

Implementation Chatbot for SMEs Using Artificial Intelligence Markup Language to Improve Customer Integration and Business Performance

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Abstract—Chatbots have been extensively adopted to produce more positive customer experiences as customers now spend more time in digital surroundings. Despite the technological advancement and benefits of chatbots for client service, exploration of chatbot operations for small and medium-sized enterprises (SMEs) is limited. The absence of exploration explaining the struggles faced by SMEs contributes to the gap in SMEs' chatbot adoption. This exploration determines the features and rudiments that fit with SMEs' characteristics and their guests' interactions with chatbots. A mixed-methods approach is used to understand SMEs' needs. The first study uses interviews with SME business owners and their customers in order to explore the features that chatbots should offer for SME by identifying combinations between chatbots' generic features and SMEs' customer characteristics. The second study tests features identified in SMEs customers to empirically test featured chatbots' influence on anthropomorphism, perceived enjoyment, perceived ease of use, perceived usefulness, and how they affect SMEs' customer intentions to use chatbots and their shopping intentions. This paper contributes to the emerging service literature on the use of chatbots for service interactions, particularly for SMEs using Artificial Intelligence Markup Language. The data that has been obtained was analyzed using a Likert scale. As a result, the accuracy of using Artificial Intelligence Markup Language is 84.8%.

Index Terms—Chatbot, MSME, artificial intelligence, business.

I. INTRODUCTION

During with the development of technology, many applications have been made using artificial intelligence (AI). One of them is chatbots. Chatbot is a computer program that can communicate with users using everyday language. The chatbot will respond to sentences/questions from users with appropriate answers because this program has a number of data [1]. If a user enters a question whose answer is not in the chatbot's knowledge, the chatbot will shift the topic of

conversation to something else so that the conversation can continue.

Chatbot technology is widely used by business people because Chatbot is an application/service that interacts with users through text conversations [2]. Chatbots work to replace the role of humans in serving conversations through messaging applications. Chatbots understand, learn, and interact like humans. This can happen because of Artificial Intelligence or artificial intelligence. Cloud-based AI chatbot building framework platforms are becoming more and more popular. The platform allows developers to be able to build chatbots without code or in combination with certain programming languages. Chatfuel as a chatbot builder framework or bot builder has been used by several world-class companies. because it only requires a short response time to answer many users at once [3].

Previous research has discussed the benefits of chatbots for customer service, such as faster responses to customers, removing customer hesitancy in asking basic questions, and building social relationships and emotional bonds with the customer. However, all of these studies have been conducted in large-scale companies or luxury brands [4]. Despite the benefits of chatbots in business, it has resource-wide consequences which may be a challenge for small and medium-sized enterprises. Furthermore, MSMEs should also examine the trade-off between conversational agent effectiveness (i.e., enhanced customer satisfaction, loyalty) and efficiency (i.e. cost-effective use of chatbots), adopting AI-based solutions is an unclear benefit of AI initiatives [5]. This study focus on how SMEs can more effectively use chatbots by understanding the characteristics of SME customers in their applications.

SMEs generally have a more significant concern in retaining customers because they have limited resources and channels to reach new customers. Relational marketing is more appropriate for SMEs; relationship and network marketing creates an important framework for SMEs. This framework urges SMEs to pay more attention to customer relationship management (CRM), and there has been a marked increase in the number and variety of initiatives that SMEs have taken in technology and marketing, particularly in engaging in more efficient relationship management. with customers. SMB customers have higher expectations of personalized service and become more involved in ensuring

Received: 7 April 2023; Revised: 17 April 2023; Accepted: 15 Mei 2023

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that they receive what they want, making them more demanding to receive a high standard of service [6].

The adoption of AI and e-service agents has started to become mainstream in large companies. A completely virtual chatbot (text- and voice-based) is the most suitable technology application for SMEs because the additional costs are almost zero [7]. Studies in marketing and services have also found that the use of chatbots offers a number of benefits [8]. However, ours and other studies of chatbot adoption in SMEs and small businesses are limited in the existing literature. In addition, there is no specific research that describes how effective chatbots are in helping SMEs run their businesses, and there is no data to explain the benefits that SMEs can get when they use chatbots. The absence of research that explains the struggles faced by SMEs adds to the gap in SME-chatbot adoption. This study determines the features of technology in society that can effectively help SMEs and their customers through the presence of chatbots. This study aims to contribute to determining how chatbots are also beneficial for SMEs, particularly in handling service interactions and increasing resource effectiveness. This study also considers the perspective of SME owners and customers to gain insight into how chatbots work for all parties by explaining how chatbots meet the needs of SMEs and customers.

