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Development of FAQ Chatbot for Digitization of Warung Gungbiang Marketing in Bali

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ABSTRACT

In today's digital era, technological transformation has changed the patterns of business and consumer interaction. Warung Gungbiang, a banten (banten) seller in Bali, still relies on conventional marketing, despite the growing need for digital information access. The main challenge faced is the limited ability to provide fast and accurate information to customers. Therefore, developing an FAQ-based chatbot is a potential solution to improve the efficiency of the stall's digital marketing. This research aims to develop a chatbot based on frequently asked questions to support more modern digital marketing strategies. Research methods include problem identification, interviews, observation, literature study, designing, developing, and testing chatbots. The chatbot was designed using a rule-based approach and developed with PHP and JavaScript technology. Testing involves Blackbox methods to ensure functionality and User Acceptance Testing (UAT) with a Likert scale to evaluate user satisfaction. Blackbox testing shows that the chatbot functionality has succeeded in providing fast and accurate responses to various customer questions regarding products, prices, and ordering methods, while in UAT testing, the design, service, and efficiency aspects of the chatbot received a score of "very good" with an average percentage above 80%. The implementation of this chatbot is able to increase information accessibility and customer convenience, while also supporting the digitalization of Warung Gungbiang's marketing.

KEYWORDS *Chatbot, Digital, FAQ, Marketing*

INTRODUCTION

Warung Gungbiang is one of the stalls in Bali that sells banten. Banten is an offering and a means for Hindus to get closer to God. Even though it has products that suit the needs of the Balinese people, Warung Gungbiang still carries out operations and marketing conventionally. In fact, in today's digital era, technology has a significant role in improving business efficiency and expanding marketing reach. (Gede Gede Oka Diputra, I Wayan Sudiarta, 2022 ; Sekarini & Widhiyanti, 2023)

The development of digital technology has encouraged consumers and businesses to be active in cyberspace. Reviews and opinions spread across the internet allow consumers to make

more informed decisions, even in some cases, influencing product pricing. In this context, small and medium enterprises (MSMEs) are competing to create engaging content for their digital marketing strategies, such as utilizing social media and other online platforms. (B. I. J. Silitonga, P. D. ., Tarigan, K. S. B., 2022)

Digital marketing encompasses a wide range of activities aimed at building branding and reaching consumers broadly through web-based media, such as blogs, *websites*, email, AdWords, and social networks. According to Hidayat and Tobing, digital marketing has tremendous potential to reach millions of customers globally, including more specific customer groups, providing a much wider appeal than conventional methods. (Sanjaya, 2009) (Tobing, n.d.)

Many MSMEs have succeeded in developing by utilizing digital platforms. Patma et al. said that MSMEs that are active in social media such as Instagram, Facebook, Twitter, WhatsApp, YouTube, and Telegram, and are able to develop e-commerce capabilities, have better business opportunities compared to those who do not. One of the digital technologies that can support MSMEs in providing better service to customers is chatbots. (Patma, T. S., Wardana, L. W., Wibowo & Narmaditya, B. S., & Akbarina, 2021)

Chatbot technology, specifically FAQ (*Frequently Asked Question*) chatbots, simplifies business operations by answering customer questions quickly and accurately. Chatbots also save on customer service costs, improve customer convenience, and create more responsive and personalized interactions. However, Warung Gungbiang still faces challenges in adopting this technology to improve the marketing of its products. (Ningtyas, n.d.)

This research aims to develop a chatbot FAQ service that can help Warung Gungbiang improve communication efficiency with customers while expanding its marketing reach. With the development of this service, it is hoped that Warung Gungbiang will be able to take advantage of the potential of digital technology to compete in the modern era and provide a better customer experience.

Amalia Fatimatu et al. in 2023. In his research, it was stated that "research on chatbot-based food ordering applications at Warung Makan Barokah Semarang Regency makes it easier for customers to order food and check order status via WhatsApp, without the need to come directly to the stall or use additional applications". Another research by Farhan Fathur Ramadhan in 2023 which in his research stated that "chatbots provide benefits in improving the operational efficiency of companies by providing responsive and automated services". Other research by Dehan Setya et al. The year 2023 states that "chatbots can interact with someone through text messages that are able to provide services to the community in terms of information about MSME products quickly and easily". Research by Siti Nur Farrah Aziz et al. The year 2024 states that "FAQ Chatbot Apps are designed to answer a variety of common questions frequently asked by users. With a quick and interactive response, this application makes it easier for users to obtain information related to MotionBank. In addition, this chatbot also supports PT Bank MNC Internasional in conveying information to users in real-time without being tied to operational hours".(Amalia Fatimatu Zahro, 2023 ; N. R. R. Farhan Fathur Ramadhan, Andri Sahata Sitanggang, 2023 ; Dehan Setya Ramadhan, 2023 ; City Noor Farah Aziz, Novi's Nathasia, 2024)

