

## The Influence of Chatbot Anthropomorphism on Trust, Intention, and Engagement of Indonesian State-Owned Bank Customers: Investigation Using the DOI Theory

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### ABSTRACT

Nowadays, artificial intelligence (AI) is growing rapidly, especially in Indonesia. Chatbot is one of the new forms of technology in AI that works like humans. Its great development is evidenced by the major adoption of chatbots in various industrial sectors, especially in the banking industry. This study intends to investigate the anthropomorphism of chatbots as one influencing factor of the trust, intention, and engagement of state-owned bank customers in Indonesia. The study employed the DOI theory since consumer behavior toward new technology is determined by his beliefs on that particular technology. The research used non-probability sampling with a total of 108 respondents who had or frequently used chatbots for their needs. The data was processed using the Partial Least Square method to analyze the measurement and structural model. The results show that all variables of chatbot anthropomorphism have a positive effect on trust, intention, and engagement of state-owned bank customers in Indonesia. This study provides insight for bank managers to continuously develop chatbots in order to get better quality and security so that customer trust, intention and engagement can increase.

### KEYWORDS

Artificial intelligence  
Anthropomorphism  
Initial chatbot trust  
Usage intention  
Customer engagement

## INTRODUCTION

Automation in various business sectors is continuously and majorly carried out in order to provide convenience and benefits for humans. Artificial intelligence (AI) is one of the many technologies that allow intelligence to penetrate into many business sectors due to its ease and excellent ability to support the running of the business. The McKinsey Global AI Survey 2021 affirmed that in 2021, the adoption rate of machine learning, computer vision, and natural language processing (NLP) reached 57%, an increase of 45% from 2020. This condition indicates that AI applications will continue to improve and multiply the benefits perceived by business actors (IDX Channel, 2022). AI is seen as a development of revolutionary technology that is able to carry out human activities and tasks, both individually and within organizations.

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In this 21<sup>st</sup> century, individuals and organizations are leveraging the latest digital technologies, such as the Internet of Things (IoT), blockchain, cloud computing, machine learning (ML), artificial intelligence (AI), and other Internet-based services, to help them in their work and activities (Fonseka et al., 2022). In the industrial environment, the popularity and adoption of AI technologies are increasing due to the increasing importance of innovation and minimizing the processes and activities carried out by humans. AI is used in various organizational functions, such as sales and marketing, as well as customer service and finance sectors (Samala et al., 2020). Hence, organizations have switched their growth strategies to the introduction of innovative technologies (Fonseka et al., 2022). Large industries have implemented AI in their businesses, including tourism, finance, manufacturing, automotive, telecommunications, energy, entertainment, and others. This is proven by the presence of self-driving cars, maintenance robots, virtual reality (VR), and chatbots.

AI chatbots are currently being widely discussed because of their ease and intelligence. Chatbots are text-based dream robots that imitate human-to-human dialogue through natural language processing (Mozafari et al., 2022). AI chatbots can communicate with consumers through regular and open-ended questions (Rania and Tamara, 2021). Customers can now interact with AI-powered chatbots so chatbots are utilized to become virtual marketing service agents that can be accessed anytime and anywhere (Cheng & Jiang, 2022). Even in the financial sector, chatbots provide services as if customers visit the banks directly.

The existence of this technology allows customers to access banking services without having to interact directly with bank employees. This is a major innovation in the banking industry (Yussaivi et al., 2021) as it reflects the intelligence of a system with efficient and autonomous operation. The technology can help users complete financial services and tasks. In Indonesia, the financial sector especially state-owned banks, such as BNI, BRI, and MANDIRI, has their own chatbots integrated with mobile banking and social media. BNI calls it CINTA, BRI has SABRINA, and Bank MANDIRI calls it MITA. The human-like naming shows the anthropomorphic side of each bank's chatbot.