This following research question of this study: (1) How to design AI chatbot for SMEs to increasingly in numerous fields of marketing and change marketers from reactive to proactive actors?; (2) How to findings suggest combinations of chatbot features that match SME customer characteristics: responsive; simple steps to trigger customer actions; humanized conversations; and personalized recommendations?; (3) How find that perceived enjoyment and usefulness positively affect customer's intention to shop and intention to use the chatbot.

II. RELATED WORK

A. Chatbot

Chatbot is a computer program designed to simulate conversations between humans, Chatbots are equipped with artificial intelligence and natural language processing that make chatbots an intelligent computer program and can answer questions given by humans. The chatbot process starts with input from the user using natural language and the system will respond. These chatbots can be used in small industries or businesses to automate customer service as user requests will be handled by the chatbots thereby reducing labor requirements and human expenses [3].

B. Chatbot in Services

Chatbots are a common emerging technology driven by AI and machine learning with unparalleled business potential. Chatbots have been implemented in various services, such as to promote interaction with students in educational settings, to interact with visitors at tourist destinations, and to interact with customers in e-commerce. Chatbots are defined as AI-enabled service agents that carry out "natural" conversations with consumers to provide individual information [4]. The term 'bot' in chatbots refers to 'robots' and implies that chatbots are programs that automatically communicate with people in place of humans or systems that include such programs [7].

C. Chatbot in SMEs

Chatbots can be used to interact with customers throughout the customer journey [9]. For example, during pre-purchase, chatbots, using learning algorithms and predictive modeling, can instantly match consumer inquiries to available products that meet their needs [9]. During the purchase stage, chatbots can direct customers to shopping platforms or introduce certain promotional offers. In the post-purchase stage, customers can still interact with the chatbot to track the delivery process and provide after-sales service relationships. Therefore, chatbots can play a major role in retaining customers, especially for vulnerable businesses like SMEs.

Early chatbot applications for marketing have been used effectively to help customers navigate websites and make online purchases [10]. Since then, chatbot technology has developed rapidly. Modern chatbots are characterized by a conversational interface that allows them to simulate a human conversation in such a way that customers may not realize that they are talking to a chatbot rather than a human service assistant [11]. With this capability, chatbots can also function not only as virtual assistants, but also as virtual friends, conducting interviews with customers and using consumer knowledge adaptively to provide customized solutions. Chatbots have also become more responsive, being able to help read reviews, browse and research products, compare products, access stored coupons, purchase products, track orders, and receive rewards and loyalty points [12]. To summarize, the literature review spans five years. lastly to explore new specific chatbot features that can effectively facilitate service interactions.

III. RESEARCH METHOD

The first study explores the features that should be provided on the chatbot for SMEs by identifying combinations between chatbots' generic features and SME customer characteristics [13]. The method for the first study is the semi-structured in-depth interview. There are two phases in the interviews. Firstly, the study explores SMEs' actors (business owners and customers) considerations in using chatbots and determines whether the results on SMEs are consistent or differ from those of existing research. Secondly, the research identifies characteristics of SME customers, to highlight the important chatbot features (what has been identified in the literature review) with identified customers' characteristics [14] and there are five stages : design system between eva.id and telegram account, workflow process,design database AIML, Design of Chatbot Feature Block Diagram ans System Test in telegram account.

A. Design System

System design is used to explain the description of the system design to be made. The system design in this research consists of designing a block diagram of the whole system that describes the chatbot system. In this section, we will describe system block diagrams, input-output process workflows, and block diagrams of chatbot features.

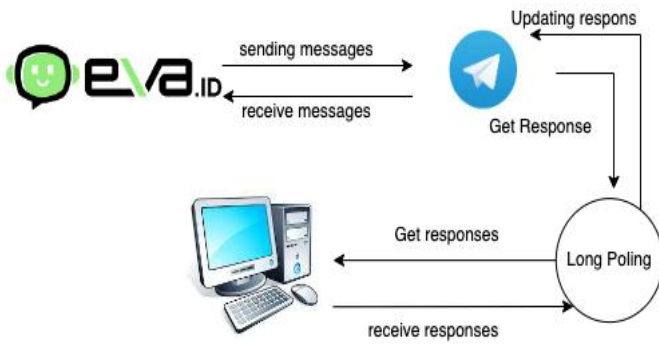


Fig. 1. Chatbot design process

Based on Fig. 1, the chatbot works by receiving messages from the user and the message will be sent to the telegram server. Then the computer will request an update message to the telegram server and telegram will respond by sending the message to the computer [15]. When the computer has received a response from the telegram, the chatbot will automatically reply to the user's message.

