

# Implementation Chatbot on Whatsapp Using Artificial Intelligence With Natural Language Processing Method

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**ABSTRACT** — The rapid growth of technology in Indonesia has caused a shift in human habits, one of which is communication. Currently, communication uses social media more often. According to research conducted by social researchers in 2023, Internet users aged 16–64 years 92.1% use WhatsApp as a long-distance communication medium. So that this is the reason why business conversations switch to using whatsapp social media. In the business process, meetings between buyers and sellers are needed so that buyers can ask about the products they will buy before the goods are purchased by the buyer. Whatsapp is one of the solutions to this problem, but the meeting is virtual. The questions asked by several buyers about the items they want to buy are usually almost the same so the chatbot comes as a solution so that the seller does not have to answer repeatedly for the same questions asked by different buyers. Previous services used admin assistance to answer buyer questions, but this was considered less efficient because buyers could not receive answers to questions quickly, because the admin had another line of work, namely packing goods. Chattbot can answer questions in real time, so that buyers can receive information directly without waiting. The research method used is the Waterfall System Development Life Cycle (SDLC) which has four stages, namely analysis, design, coding and testing and uses the User Acceptance Testing (UAT) application testing technique. In this study, in the results of the questionnaire sent to buyers stated that the service using the chatbot average index of 3.71. These results show that the chatbot system is feasible and effective in helping customers obtain the information needed

**KEYWORDS** — Chatbot, Whatsapp, Natural Language Processing, Business, System Development Life Cycle

## I. INTRODUCTION

In the growing digital age, chatbot technology has become one of the preferred solutions in providing efficient and responsive customer service. With its ability to interact with users in natural language, chatbots are able to provide fast and accurate services, improving the overall user experience.[1], [2] One of the most popular communication platforms used by the global community is WhatsApp, with millions of active users every day [3].

Chatbots have become one of the increasingly popular applications in various communication platforms, including WhatsApp. In this study, we introduce a chatbot system implemented on the WhatsApp platform using Natural Language Processing (NLP) methods. [2]The goal of this research is to build a chatbot that is able to understand and respond appropriately to user messages in natural language [4].

The application of chatbots on the WhatsApp platform is becoming increasingly relevant, allowing organizations and businesses to provide better and more efficient customer service through a channel that is familiar and used by many[5]. On the other hand, developing a chatbot capable of operating in an environment like WhatsApp requires a careful approach, especially in understanding and responding to user messages in natural language [2].

The application of the System Development Life Cycle (SDLC) in the development of a chatbot on the WhatsApp platform using the Natural Language Processing (NLP) method involves a series of structured steps to ensure that development runs efficiently and effectively [6]. Among them are Requirements Gathering, Planning, Analysis, Design, Development, Test, Implementation, Maintenance and Support [7].

In this work to implement a chatbot into WhatsApp using the Software Development Life Cycle (SLDC) method. When the chatbot has been implemented, the questions given by the user to the chatbot, it may be that not all questions can be answered because there are differences in writing uppercase and lowercase letters, there are conjunctions that are not in the questions stored by the chatbot, so the Natural Language Processing (NLP) method is needed to overcome these problems [8]. This method allows the chatbot to accurately process and understand user messages, and provide relevant responses according to user needs. [9]We believe that implementing a chatbot on WhatsApp using artificial intelligence can provide significant benefits in improving communication efficiency, expanding service reach, and improving overall user experience [10].

## A. NATURAL LANGUAGE PROCESSING

Natural Language Processing (NLP) is one of the fields of computer science, which is related to artificial intelligence, and language (linguistics) which deals with the interaction between computers and natural human languages, such as Indonesian, English, and even Javanese. In a broad sense to cover any kind of computer manipulation of natural languages [11]. Furthermore, it can be as simple as counting word frequencies to compare different writing styles. On the other hand, NLP involves a complete "understanding" of human speech, at least capable of providing useful responses to the user [11]. NLP-based technologies are becoming increasingly widespread. For example, phones and handheld computers support text prediction and handwriting

recognition; web search engines provide access to information locked in unstructured text; machine translation allows us to take text written in Chinese and read it in Spanish [12]. By providing more natural human-machine interfaces, and more sophisticated access to stored information, language processing has played a central role in the multilingual information society [13]. Through this research, we hope to contribute to the development of more advanced and responsive chatbot technology, as well as expand the application of artificial intelligence in various digital communication contexts. Thus, this research is not only a valuable scientific contribution, but can also have a significant practical impact in improving customer service and user experience within the WhatsApp platform [14].