Anthropomorphism depicts how chatbot processes services and tasks and behaves like humans (Mostafa & Kasamani, 2022). From that side, academicians attempt to examine the anthropomorphism variable on the level of confidence in the chatbot performance results. The performance of a chatbot, whether it provides the right answers and solutions, greatly affects the trust of its users. Trust is known to shape a positive relationship between customers and companies. Previous researchers used interpersonal trust to analyze customer trust toward a particular technology i.e. benevolence, capability, integrity, and reliability of the system (i.e., ease of use, functionality, reliability) (Abdulrahman Al Moosa et al., 2022). However, in the context of human-machine interactions, those previous studies bear some significant gaps that this current research attempts to fill.

This present research bases its analysis on the Diffusion of Innovation (DOI) theory (Rogers, 1995). The theory believes that customer behavior toward a new technology is determined by his beliefs about that particular technology (Davis, 1989). DOI consists of five technology-related aspects that are considered the main influences on accepting or rejecting innovations. They are relative merit, compatibility, complexity, testability, and observability. However, the first three are considered the most influential factors for consumers to embrace new technologies (Mostafa & Kasamani, 2022).

The DOI theory is adopted in this study because it is able to measure how much people's habits and beliefs influence their usage of a new technology, in this case, the chatbot. This theory is employed as a theoretical basis since many people are still not familiar with this technology. Besides, it is used to obtain facts and data to improve the development and implementation of new technology in the banking business, especially in state-owned banks. While previous research has confirmed the role of perceived usefulness and perceived ease of use in the application of technology, another

concept derived from the DOI theory is customer lifestyle and routine. Recognized adaptations may also be relevant (Ewe et al., 2015).

Previous research discovered that expectations for performance do not immediately grow consumer trust in chatbots (Mostafa & Kasamani, 2022). It was assumed then that other variables influence the performance expectation, and one of them is anthropomorphism. This present research, therefore, attempts to investigate the impact of chatbot anthropomorphism on the level of trust, intention, and engagement of state-owned bank customers in Indonesia. Anthropomorphism is believed to play a significant role in influencing the quality of performance, trust, and user satisfaction. This research is expected to contribute to the development of chatbots to increase state-owned banks' customer satisfaction. The technology is designed to interact and help customers in their daily life transactions by simulating spoken or textual conversations. Public acceptance of chatbots is determined by the tendency of customers to either use the technology or still come directly to the banks to do their financial needs. The results of this study will benefit state-owned banks, especially in Indonesia, by assisting them to provide better and superior services in order to give convenience to customers.

## LITERATURE REVIEW

### The DOI Theory

The Diffusion of Innovation (DOI) theory has valid uses, but the search factors influence the proliferation of discoveries in social systems. Diffusion means innovation (new ideas, applications, products, and technologies through dedicated channels between members of the social system). The DOI theory explains a number of exogenous factors that influence the decision-making application of information technology innovation (Akca & Ozer, 2014). Numerous studies have applied this theory to examine user behavior when adopting cutting-edge technology (Lim et al., 2022). To encourage users to overcome uncertainty in adopting new technologies, five characteristics of innovation are proposed: relative advantage, compatibility, observability, complexity, and testability. The process of adoption, diffusion, and exploitation begins with the identification of a problem, or awareness of the innovation and product need, which leads to the search for a technology that can solve the current problem or need (Shaikh et al., 2020).

### Chatbots and Compatibility

Compatibility is the extent to which the innovation is considered consistent with the values, needs, and previous experiences of potential users (Mostafa & Kasamani, 2022). It has a huge impact on trust (Alsmadi et al., 2022). Compatibility refers to “the degree to which an innovation is perceived as consistent with the existing values, needs, and previous experiences of a potential employer” (Jia et al., 2021). This is a fundamental aspect that leads to trust and acceptance. The start of technology and ensuring compatibility are two main factors that influence initial trust in Internet banking services (Mostafa & Kasamani, 2022). In the context of chatbots, the technology is designed to interact by simulating voice or text conversations to help customers complete routine transactions (Yussaivi et al., 2021). It is closely related to compatibility. Thus, the proposed hypothesis is:

H<sub>1</sub>: Compatibility has a positive impact on initial chatbot trust.