B. Workflow

This process begins by receiving input sentences from the user. Then the input sentence will be normalized to fit the knowledge base in the form of AIML. After the input sentence is normalized, the next step to be passed is the production of the input line. In the production process of the input line, the sentence will be checked and the AIML pattern of the sentence will be obtained [16]. After that, the sentence will be broken down into words so that the matching/search process on the knowledge base can be carried out. When an answer is found that matches the input sentence from the user, the process is complete by displaying the answer.

Figure 2 shows, the input-output process workflow. This process begins by input sentences from the user. Then the input sentence will be normalized to fit the knowledge. After the input sentence is normalized, the next step that will be skipped is the production of the input line [17]. In the input line production process, sentence checking will be carried out and the sentence will be broken down into words so that the matching/searching process can be carried out on the knowledge base. When an answer is found that matches the input sentence from the user, the process is finished by displaying the answer.

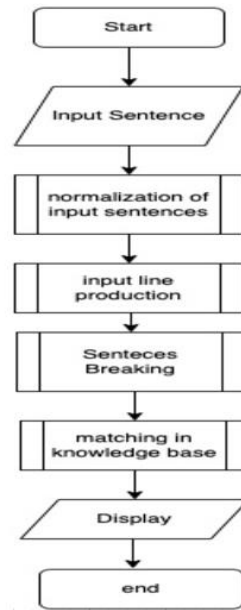


Fig. 2. Input and output process workflow

The input and output process consists of 4 stages, namely:

- Normalization of input sentences

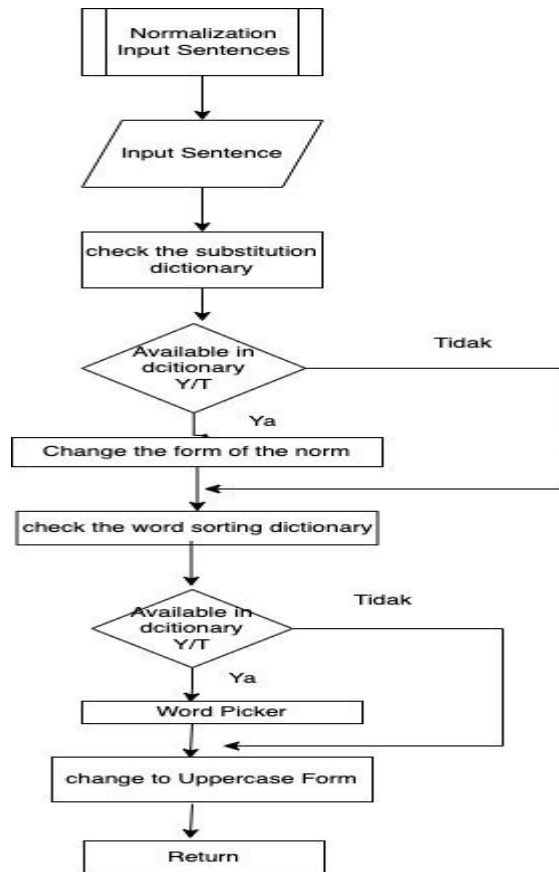


Fig. 3. Normalization process

In this process, all input sentences are normalized first through three stages, namely Substitution Normalization, Sentence-Splitting Normalization, and Pattern-Fitting Normalization so that they can be adapted to the knowledge base in the form of AIML [18].

1) *Substitution normalization*

At this stage the input sentence will be checked and corrected if there are writing errors and word abbreviations. This is done to protect information from input sentences that might be lost when going through the sentence-splitting and pattern-fitting processes.

2) *Sentence-splitting normalization*

At this stage the input sentence will be separated into two or more sentences with the reference that the "." (period), "," (comma), "!" (exclamation mark) and "?" (question mark) is the end of the sentence. Sentence sorting is done based on the presence of punctuation marks.

3) *Pattern-fitting normalization*

At the last stage, the character shape of the sentence is changed, removing punctuation marks in the input sentence and converting the input sentence into capital letters (UPPERCASE). The conversion into the uppercase form aims to carry out the next process which will perform pattern matching on the AIML pattern in the uppercase form.

• Production of input lines.