### B. SYSTEM DEVELOPMENT LIFE CYCLE (SDLC)

SLDC is a structured process such as creating and changing systems, methods, and models, which allows engineers and developers to produce high-quality software at low cost, in the shortest possible production time. it is a stage or method used to create software with the aim of producing superior software that meets and exceeds all customer expectations and requests. SLDC is designed so that the software production process can be done in a short time and does not incur too much cost. The software will be made by going through several stages, including planning, software design such as architectural design, development, testing, and deployment.

#### 1) Planning

At this stage, the development team gathers opinions or input from stakeholders involved in the production project, including customers, sales, internal and external experts, and developers. The input will be collected to help the software creation process so that the output produced is in accordance with expectations and needs.

#### 2) Software design

The design stage is the stage where developers make changes to the software specifications into a design plan or referred to as the Design Document Specification (DDS).

#### 3) Development stage

This SLDC stage is where the real software development begins. It is important to collect all approvals from developers against the existing blueprint. If in the previous stage the design was done in great detail, this development stage can be a difficult stage.

#### 4) Testing phase

This stage is a fairly important stage, where the software that has been developed will be evaluated by the testing team, whether the software meets the requirements or not, according to what was determined in the planning stage. These tests include; functional testing, unit testing, code quality testing, system testing, security testing, performance testing, and non-functional testing.

#### 5) Deployment stage

At this stage, the goal is to deploy the successfully created software to the production environment so that users can start using the product.

## II. METODOLOGY

In Figure 1 the user will start the conversation by opening the whatsapp application, and the chatbot will be implemented into whatsapp to answer the buyer's questions. When the buyer sends a message, the system will read the message and perform normalization to make it easier for the system to understand the meaning of the message received. with chatbot. Chatbot is created with a database of questions and answers in it. So that when customers ask questions to the chatbot, it will be matched with questions in the database, so that the chatbot will issue the right answer. In this research using the natural language processing method, the following is the process carried out by the implementation of natural language processing.

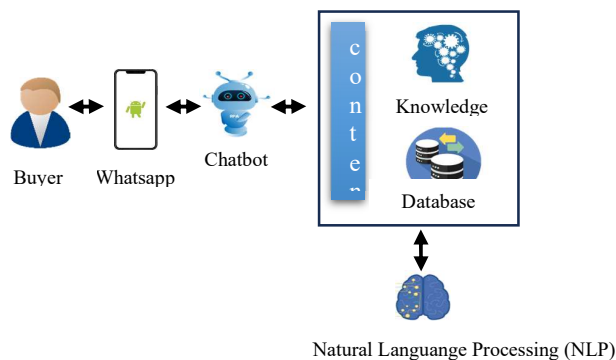


Figure 1. Design Framework of AI Chatbot

Figure 1 explains that customers who want to communicate with the seller must enter the seller's WhatsApp number to send a message, so that it will be connected directly to the Chatbot, the message will be received by the system and then matched with the pattern that already exists in the Knowledge Base. Messages that match the knowledge base will be linked to answers that are already available in the database [15]. If the message sent by the buyer is not included in the knowledgebase, the database will not display the answer according to the data stored in the database [16]. The user sends a text message to the bot account through the

whatsapp server and forwards it to the bot server. The bot server processes the message so that it can provide the correct response to the user in the form of a text message. The response is sent to the user via whatsapp [17].