## Performance Expectation and Anthropomorphism

Performance expectation is interpreted as the performance of using technology in such a way that provides benefits (Chua et al., 2018). This expectation is closely related to using technology gratification, which requires the ability of the new technology to increase customer satisfaction. Chatbot's interactivity & accessibility are two crucial traits that shape performance expectations (Nyangadza et al., 2022). Since chatbots are used to assist e-bank customer service, it is recommended for consumers and leads to improved performance. In the context of banking, performance expectation means the use of online technology to help customers perform certain banking activities, such as finding and maintaining information, doing payments, and buying processes (Mostafa & Kasamani, 2022). Users build trust in chatbots by realizing the quality of their intelligence.

During the dialogue between users and chatbots, an anthropomorphic component has been added to the intelligent service, allowing users to use all available information to conclude them through anthropomorphic beliefs based on their perception of intelligence and AI. This anthropomorphism increases trust and adherence to the robot and builds positive interactions (Chen & Park, 2021). AI has some built-in expert intelligence to help reduce human error to some extent and reevaluate transactions that human experts can ignore. AI expert systems improve decision-making, facilitate timely and cost-effective expert-based decision-making, and increase data availability (Nayal et al., 2021). However, it may have a little drawback in the accuracy of the construction because people from different countries have different cultural values and behavior (Chua et al., 2018). The proposed hypothesis is:

H<sub>2</sub>: Performance expectation has a positive impact on perceived anthropomorphism.

## Initial Trust

Trust is an important factor that shapes people's relationship with the environment. In a business environment, it allows customers to subjectively exclude and process "possible" outcomes against undesirable things that can occur when using electronic channels (Abdulrahman Al Moosa et al., 2022). Initial trust can be defined as "preparation" when one party becomes vulnerable to the actions of the other party. The vulnerability may be caused by one's expectation that the other party will perform a certain important action, regardless of his expertise in monitoring or controlling them. In the context of AI chatbots, their functional design and format can increase perceived usefulness and comfort, which can then promote behavioral intentions (Michaelis et al., 2008). Thus, the formulated hypothesis is:

H<sub>3</sub>: Perceived anthropomorphism has a positive impact on initial chatbot trust.

## Usage Intention

Intention has always become a crucial factor to predict consumer actual behavior (Lee et al., 2021). There is strong evidence in the literature that users and non-users perceive the capabilities and risks of new technologies in different ways, which ultimately affect their future use (Thakur & Srivastava, 2014). Users have a higher awareness of the ease of use, which then increases the corresponding purpose of use (Rui-Hsin & Lin, 2018). Customers' habits of using chatbots are directly impacted by their past and present behaviors; these then affect their confidence and intention to use chatbots (Nyangadza et al., 2022). Comprehending consumers' usage intentions is important for news practitioners and marketing managers in making strategic decisions and forecasting sales of their

existing and new products and services (Karjaluoto et al., 2020). Despite the importance of this revolution, the goal of sustainable use is driven by increasing adoption which can change the way consumers make purchase decisions. Thus, the proposed hypothesis is:

H<sub>4</sub>: Initial chatbot trust has a positive impact on chatbot usage intention.

### Customer Engagement

Customer engagement is a customer's mental state that creates a company experience with a particular service relationship (Gao et al., 2022). Based on relationship marketing, it is characterized as a multifaceted construct and has been proven to influence value in relation to expression, engagement, trust, satisfaction, and loyalty (Kritzing & Petzer, 2020). User engagement is a quality of user experience that emphasizes positive aspects of interaction, especially phenomena related to motivation to be interested in and use web applications (Srivastava & Sivaramakrishnan, 2021). Customers invest time, money, and energy in the form of brand-related thoughts, emotions, and behaviors (Srivastava & Sivaramakrishnan, 2021). The formulated hypothesis is:

H<sub>5</sub>: Initial chatbot trust has a positive impact on customer engagement.