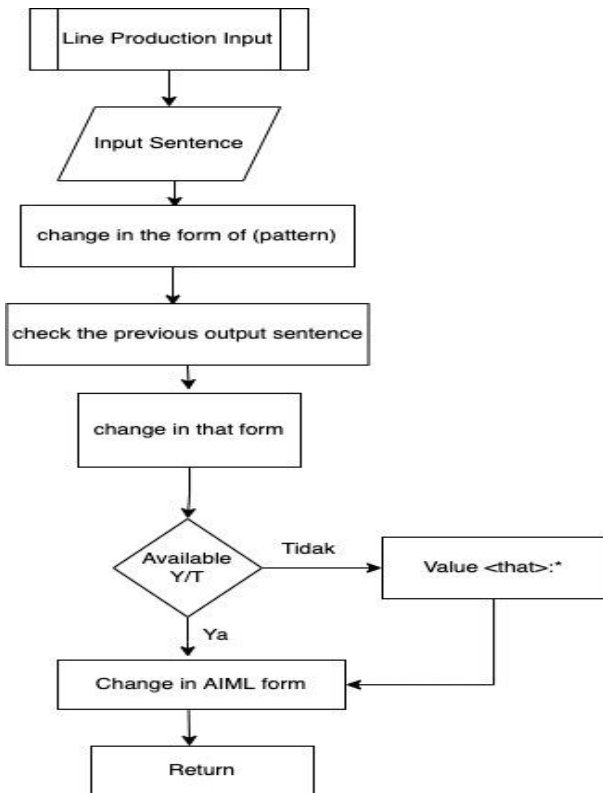


Fig. 4. Production of input lines

Figure 4 shows input output process flow of production, This process begins by receiving line production input and then input sentences, after input sentences changes in the form dan check the previous output sentences [19], After that change the form and check is there available or not, if not value is end, if changes is yes then continue change in AIML form. In this process, all input sentences will be changed and a pattern will be obtained in the form of AIML. This pattern is used to search for appropriate answers in the knowledge base.

• Sentence Breaking Process

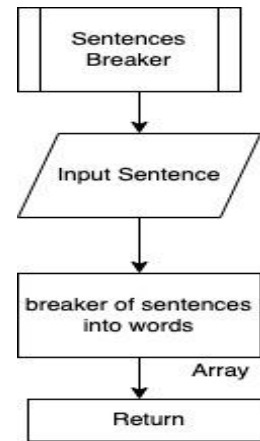


Fig. 5. Sentence Breaking Process

Figure 5 shows, In this process, sentences are broken down into word arrays. This is done for matching or searching in answers on the knowledge base word for word. for first step sentences breaker then input sentences and breaker into words then return.

• Answer Search on Knowledge Base

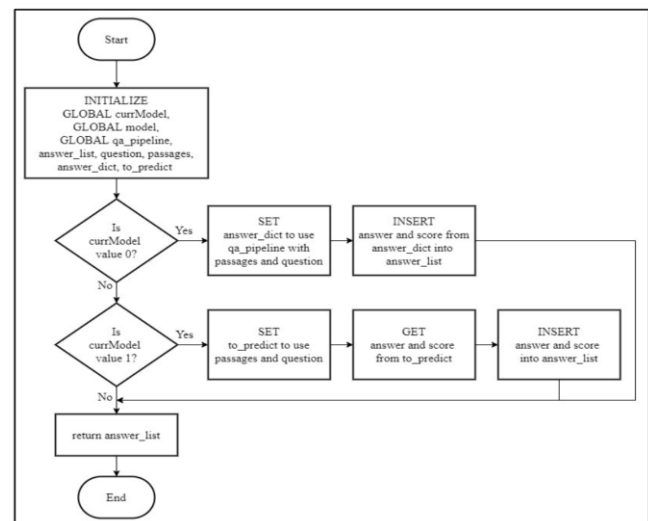


Fig. 6. Flowmap predict answer

Figure 6 shows, In the Predict Answer resource, changes are made by removing the use of pre and max tokens used by the web service in the module. Tokens were removed because both were pre-trained the model used in this study does not use tokens for predict answers. The answer_list variable in the form of an array is used for store the predicted answers and accuracy values resulting from the pretrained model when providing predictive answers.

C. Design

In the database there is an AIML table that serves to store data for questions and answers. Table 1 shows the structure of the AIML table.

Table 1. AIML Table Structure

Column	Type	Description
Pattern	Text	Pattern Stimulus
Template	Text	Template response

D. Design of Chatbot Feature Block Diagram

This feature works by means of the user sending a message to the chatbot and then the server computer will ask for information updates to the telegram server, whether there is an incoming message or not [20]. If the telegram server does not yet have a message, the telegram server will first hold the update request from the server computer and wait for the message to arrive. When a message comes in, the telegram server will immediately respond to the server computer, and the server computer will request access to the web server to get services. Then the web server will provide service access to the server computer, and the server computer will provide messages to the telegram server. And then the user will receive a message from the chatbot.