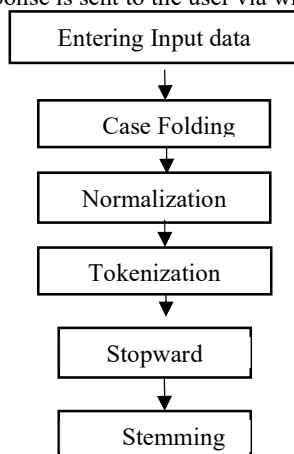


Figure 2. Process of Natural Language Processing

From the plan in Figure 2, the stages can be explained as follows:

1. Sentence Input, Input to this system is of course in the form of keywords with simple sentences that will be submitted by users to the next process system that will be run using natural language processing methods in checking the sentences to be entered.
2. Case Folding, at this stage, converts all characters in the text into lowercase or uppercase, depending on the preferences or specific needs of the application. Texts in natural languages often have variations in the use of uppercase and lowercase letters, which can cause ambiguity in text processing. For example, the same word in a text may be capitalized at the beginning of a sentence or lower-cased in the middle of a sentence. In some cases, such as text classification or feature extraction in Natural Language Processing it is important to treat words with upper and lower case as identical, so case folding helps to equalize the representation of the same words.
3. Normalization in this process is to convert or normalize text into a standard form that is easier for computers to process and understand. The main purpose of normalization is to reduce variation and ambiguity in the text so as to facilitate subsequent stages of text analysis and processing.
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7. Tokenization is the process of dividing text into smaller units called tokens. Tokens can be separate words, phrases, or characters depending on the desired level of granularity. The purpose of tokenization is to separate text into units that can be processed more easily. The types of tokenization application are Word Tokenization: In word tokenization, the text is divided into tokens based on spaces or whitespace characters. Each token represents one word in the text. Phrase Tokenization: In phrase tokenization, the text is divided into tokens based on phrases or specific sequential units. Character tokenization divides text into tokens based on single characters.
8. Stopword Removal is serves to sort out important words in the tokens generated by the previous process. The stopword list is recorded in a table using the stopword list used in this research by Tala (2003), namely Indonesian stopwords, which include words such as: "ini", "itu", "yang", "ke", "di", "di", "ke", and so on.
9. Stemming is the process of forming base words. The terms obtained from the stopword elimination step are derived. step are derived. The actual process is to generate keywords because these keywords provide more relevant documents / information
10. The result that will be issued in this system is the answer to the user's question in the form of a correct or incorrect answer (no answer found). Next, system planning will be carried out, where the methods and data that have been obtained will be designed, so that during the system development process it will be easier to implement into the application. Then the system development will be carried out based on the system design that has been made. The finished design is then implemented into an application.

### III. RESULT AND DISSCUSSION

This research data in the form of datasets is taken and collected from the Ariatna Hijab online shop that sells via online using whatsapp social media, the data. [18]in the form of FAQs containing questions and information about the buying and selling process carried out by Ariatna Hijab buyers who are often asked. To run the system, the user inputs a sentence into the Whatsapp chat application The chatbot interface that has been built is shown in Figure 3. The result of the Chatbot system is the process of searching for answers and conversations that are carried out. Several scenarios are discussed. The scenarios are used to match the input and the expected output. The scenarios are shown in Table 1.

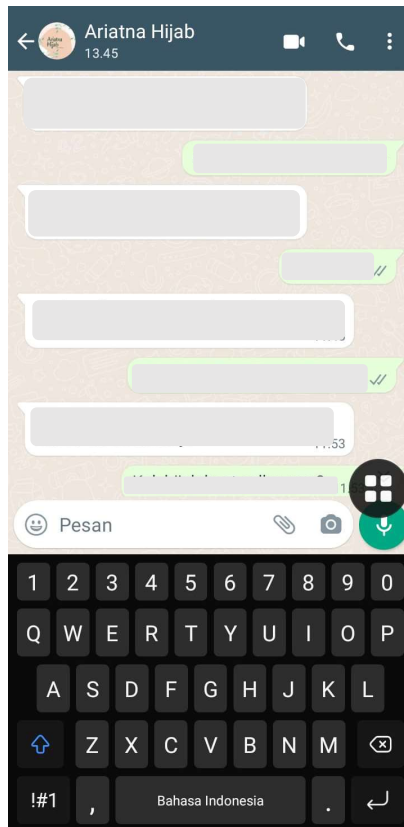


Figure 3. Interface Chatbot

Based on the results of the chat built, a system that is able to provide answers based on input from buyers is obtained. When buyers use Chatbot for the first time [19]. Questions that can be answered by chatbots are limited to information on the list of products sold, information related to customer complaints, complaints, the process of returning goods, and the system to become a reseller. Chatbot development using natural language processing methods produces good results. The chatbot system built in this study failed to respond when there was a typo or typo in the input entered by the user [20].