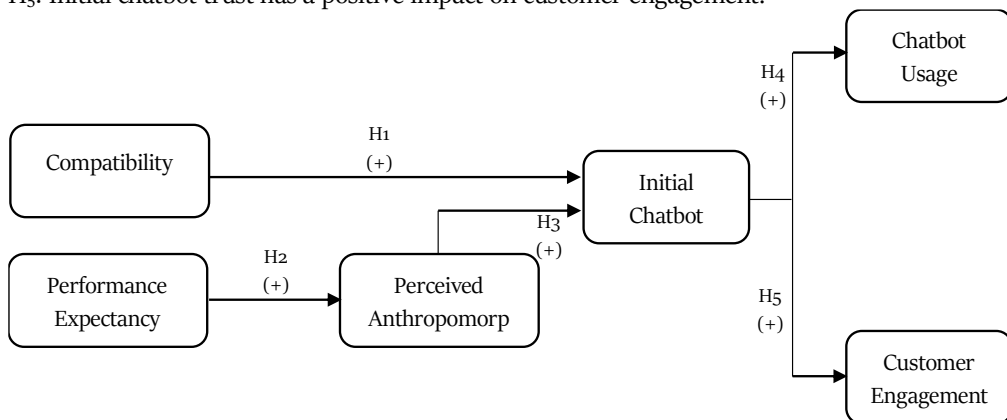


Figure 1. Conceptual framework

### RESEARCH METHOD

This research investigated chatbot factors (compatibility, performance expectancy, anthropomorphism, initial trust, usage intention, and customer engagement). Data were obtained using an online questionnaire distributed via Google Forms to the chatbot users of state-owned banks in Indonesia, selected based on non-probability sampling. The questionnaire items were analyzed using a five-point scale ranging from 1 = strongly disagree to 5 = strongly agree.

Indicator measurements in the questionnaire were adopted from previous studies that analyzed and examined compatibility, performance expectancy, anthropomorphism, initial chatbot trust, chatbot usage intention, and customer engagement. Table 1 presents the measurements of variables and their sources.

Table 1. Construct variables and sources

No.	Construct	Sources
1.	Compatibility	(Mostafa & Kasamani, 2022)
2.	Performance Expectancy	(Karjaluoto et al., 2020)
3.	Anthropomorphism	(Zhu & Chang, 2020)
4.	Initial Chatbot Trust	(Mostafa & Kasamani, 2022)
5.	Chatbot Usage Intention	(Lee et al., 2021)
6.	Customer Engagement	(Jami Pour et al., 2021)

Compatibility was measured using three indicators, performance expectancy was measured using four indicators, initial chatbot trust was measured using four indicators, anthropomorphism was measured using five indicators, chatbot usage intention was measured using four indicators, and customer engagement was measured using ten indicators adopted from the above-mentioned sources. This research was conducted to complement previous studies, and future researchers are advised to introduce other variables (customer, experience, satisfaction, attitude, etc.) into the research model to comprehend the role of initial chatbot trust in improving AI outcomes (Mostafa & Kasamani, 2022).

Following Hair (2017), the minimum sample with a significance level of 5% must be 122. This research had indeed met the minimum requirement by obtaining a sample of 150 data. However, after being processed using PLS, some had to be eliminated due to incomplete validation caused by errors in filling out the questionnaire, leaving only 108 valid data. Also, many people in Indonesia still did not have enough knowledge about chatbots and never used chatbots in their life. This condition was also experienced in the previous study (Mostafa & Kasamani, 2022) in which 500 distributed links only resulted in 184 complete responses (36.8%). In conclusion, it was difficult to find valid and suitable samples to fulfill the sample requirement.