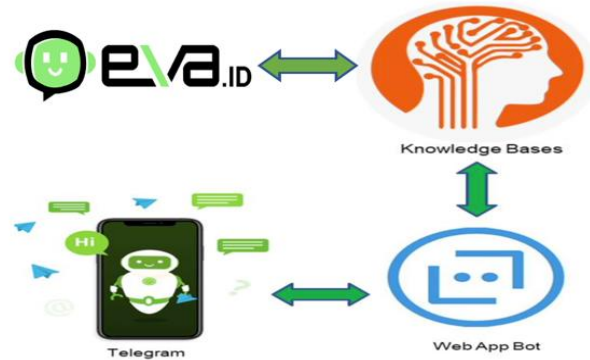


Fig. 8. Chatbot design concept

E. System Test

Testing begins by installing the Telegram application on a smartphone or PC. After that, find the chatbot username, then press /start to start the bot. This test can be described in the form of a block diagram as shown in Fig. 7.

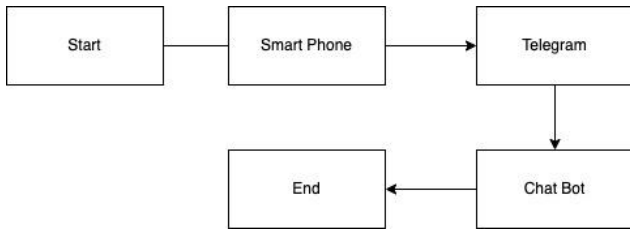


Figure 7. Block diagram of testing

B. Creating Knowledge Base

First, create a knowledge base, it is done on a separate portal, namely eva id, <https://eva.id>, this portal serves to create a knowledge base, test and publish chatbots.

IV. RESULT

After the artificial markup language chatbot has gone through the design process, the next stage is the testing and discussion process. The results show that the featured chatbot prototype impacts higher anthropomorphism, perceived enjoyment, and perceived usefulness, compared to the standard chatbot. After knowing the overall value of the rating scale, the percentage value is calculated. The percentage test results with a value of 84.8. The calculation for the percentage uses the following formula. Based on these calculations, the results obtained were 84.8%. This percentage figure if converted to a reference value can be categorized as good with a value of 85-100%. Thus, it can be concluded that the respondents agree that Chatbot for SMEs Using Artificial Intelligence Markup Language is accurate.

A. Chatbot Implementattion

Design an automated conversation engine (Chat bot) has a process step that must be done. Starting with the design of intelligent machines, then the creation of a Knowbase Base as basic knowledge that will be taught to intelligent machines, the creation of a Web App Bot as a liaison between intelligent machines and user applications. The final step is to create a bot in the Telegram app (Fig. 8).

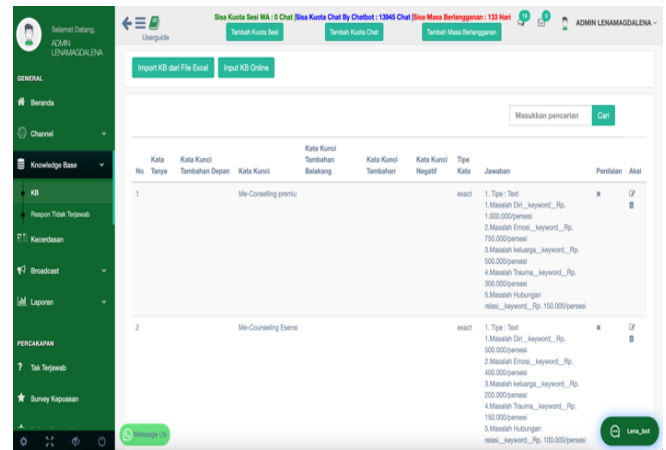


Fig. 9. Knowledge base creation process

The process of creating a knowledge base (Fig. 9) consists of four stages:

- 1) Create an Eva.id account;
- 2) Naming Knowledge Base;
- 3) Retrieve question and answer data;
- 4) Starting the Knowledge Base process.