TABLE 1. CHATBOT TESTING

No	Input	Response	Description	Status
1.	Ariatna hijab	<p>Hari ini</p> <p>Ariatna hijab 14.20 ✓✓</p> <p>Halo, Selamat datang di Ariatna Hijab,                      Kami menjual                      1. Jilbab Segi4                      2. Jilbab Instan                      14.20</p>	Testing the first time with Chatbot, to be able to see the display like the picture beside is accessing <a href="https://wa.me/+6281998718935">https://wa.me/+6281998718935</a>	Success
1.	1	<p>1 14.27 ✓✓</p> <p>Hijab Segi4                      1. Bella Square                      2. Azahra                      14.27</p>	The first step in enquiring about the products of the items in the list and the results are out.	Success

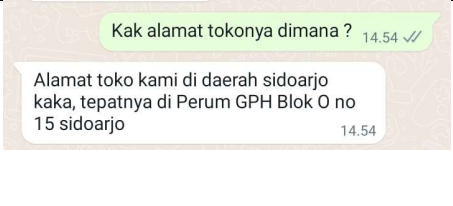

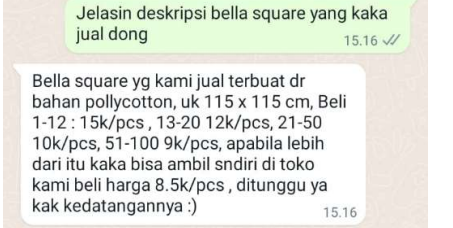
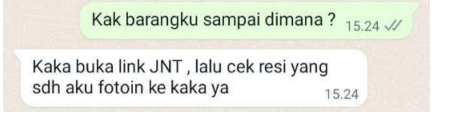
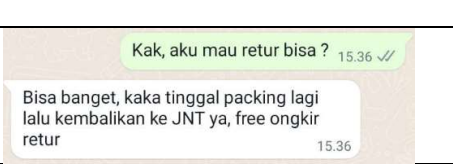
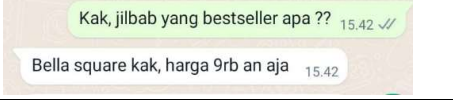

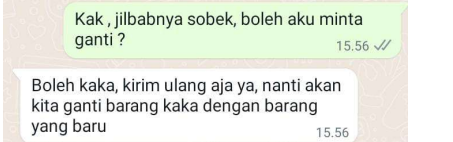
2.	“Kak, alamat tokonya dimana ?”		The question about the store address was a general question, so the researcher chose the input sentence “Kak, alamat tokonya dimana?” then Chatbot will provide answers in the form of complete address information from the ariatna hijab shop.	Success
3.	“Kak, toko buka jam berapa ?”		Research on store opening hours enquiry, displaying offline store operating times.	Success
4.	“Jelaskan deskripsi bella square yang kaka jual dong”		The question asked for a description of the bella square sold by the shop and the bot answered about the ingredients and selling price.	Success
5.	“Kak, barangku sampai mana ?”		Choose “kata, kak barangku sampai dimana ?” will still produce the desired answer even though the question is recorded in the database “kak, barangku sampai dimana ?” the use of commas can be eliminated because it uses natural language processing methods.	Success
6.	“Kak, aku mau retur bisa ?”		Question “kak, aku mau retur bisa?”, then the bot will answer according to the return of goods in accordance with the procedure.	Success
7.	“Kak, jilbab yang bestseller apa ??”		Question “kak, jilbab yang bestseller apa ???” The question is still directly answered by the bot even though there are 2 question marks “??” so that the buyer can receive a direct answer.	Success
8.	“Kak, minta pricelist ariatna hijab “		Generally, buyers ask the price before the buyer comes to buy the goods directly, so the seller asks to answer the wholesale and retail prices.	Success
9.	“kak, jilbabnya sobek, boleh aku minta ganti ?”		The system of returning goods if you want to exchange can be accepted by the seller if there is damage and not later than the day the goods are received.	Success