The similarity in the previous study is the application of chatbot technology, but there have not been many studies that specifically explore the application of chatbots in the context of Banten marketing in Bali. Therefore, the author tries to develop a digitalization strategy for Warung Gungbiang, which is a banten seller in Bali with a focus on the development of a chatbot application, where a chatbot link will be placed on the Warung Gungbiang Instagram bio to facilitate customer interaction.

This research aims to develop an FAQ-based chatbot to support Warung Gungbiang's digital marketing strategy. Its particular goal is to design and implement a rules-based chatbot

that can answer customers' common questions about products, prices, and how to order. In addition, this study also evaluates the functionality of chatbots through Blackbox testing and User Acceptance Testing (UAT) to ensure user satisfaction. With this chatbot, it is hoped that information access for customers will be easier, service efficiency will increase, and Warung Gungbiang can transform towards digital.

This research contributes from several aspects, both in terms of science and the impact of its practical application on society. As for the scientific side, this research strengthens studies related to AI and automation in customer service, especially in the traditional business sector that has not been touched by modern technology. Meanwhile, the impact of its practical application to the community is that chatbot technology provides efficiency in terms of customer service. With chatbot services, customers can get information at any time, while business owners can focus on other operational aspects without having to worry too much about customer interactions. This reduces the reliance on manual labor to respond to customer inquiries directly.

RESEARCH METHOD

The stages in the research method include the process of problem identification, data collection, chatbot design, chatbot development, and chatbot testing. The flow diagram of the research method is presented in Figure 1.

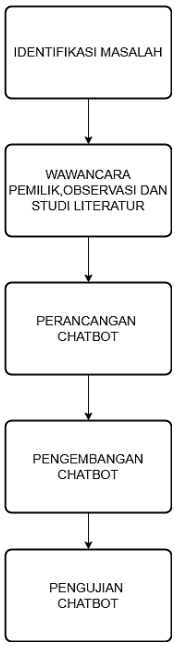

Figure 1 Research Methods

Source: Author Testing Results, 2025

1. Problem Identification

At this stage, researchers try to find out what problems or needs they want to solve with chatbots. Questions that need to be answered at this stage include: What are the main problems you want to solve? Who are the target users of this chatbot? What is the ultimate goal of this chatbot? Is it to increase sales, provide information, or other purposes?

2. Interviews, Observations and Literature Studies

Once the issue is identified, the next stage is to collect further data. This involves

Interviews, i.e. talking directly with business owners to understand their needs and expectations, Observation, i.e. observing how users interact with existing systems to find opportunities for improvement, and Literature Studies, i.e. conducting research to study approaches that have been successfully applied in the development of similar chatbots.

3. Chatbot Planning

At this stage, the researcher designs how the interaction flow between the user and the chatbot will take place, such as: How will the conversation between the user and the chatbot take place? What are the keywords or phrases that the chatbot will recognize? In addition, at this stage, the researcher also determines the approach to be used in building the chatbot. In this study, the researcher uses a Rule-Based chatbot approach and the creation of a chatbot wireframe which will later be implemented.

4. Chatbot Development

This stage is the technical implementation stage. Researchers will write code to make the chatbot work according to the design that has been created. Applications are built using PHP language, Javascript libraries such as JQuery and Popper.js and interface frameworks using Bootstrap.

5. Chatbot Testing

Once the chatbot has been developed, the next stage is to test and evaluate the chatbot's performance. The testing methods used in this study are the Blackbox Testing and UAT (User Acceptance Test) methods. The Blackbox test method is used to test the functionality of a system or program that has been created. Meanwhile, the UAT test aims to assess the level of user satisfaction in using the application.(Listiyan, Edy, 2021)

RESULTS AND DISCUSSION

Chatbot Application Design

The following image is the result of designing the chatbot to be implemented. The design uses draw.io tools and balsamic mockups. Draw.io is an application that can be used without the need to install, just by connecting to the internet and opening *a browser* (Mulia Nurwana, Desfa Anisa, 2022). The concept of using Balsamiq Mockups is to create a sketch-like design on a whiteboard, but with the help of computer technology, the process of creating mockups becomes faster and more efficient. The following is a picture of the flow of user interaction with the chatbot and the results of designing the chatbot UI.(Norhayati, Rosmiati, Zefanya Violinchia, 2022)