The first step has been done, namely creating an account on eva.id. The second stage connects the eva id account with the Knowledge Base. The third stage is naming the knowledge base, the fourth stage is taking questions and answers, at this stage it can be done after making the knowledge base, the fourth stage starting the process of making the knowledge base. There are several types of series of questions and answers, but in this paper we will discuss 3 types of series of questions and answers, namely:

- Single-answer questions, sample questions for greetings such as good morning, good evening, good evening and others.
- Questions with choice answers, i.e. questions that require a choice of answers, for example in this question "Show

what products in the service?", and the next example "How many sizes and prices are there for the product?".

- Questions with answers in the form of links, such as the example of the question "where is the address of an MSME Store?", an answer will be given in the form of a link to the location of the store that can lead to a map of an MSME Store. For example, the answer is "the address of our MSME Shop can be seen at the following link".

These three series of questions and answers can be made after the knowledge base creation process is completed (Fig. 10).

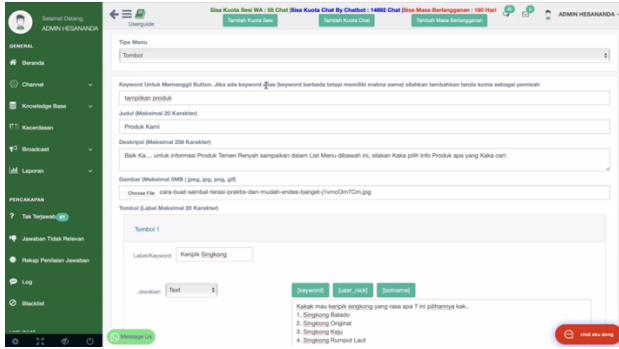


Fig. 10. Series of questions and answers

C. Contextually Flowchart

In compiling a question and answer sentence for a chatbot, it can be assumed that general questions are given by the sender of the message through the chat application. Example context: chatbot for English course information services, so the questions that usually arise are the type of program, cost and duration of the course. Figure 11 shows the chatbot flow for the MSME product business trade.

Konteks Komunikasi	Kata Kunci	Tujuan penyampaian Pesan	Target Penerima Pesan
Jual Beli Edukasi Pelayanan Jasa Komunikasi sehari-hari (Bisa menggunakan pilihan di atas atau Anda dapat menambahkan)	Tuliskan semua kata kunci yang berkaitan dengan bidang layanan/profesi Anda	Memberikan informasi Mempersuasi Meyakinkan orang lain (Bisa menggunakan pilihan di atas atau Anda dapat menambahkan)	Masyarakat umum Konsumen dengan target khusus, misal, IRT, Dewasa, Remaja, Pekerja, Mahasiswa dll (Sila tuliskan target penerima pesan Anda)

Fig. 11. Flowchart contextually

D. Chatbot integration with Telegram Channel

Web App Bot as a liaison between the intelligent Chat bot engine that has been created and the Telegram channel. This process can be done after the knowledge base creation process is complete and the Publish process is carried out (Fig. 12). The configuration of the web app bot in this study is as shown in Fig. 13.

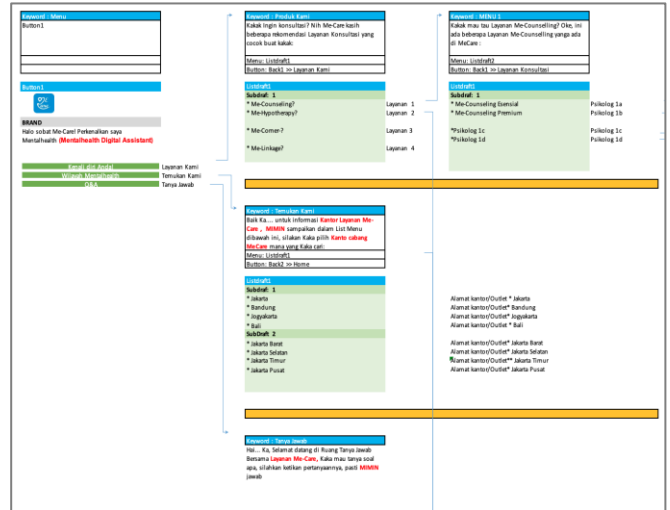


Fig 12. Example of making a chatbot for UMKM products

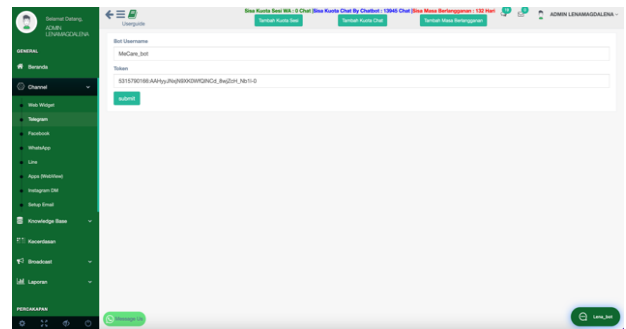


Fig. 13. Web app bot configuration

E. Connecting With Telegram

Telegram is a cloud-based chat application on mobile and desktop devices with a focus on security and speed. One of the features found in Telegram is the Telegram bot. Telegram bot is a group or channel that is programmed with various commands to carry out a series of instructions given by the user. This bot is just a Telegram account operated by software that can be linked to an AI engine. Telegram bot features can be accessed through the @BotFather account. With this BotFather account, you will be guided to create a Telegram Bot automatically.