Table 1 shows the questions submitted by the buyer to the seller about the buying and selling activities that will be carried out, based on the natural language processing method, there will be the removal of some connecting words, punctuation marks. In the natural language processing method, there will be several stages, the first of which is case folding, where at the case folding stage it changes the capital letters that are not located in front, they will be replaced because the process changes uppercase letters to lowercase letters. For example, “Kak, Alamat tokonya dimana?” become “Kak, alamat tokonya dimana?” The second stage is tokenization, at this stage the entered sentence will be broken down into words so that further processing will be easier. For example, at research there are questions “Kak, Alamat tokonya dimana?” become “kak”; “alamat”; “tokonya”; “dimana” “?”, so that in this process the entered sentence will be broken into words. In the last process is filtering so that in this process it will remove words, or punctuation that can actually be removed. For example: “Kak, Alamat tokonya dimana?” the filtering process can remove punctuation “,” so that it is read by the system “Kak alamat tokonya dimana?”.

TABLE 2. BETA TESTING

No	Question	Score					Total	Result
		5	4	3	2	1		
1	After using this chatbot, do you think it can help	15	38	28	1	1	80	3.925



	provide Ariatna Hijab product information?							
2	After using this chatbot, do you think this chatbot makes it easier to get information about ariatna hijab?	12	38	30	2	0	83	3.686747
3	Do you think that the information/answer provided by the chatbot is appropriate with what was asked?	11	35	33	1	0	82	3.609756
4	Do you think there is a need for updates to enhance the This chatbot application?	10	34	32	3	0	80	3.6
5	Do you think the chatbot application can answer questions?	10	35	34	1	0	79	3.721519
6	Do you think the appearance of the chatbot application is attractive?	9	33	32	1	0	80	3.4375
7	Do you think the answers from the chatbot are easy to understand?	14	33	33	2	0	75	4.066667
8	Do you think the chatbot application is efficient in finding sales information?	14	33	33	1	0	82	3.695122
Total quantity								29.74231
Average								3.717788836

In table 2, the question by showing the number 5 indicates very good or the user strongly agrees on the indicators given by the developer. number 4 indicates very good or the user agrees on the indicators given by the developer. number 3 indicates good or the user slightly disagrees or is neutral on the indicators given by the developer. number 2 indicates not good or the user slightly disagrees on the indicators given by the developer. The number 1 indicates not very good or the user strongly disagrees on the indicators given by the developer. From the results of filling out the questionnaire addressed to 82 buyers, an average score of 3.717788836 was obtained, which is very good from a value scale of 4. So that in the beta test for the efficiency level of the chatbot system made, it produces a good system because based on the survey results using questionnaires the results are very good.

#### IV. CONCLUSION

This research identifies the use of chatbots in online store services by applying Natural Language Processing (NLP) methods. Through this exploration, it can be concluded that the use of chatbots with Natural Language Processing (NLP). brings a significant positive impact on various operational aspects and quality of online store services. Buyers stated that the service is getting better because there is a chatbot in the service of answering buyer questions, this is evidenced by a questionnaire survey conducted on 84 buyers, and has an average value of 3.71778883, where the value if interpreted in the value is very good. The use of Natural Language Processing (NLP) methods can produce the right answer even though the input has input errors where it must go through the process, case folding, tokenization and filtering. The implementation of a chatbot improves operational efficiency by providing instant responses to customer queries and handling routine tasks automatically. This not only reduces the workload of the human customer support team but also speeds up the overall service process. The chatbot's ability to understand natural language using Natural Language Processing (NLP) methods. provides more natural and relevant interactions with customers. Peningkatan dalam memahami sinonim, struktur kalimat yang kompleks, dan konteks memperkaya pengalaman pelanggan dan menghasilkan respons yang lebih akurat. Improvements in understanding synonyms, complex sentence structures and context enrich the customer experience and result in more accurate responses.

#### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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