The data were analyzed using the Partial Least Square (PLS) method. The PLS-SEM method was used due to the complex structure of the model, small sample size, and not-normally distributed data (Hair, J. F., 2017). Besides, it is the method for developing paths in the model structure (Dean et al., 2019). PLS-SEM works efficiently with small sample sizes and complex models, making almost no assumptions about the data it holds (Hair, J. F., 2017). PLS was also used to evaluate structural models, such as testing the validity of the model to explain the data and test the developed hypotheses. The confirmatory factor analysis was employed to test the validity and reliability of the constructs. The reliability test aimed to check the consistency of the measures if they were applied repeatedly. Meanwhile, the validity test aimed to check the accuracy of the measures.

## RESULTS

### Data Analysis

Table 2 shows the descriptive characteristics of the respondents, covering age, gender, education, and occupation. Table 2 shows that the majority of the respondents are between 25-30 years old (72%). It indicates that the younger generation knows more and frequently uses chatbots to solve their banking problems. Due to the lack of time, they rarely come to banks and make use of chatbot facilities instead since the technology is able to answer their problems more practically and

efficiently. In short, the younger generation is more open to the development of AI Chatbot technology.

Table 2. Characteristic of respondent

Variable	Description	Frequency	Percentage
Age	18 - 25	20	18.7%
	25 - 30	77	72%
	30 - 35	7	6.5%
	35 - 40	1	0.9%
	>40	2	1.9%
Gender	Male	66	61.7%
	Female	41	38,3%
Education	High School	5	4.7%
	Diploma	5	4.7%
	Undergraduate	87	81.3%
	Graduate	10	9.3%
Occupation	Government Employee	28	26.2%
	Private Employee	64	59.8%
	Student	2	1.9%
	Others	13	12.1%

### Measurement Model

It is important to ensure that all data is valid and reliable for the research. Thus, the validity and reliability tests were conducted. The data are valid and reliable when Cronbach Alpha  $>0.7$ . The results of the measurement model are presented below:

Table 3 shows that all indicators used in this study are valid and reliable because the Cronbach Alpha value is  $>0.7$ .

Table 3. Measurement model results

Construct	Factor Loading	Cronbach's Alpha Value	Conclusion	Mean	STDEV
Compatibility		0.910	Reliable	2.215	0.744
Chatbot service is compatible with my values	0.924		Valid	2.224	0.792
Chatbot service is compatible with my needs	0.943		Valid	2.215	0.812
Chatbot service is compatible with the way I buy/use	0.893		Valid	2.205	0.821
Performance Expectancy		0.928	Reliable	2.156	0.826
Chatbots are very useful for me	0.916		Valid	2.130	0.825
Chatbots increase my chances of achieving things	0.890		Valid	2.205	0.887
Chatbots help me get things done faster	0.924		Valid	2.252	0.991
Using chatbots increases my productivity	0.897		Valid	2.037	0.940

Table 3. Measurement model results (continued)

Construct	Factor Loading	Cronbach's Alpha Value	Conclusion	Mean	STDEV
Anthropomorphism		0.906	Reliable	2.598	0.869
Chatbots feel like a human	0.839		Valid	2.579	1.028
I think chatbots are human	0.852		Valid	2.943	1.106
Chatbots have its personality	0.868		Valid	2.448	1.011
Chatbots seem to have their own intentions/purposes	0.850		Valid	2.317	0.947
Chatbots seem to have their consciousness	0.851		Valid	2.700	1.011
Initial Chatbot Trust		0.783	Reliable	2.056	0.631
Chatbots are reliable to help users	0.805		Valid	2.074	0.832
Chatbots are very safe to use	0.845		Valid	2.074	0.773
Chatbots are trustworthy	0.847		Valid	2.018	0.672
Customer Engagement		0.956	Reliable	2.805	0.862
I feel proud when I use the chatbot	0.871		Valid	2.747	1.037
I like and love the chatbot	0.887		Valid	2.654	1.000
I always feel happy when I use the chatbot	0.866		Valid	2.803	0.994
I feel stimulated to learn more when using the chatbot	0.852		Valid	2.560	0.923
I keep thinking about the chatbot after I use it	0.856		Valid	3.028	1.085
Anything Chatbot-related catches my attention	0.862		Valid	2.766	0.917
I'm talking to other people about the chatbot	0.847		Valid	2.831	1.161
I feel happy to share my experience using the chatbot	0.826		Valid	2.570	0.972
I feel friendly with other people who use the chatbot	0.867		Valid	2.850	0.998
I often participate in chatbot user activities	0.724		Valid	3.243	1.106