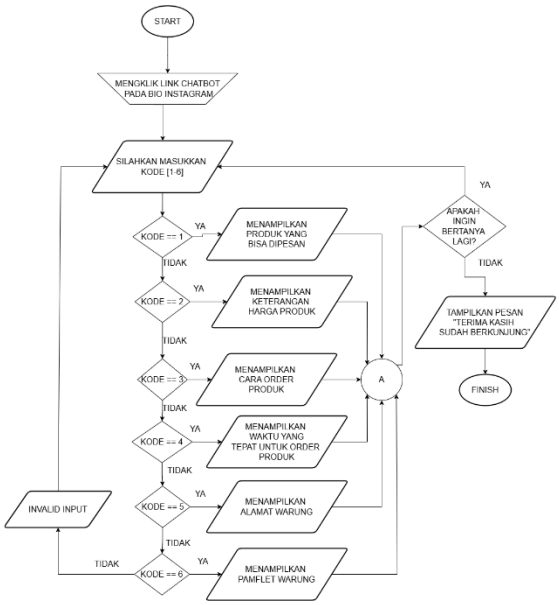

Figure 2 User Interaction Flow with Chatbot

Source: Design Author using draw.io, 2025

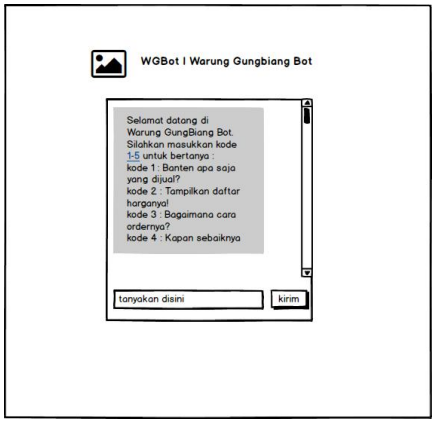

Figure 3 Chatbot UI Design Results

Source: Mockup Author using Balsamiq, 2025

Chatbot App Development

The chatbot developed in this study is a chatbot FAQ with a Rule-Based Chatbot approach. A rule-based approach is a method that represents knowledge through a set of rules in IF-THEN format. The chatbot is suitable for simple applications such as FAQs or menu-based services that do not require complex text processing. The following are the results of the chatbot implementation. When the buyer accesses the chatbot, the buyer will receive a welcome message and instructions to enter the question code where code 1 is chosen if the buyer will ask what is sold, code 2 if the buyer wants to display the price list, code 3 if the buyer wants to know how to place an order, code 4 if the buyer wants to know when to place an order, Code 5 if the buyer wants to know the location of the stall and code 6 if the buyer wants to see a pamphlet or brochure from Warung Gungbiang. (Ishlakhuddin, F., Basir, A., & Nurlaela, 2020)

Figure 4 Chatbot Development Results
Source: Author Code Documentation, 2025

The code below is a PHP-based chatbot API using the WebBot library. An Application Programming Interface (API) is an interface that allows applications to communicate and interact with each other. The main goal of this code is to create a chatbot that is capable of responding to various user inputs with specific logic. (The Lance of Anaheim has been dismissed.) Harvesting Harvesting , 2024)

```
$myBot->hears("5", function($bot) {
    $alamat = "https://maps.app.goo.gl/1dg6489t6vaTtCum6";

    $bot->answer(new Message("text", "Alamat Warung: <a href='$alamat'>klik di sini</a>."."<br><br>Apakah ada yang ingin ditanyakan lagi?".
    Emoji::mult(Emoji::$smile)."<br>Ketik 'Ya' jika ingin bertanya lagi dan 'Tidak' jika tidak ada"));
});



$myBot->hears("6", function($bot) {

    // Gambar pertama dengan fitur zoom
    $image1 = "https://res.cloudinary.com/dnc3b72r4/image/upload/v1715991827/ofxhrmsare6kh4bl4yp1.png";
    $zoomableImage1 = "<a href='$image1' target='_blank'><img src='$image1' alt='Image 1' style='max-width: 100%; cursor: zoom-in;'></a>";
    $bot->answer(new Message("html", $zoomableImage1));

    // Gambar kedua dengan fitur zoom
    $image2 = "https://res.cloudinary.com/dnc3b72r4/image/upload/v1715991865/cwjlkjbrlaxvlohdvekl.png";
    $zoomableImage2 = "<a href='$image2' target='_blank'><img src='$image2' alt='Image 2' style='max-width: 100%; cursor: zoom-in;'></a>";
    $bot->answer(new Message("html", $zoomableImage2));

    $bot->answer(new Message("text", "Apakah ada yang ingin ditanyakan lagi?". Emoji::mult(Emoji::$smile)."<br><br>Ketik 'Ya'
    Jika ingin bertanya lagi dan 'Tidak' jika tidak ada" ));
});

$myBot->confuse(function($bot){

    $bot->answer(new Message("text", "maaf saya tidak mengerti " . Emoji::mult(Emoji::$confused) ));

});
```