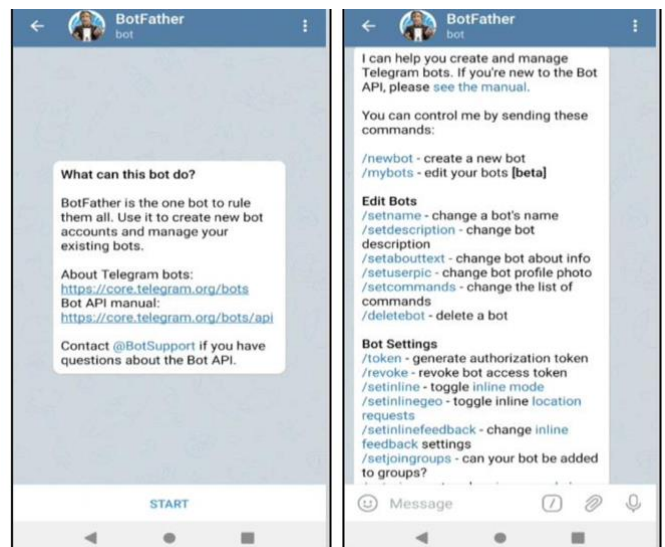


Fig. 14. Bot father telegram

Figure 14 shows Telegram bots can do anything on command. Telegram bots can be used to perform searches, as liaisons, reminders, teachers, integrations, and more.

F. Chatbot Test Result

From the results of testing the same message through the telegram bot with the Eva.id web, the data can be given in Table 2.

Table 2.
Testing response time with the same message

No	Message Type	Response Time
1	Good Morning	2.26 s
2	Good Morning	2.19 s
3	Good Morning	1.92 s
4	Good Morning	2.04 s
5	Good Morning	2.03 s

The test response in Table 2 is done by sending the same question repeatedly 5 times, then recording the response time of the bot in providing answers using a stopwatch.

Table 3.
Testing Response time with different messages

No	Message Type	Response Time
1	Question 1	1.55 s
2	Question 2	2.63 s
3	Question 3	2.74 s
4	Question 4	2.43 s
5	Question 5	1.85 s

The next test is sending with different types of messages for 5 times and recording the response time of the bot in providing answers. The results of testing with different types of questions are in Table 3. The results of the Telegram bot's response are shown in Figs. 15–18.

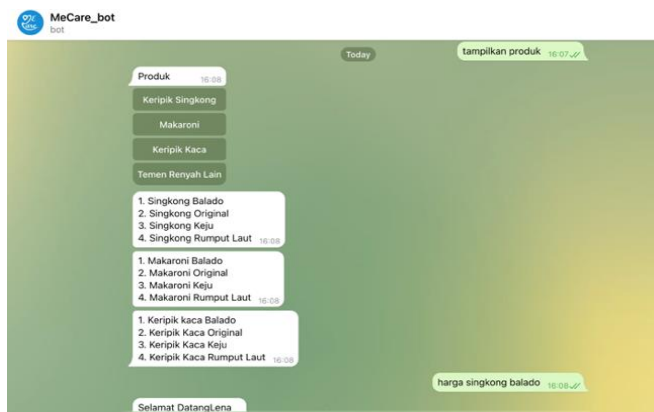


Fig. 15. Telegram bot father test results for product information

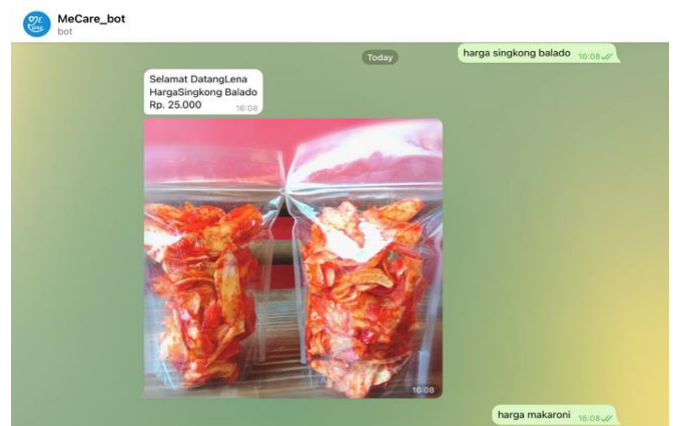


Fig. 16. Telegram bot father test results for cassava product categories and product prices