### Structural Model

Figure 2 presents the research model built using Smart PLS. This structural model shows how the resulting structural relationship between factors and their variables.

The results of the measurement model and PLS model were used to test the coefficient of determination (R-square) and proposed hypotheses. This determination test was carried out to identify the impact level of independent variables on the dependent variables.



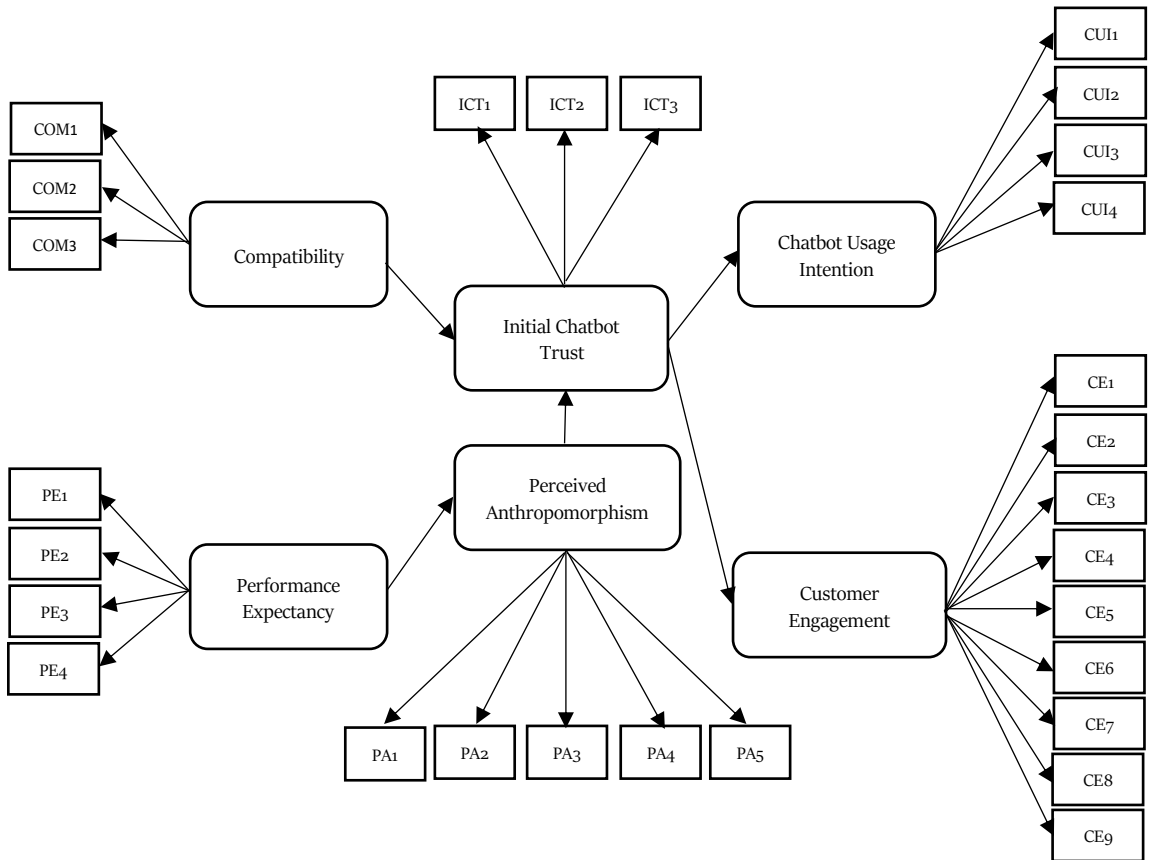


Figure 2. The research model

This study used four structural equation models, namely Perceived Anthropomorphism, Initial Chatbot Trust, Chatbot Usage Intention, and Customer Engagement. The results are presented as follows:

**Table 4. Coefficient of determination value (R-Square)**

No.	Construct	R-square (R <sup>2</sup> )	R Square Adjusted
1.	Anthropomorphism	0.569	0.565
2.	Initial Chatbot Trust	0.446	0.435
3.	Chatbot Usage Intention	0.626	0.623
4.	Customer Engagement	0.465	0.460

Table 4 shows that the adjusted R-squared values are 0.565, 0.435, 0.623, and 0.460. It indicates that the variation of the independent variable Performance Expectancy can explain the variation of the dependent variables: Perceived Anthropomorphism, Initial Chatbot Trust, Chatbot Usage Intention, and Customer Engagement. The rest are variations of other variables that affect Perceived Anthropomorphism but are not included in the model.

### Hypotheses Test Results

After measuring and processing the data, here are the results of each hypothesis test:

Table 5. Hypothesis Test Results

No.	Hypothesis	Coefficient	T <sub>statistic</sub>	P-value	Decision
H1	Compatibility has a positive impact on initial chatbot trust	0.382	3.578	0.000	Supported
H2	Performance expectation has a positive impact on perceived anthropomorphism	0.755	16.769	0.000	Supported
H3	Perceived anthropomorphism has a positive impact on initial chatbot trust	0.348	3.057	0.001	Supported