Figure 5 Source Code API Chatbot
Source: Author Code Documentation, 2025

The chatbot implemented in this study uses Event-Driven Programming, where the chatbot detects user input (event) through *the hears* method and processes it when it occurs, such as when the user types "1", then gives an appropriate response. The conversation logic is handled with *a callback function* on each trigger (*hears*), which has a specific logic to determine the chatbot's reply. The resulting response is dynamic, it can be text, links, images, or HTML elements rendered as needed, with support from *libraries* that provide abstractions through objects such as *Messages*. In addition, the chatbot also has error handling with *a fallback* mechanism (*confuse* logic) to respond to unrecognized input.

3.3 Chatbot App Testing

a. Blackbox Testing

The application functionality test is carried out using the Blackbox method, which focuses on the output generated from the given input process. The following table shows the input scenarios along with the results obtained from the Chatbot.

Table 1. Test Scenarios

Input	Expected output	Output obtained	Conclusion
1	Here are the products that can be ordered: • Canang Ceper • Tangkih Port • Canang Sari • Pejati • Ayaban tumpeng 5 • Ayaban tumpeng • Banten • Share Efforts • Banten mereb • Banten Oton • South	Here are the products that can be ordered: • Canang Ceper • Tangkih Port • Canang Sari • Pejati • Ayaban tumpeng 5 • Ayaban tumpeng • Banten • Share Efforts • Banten mereb • Banten Oton • South	Valid
2	The price of banten or canang depends/follows the price of materials in the market	The price of banten or canang depends/follows the price of materials in the market	Valid
3	Please place an order via WA: *Click here*	Please place an order via WA: *Click here*	Valid
4	Order at least **one week** before the Ceremony or Activity	Order at least **one week** before the Ceremony or Activity	Valid
5	Warung Address: *Click here*	Warung Address: *Click here*	Valid
6	 	 	Valid
Yes/yes/YES	Please enter the code [1-6] to ask: 1 : What Banten is sold? 2 : Show the price list! 3 : How to order? 4 : When should I place an order? 5 : Where is the stall located? 6 : Show the pamphlet/brochure!	Please enter the code [1-6] to ask: 1 : What Banten is sold? 2 : Show the price list! 3 : How to order? 4 : When should I place an order? 5 : Where is the stall located? 6 : Show the pamphlet/brochure!	Valid
No/NO/NO	Thank you for visiting	Thank you for visiting	Valid

Source: Author Testing Results, 2025

b. UAT Testing

UAT (User Acceptance Testing) is the final testing stage in the development of a product that aims to validate that the system created is in accordance with the user's needs. The UAT test was carried out by distributing a questionnaire consisting of 13 questions to 100 respondents, where the answers to the questions consisted of levels that could be selected as follows. (Paturusi, 2023) (Sulisteini, 2023)

Table 2. UAT Assessment Indicators (Likert Scale)

Criterion	Weight
very: not easy/not suitable/unclear/can't/disagree	1
Not easy / not suitable / unclear / can't / disagree	2
Neutral	3
Easy/Appropriate/Clear/Can/Agree	4
Very:Easy/Suitable/Clear/Can/Agree	5

Source: Kurniawan & Kusuma, (2021)

The formula in the User Acceptance Test (UAT) test is:

$$P = \frac{F}{N} x100\% \qquad (1)$$

Where:
P = percentage obtained,
F = frequency of the variable being tested, and
N = number of respondents.
The percentage of UAT test results is assessed based on the assessment category indicators listed in the following table. (Kurniawan, Y. I., & Kusuma, 2021)

Table 3. Assessment Category Indicators

P value	Category
0% - 20%	Very Bad
20.01% - 40%	Bad
40.01% - 60%	Enough
60.01% - 80%	Good
80.01% - 100%	Excellent

Source: Adaptation of Paturusi, (2023)

UAT testing is carried out based on four assessment categories, namely from the aspects of design, service and efficiency. The answer column was obtained from the calculation of the number of respondents who voted for each criterion. After getting the answer, the value obtained from multiplying each answer point by the weight on the UAT assessment indicator table is sought. The following are the results of the respondents' answers as well as the total value per indicator.

