message after sending your location?	-	-	-	1	4
P4	Is the auto-reply message after sending location easy to understand?	-	-	-	1	4
P5	Is the overall flow of complaints via WhatsApp easy to understand?	-	-	-	2	3

Table 15 Description of UAT Weights

Answer	Information	Weight
1	Strongly Disagree	1
2	Disagree	2
3	Neutral	3
4	Agree	4
5	Agree	5

After assessment and weighting using the values in Table 15, then the calculation of the interpretation of the achievement score using table 16 below is carried out.

Table 16 Score Interpretation Criteria

Score Interpretation Criteria	
0% - 20%	Very weak
21% - 40%	Weak
41% - 60%	Enough
61% - 80%	Good
81% - 100%	Excellent

The calculation of the interpretation of the UAT achievement score in each sprint is shown in table 17 below.

Table 17 UAT Score Interpretation Results (admin)

No	Respond	Value			Value x Weight	Percentage
		P1	P2	P3		
1.	Respond 1	4	5	4	57	76%
2.	Respond 2	5	5	5	75	100%
3.	Respond 3	5	5	5	75	100%
4.	Respond 4	5	5	5	75	100%
Total Value and Percentage Average		19	20	19	282	94%

Table 18 UAT Score Interpretation Results (user)

No.	Respond	Value				Value x Weight	Percentage	
		P1	P2	P3	P4			
Sprint 1								
1.	Respond 1	4	5	5	5	91	91%	
2.	Respond 2	5	5	5	5	100	100%	
3.	Respond 3	5	5	5	5	100	100%	
4.	Respond 4	5	5	5	5	100	100%	
5.	Respond 5	4	5	5	4	82	78,4%	
Total Value and Percentage Average		23	24	24	24	473	94,60%	
Sprint 2								
No	Respond	Value					Value x Weight	Percentage
		P1	P2	P3	P4	P5		
1.	Respond 1	5	5	5	5	5	125	100%
2.	Respond 2	5	5	5	5	4	116	92,8%
3.	Respond 3	5	5	5	5	5	125	100%
4.	Respond 4	5	5	5	5	5	125	100%
5.	Respond 5	5	4	4	5	4	98	78,4%
Total Value and Percentage Average		23	24	24	24	24	589	94,24%
Sprint 3								
No.	Respond	Value					Value x Weight	Percentage
		P1	P2	P3	P4	P5		

1.	Respond 1	5	5	5	5	5	125	100%
2.	Respond 2	5	5	5	5	4	116	92,8%
3.	Respond 3	5	5	5	5	5	125	100%
4.	Respond 4	5	5	5	5	5	125	100%
5.	Respond 5	3	4	4	4	4	73	58,4%
Total Value and Percentage Average		23	24	24	24	24	564	90,24%

Based on the weighting data obtained in Table 18 for each question asked to the user, the results of calculating the weight value of the user acceptance test in sprints 1 to 3 are shown. Each score obtained from testing the complaint feature via WhatsApp Adu.in was 473 out of 500 with an average percentage of 94.60% in sprint 1, 589 out of 625 with an average percentage of 94.24% in sprint 2, and 564 out of 625 with an average percentage of 90.24% in sprint 3, with an outstanding category.

Application performance testing is also carried out using the load testing method. The results of load testing the public complaint feature via WhatsApp are shown in Table 19 below.

Table 19 WhatsApp Load Testing Results Adu.in

Timestamp	HTTP Response Code	Downloaded Bytes	Request Rate (req/sec)	Request Count	Response Time (ms)	VUsers Completed	Session Length (s)	Failed Requests
7:52:40 (+0700)	200	36652	100	748	0.9	748	4.6	0
17:52:50 (+0700)	200	49000	100	1000	0.8	1000	4.2	0
17:53:00 (+0700)	200	49000	100	1000	0.8	1000	4.4	0
17:53:10 (+0700)	200	49000	100	1000	0.8	1000	4.6	0
17:53:20 (+0700)	200	39298	100	972	56	802	4.6	0
17:53:30 (+0700)	200	19943	83	815	4108.8	407	4252.6	329
17:53:40 (+0700)	200	26117	118	465	3097.3	533	3281.2	181
17:52:40 (+0700)	200	36652	100	748	0.9	748	4.6	0
17:52:50 (+0700)	200	49000	100	1000	0.8	1000	4.2	0

Based on the test results, it was found that:

- Server response (HTTP Response Code 200) was stable and consistent throughout the test period.
- The number of virtual users completing sessions (VUsers Completed) increases as demand increases.
- The user session length is stable and does not change much.

4. Conclusion

This research developed a complaint website application and Adu.in public service, with a complaint feature via WhatsApp, which the people of West Java and the West Java Provincial DPRD successfully used. The app allows people to report problems around them using WhatsApp's features, including photos and the location of the incident. The West Java DPRD immediately follows up on every complaint according to the community's category. The test results using black box testing and user acceptance testing show that the application can function correctly. Based on the results of performance testing using load testing, this application also shows good performance. Despite this, the study still has the potential to be improved. This research can be a reference to improve the application by providing a complaint ID so that it can be searched through the main website. Future research is expected to improve handling messages beyond expectations and add spam filtering and image recognition features. Improved live chat features with admins, and the possibility of dealing directly with members of the DPRD or related commissions are also considerations for further research.

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