H4	Initial chatbot trust has a positive impact on chatbot usage intention	0.791	29.131	0.000	Supported
H5	Initial chatbot trust has a positive impact on customer engagement	0.682	15.413	0.000	Supported

Table 5 shows that all hypotheses have a positive relationship. It indicates that these variables support each other and have a positive impact on one another. It is proven by the P-value of  $<0.05$ .

The test of hypothesis 1, regarding the relationship between compatibility and initial chatbot trust, results in a coefficient value of 0.382 and a p-value of 0.000. The test of hypothesis 2, regarding the relationship between performance expectancy and perceived anthropomorphism, results in a coefficient value of 0.755 and a p-value of 0.000. The test of hypothesis 3, regarding the relationship between perceived anthropomorphism and initial chatbot trust, results in a coefficient value of 0.348 and a p-value of 0.001. The test of hypothesis 4, regarding the relationship between initial chatbot trust and chatbot usage intention, results in a coefficient value of 0.791 and a p-value of 0.000. Finally, the test of hypothesis 5, regarding the relationship between initial chatbot trust and customer engagement, results in a coefficient value of 0.682 and a p-value = 0.000).

The impact of performance expectancy on perceived anthropomorphism and initial chatbot trust on chatbot usage intention shows the highest coefficient value. It means that the impacts of these relationships are more positive compared to others. It implies that users have very high expectations of chatbots, and this will influence their trust and intention to use chatbots. However, the impact of perceived anthropomorphism on initial chatbot trust shows the smallest coefficient value of 0.348. It means that the anthropomorphism side of chatbots does not significantly increase the level of trust. In short, many users doubt that this new technology is like humans.