Table 4. Respondents' Answers and Total Scores per Indicator

No	Question	Value (Answer x Weight)				
		5	4	3	2	1
		Design				
1	Is the WGBot app attractive view?	135	148	102	0	2

2	Are the menus/features in the WGBot app easy to learn?	290	100	48	2	0
3	Is the use of writing colors with backgrounds appropriate?	175	160	54	10	2
4	Is the WGBot app interesting?	180	156	66	6	0
			Service			
5	Is the use of fonts/writing easy to read?	300	108	30	6	0
6	Is the information provided on the WGBot application easy to understand?	245	156	36	0	0
7	Does the existence of the WGBot application help the digital marketing process of the stalls that use it?	255	124	36	12	0
8	Overall, is the use of the WGBot application satisfactory?	145	180	63	10	0
9	Is the WGBot application in accordance with the needs?	200	128	63	14	0
10	Can the chatbot give a clear error message if the chatbot doesn't understand the user's question?	175	156	69	6	0
			Efficient			
11	Is the chatbot response time on the WGBot app after receiving a user question fast?	280	128	27	6	0
12	Is the WGBot app accessible on all devices? (tablet, mobile and desktop)	245	116	48	12	0
13	Is the access time of the WGBot app fast when the user has clicked on the app link?	230	148	33	12	0

Source: Research Primary Data, 2025

Next, the amount obtained from summing all the respondents' scores is sought, looking for averages, percentages and conclusions. The following are the results of the UAT test.

Table 5. UAT Test Results

No	Question	Average	Percentage of Grades	Conclusion
		Design		
1	Is the WGBot app attractive view?	3,87	77%	Good
2	Are the menus/features in the WGBot app easy to learn?	4,4	88%	Excellent

3	Is the use of writing colors with backgrounds appropriate?	4,01	80%	Good
4	Is the WGBot app interesting?	4,08	82%	Excellent
	Total Total Questions	4,09	82%	Excellent
		Service		
5	Is the use of fonts/writing easy to read?	4,44	89%	Excellent
6	Is the information provided on the WGBot application easy to understand?	4,37	87%	Excellent
7	Does the existence of the WGBot application help the digital marketing process of the stalls that use it?	4,27	85%	Excellent
8	Overall, is the use of the WGBot application satisfactory?	3,98	80%	Good
9	Is the WGBot application in accordance with the needs?	4,05	81%	Excellent
10	Can the chatbot give a clear error message if the chatbot doesn't understand the user's question?	4,06	81%	Excellent
	Total Total Questions	4,20	84%	Excellent
		Efficient		
11	Is the chatbot response time on the WGBot app after receiving a user question fast?	4	80%	Excellent
12	Is the WGBot app accessible on all devices? (tablet, mobile and desktop)	4,21	84%	Excellent
13	Is the access time of the WGBot app fast when the user has clicked on the app link?	4,23	85%	Excellent
	Total Total Questions	4,14	83%	Excellent

Source: Author's Data Analysis, 2025

After testing the respondents with several aspects of assessment and a number of question indicators, the results of the UAT test were obtained as follows:

a. Design Aspects

The results of the assessment on the design aspect based on the assessment of 100 respondents showed a total score of 1636 with an average of 4.09 out of five question indicators. The percentage of the value is (4.09/5) x 100% = 82%. These results show that the design aspect for users according to respondents is in the "Very Good" category.

b. Service Aspects

The results of the assessment on the service aspect based on the assessment of 100 respondents showed a total score of 2517 with an average of 4.20 from five question indicators. The percentage of the value is (4.20/5) x 100% = 84%. These results show that the service aspect for users according to respondents is in the "Very Good" category.

c. Efficient Aspects

The results of the assessment on the efficient aspect based on the assessment of 100 respondents showed a total score of 1285 with an average of 4.14 from five question indicators. The percentage of the value is (4.14/5) x 100% = 83%. These results show that the service aspect for users according to respondents is in the "Very Good" category.

CONCLUSION

This research successfully designed and developed a rule-based chatbot FAQ to support *Warung* Gungbiang's digital marketing. Based on Blackbox testing, the app has decent functionality and in UAT testing, the chatbot received an "Excellent" rating in terms of design (82%), service (84%), and efficiency (83%), demonstrating excellence in attractive interface, fast response, and ease of access on various devices. The Chatbot FAQ in the study still has limitations, such as not supporting Natural Language Processing (NLP). For future development, it is recommended to integrate NLP to improve the flexibility of response and automation of the ordering process.

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