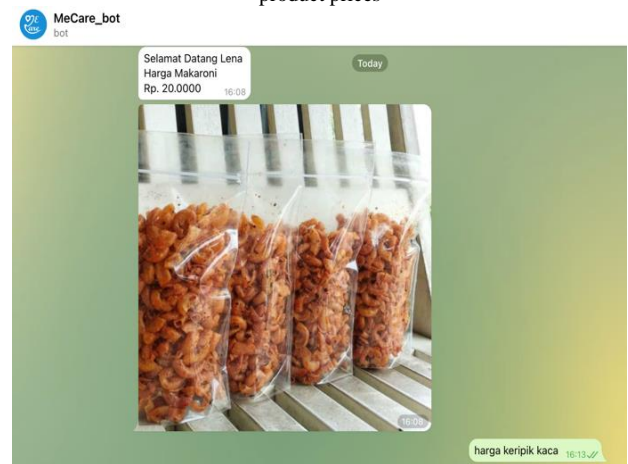


Fig. 15. Telegram bot father test results for macaroni product categories and product prices

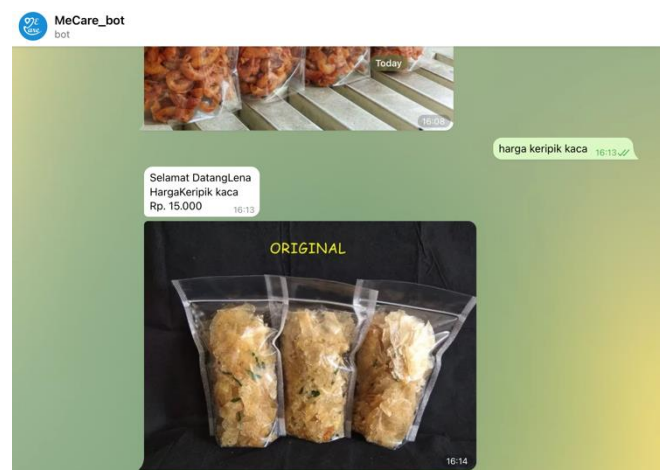


Fig. 18. Telegram bot father test results for the glass chips product category and product prices

Based on the results of tests that have been carried out, it can be found that chat bots can quickly answer questions asked by consumers. Apart from that, MSME sellers can also change the products they offer. By using chat bots that can be used on Telegram, MSMEs can provide product offers to consumers much more quickly and effectively so that they can increase transactions in the future.

V. CONCLUSION

Based on this exploratory study of SME owners and customers, four chatbot features deemed as important for SMEs: responsive chatbots; simple actions step to trigger customer action; humanized conversations; and personalized recommendations. Featured chatbot prototypes were then developed with these features to test empirically on larger SMEs' customers. Creating both enjoyable and useful chatbot features may induce customers to use and shop on SMEs. On the other hand, having only user-friendly or easy-to-operate chatbots have no impact to customer usage and shopping intention. From this research it can be concluded that the use of Eva.id and Telegram bots is quite effective in making an automatic conversation (Chat bot). The response time and accurate is fast enough to make the waiting time of the recipient of the message smaller so that it can provide a high level of satisfaction in terms of a fast response. In addition, another advantage is that by using this chat bot, there is a direct interaction between the user and the organization, so that users will be served one by one privately.

To date, exploration in this area is limited and has substantially concentrated on chatbot acceptance by well established companies or brands. On the other hand, SME guests have unique characteristics and expectations of the kind of service hassles during shopping at original SMEs. The present findings are the first to provide needed insights into chatbot design that fits SMEs' needs for serving their customers. Thus, this study may serve as an important departing point for applicable, timely exploration on effective chatbots for small businesses.

ACKNOWLEDGMENT

The authors are grateful to any or all the MSMEs concerned during this analysis. While not their cooperation, this study wouldn't be potential. The authors are glad for the support they received to carry out this study from Ministry of Cooperatives and MSMEs and from many thanks to my lecturer who has guided masses for the foremost effective formula sampling technique.

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