In relation to the DOI theory, the precursors to the new adoption or diffusion of process ideas include relative usefulness (perceived utility), complexity (difficulty), compatibility (the degree of compatibility with what is commonly used), observability (the ability to assess the impact of innovation) and relevance (the willingness to buy and to try the product) (Ahmad et al., 2022). The spread of innovation is a social and psychological process, and consumer behavior is closely related to consumer acceptance and adoption of new products (Ahmad et al., 2022). Therefore, this research is relevant to the DOI theory.

## DISCUSSION

First, this study demonstrates the importance of DOI theory in influencing public acceptance and adoption of new technology. It is essential to know the initial response and public response to use

this new technology, in this case, chatbots, for everyday life. The theory also identifies the spread of new technology in a culture and social system. From this basis, people can decide whether or not they want to know more about this new technology, adopt and use it.

Second, two influencing factors, compatibility and performance expectancy, are closely related to the advantages and sophistication of chatbots. Chatbots are judged from these two sides because they are actually very helpful, sophisticated, and have good performance. However, in Indonesia, this culture is not yet mushrooming so people need to experience the technology first before embracing the sophistication of chatbots.

Third, this study highlights the anthropomorphism side of chatbots. It means that this technology is very much like humans and carries out tasks like humans. This finding is important because it shows that chatbot anthropomorphism and its compatibility greatly influence users' trust, intentions, and engagement in adopting chatbots. This can also provide a broader understanding of those factors that support users using this technology.

Fourth, the results of this study show that certain variables have a large impact on users' trust, intention, and engagement while some have a smaller impact. People prioritize trust, implying that they believe that their banking data is safe and secure, and chatbots can provide services that they need. Other variables basically have a positive impact but the coefficient is smaller, indicating that these variables are not much considered by chatbot users.

Fifth, all hypotheses of this study are accepted, proving that all variables play a significant and positive role. The results show that compatibility has a positive impact on initial chatbot trust, performance expectations have a positive impact on anthropomorphism, anthropomorphism has a positive impact on chatbot initial trust, and chatbot initial trust has a positive impact on both chatbot usage intentions and customer engagement.

Sixth, related to the previous research of (Richad et al., 2019), the results of this study also indicate that all examining factors have a positive impact on the acceptance of chatbot technology by bank customers, especially millennials. Innovation is an exogenous variable that encourages millennials to adopt chatbots to assist them in doing their banking activities due to the positive impact of usability and ease of use of the technology. This later gives a tremendous influence on their attitudes toward chatbots, including recommending chatbots to others (Richad et al., 2019).

## CONCLUSION

This study provides an overview and broad information regarding the roles of perceived compatibility, performance expectations, and anthropomorphism in affecting the level of trust, intention, and engagement of Chatbot users. Previous research even proved that initial trust motivates users to use chatbots which then later leads to customer loyalty (Mostafa & Kasamani, 2022). The conclusion of this research is explained in the following paragraphs.

First, the anthropomorphism side of chatbots affects the level of user trust. Chatbots are seen as humans that can provide services in accordance with users' needs and desires. This anthropomorphism increases the level of trust since the technology is able to solve users' banking problems.

Second, the level of trust improves the intention and engagement of Chatbot users and makes them want to continue using the technology in the future. Therefore, the findings of this study imply that chatbot anthropomorphisms significantly impact users' trust, intentions, and engagement.

Third, although anthropomorphism has a positive impact, a number of users still do not believe that chatbots act like a human. Thus, the level of trust is not built optimally. It can be said then that

anthropomorphism has a positive effect on the perception of warmth but does not significantly affect the perceptual ability (Mostafa & Kasamani, 2022).

Fourth, the DOI theory is suitable for this study since its five proposed characteristics are able to encourage users to overcome uncertainty in adopting new technologies. The five characteristics are relative advantage, compatibility, observability, complexity, and testability. Previous research has applied this theory to examine user behavior when adopting cutting-edge technology (Lim et al., 2022). PLS-SEM explicitly calculates the value of the case variables of the algorithm, and non-observable variables empirically determine the exact combination of their indices (Richard et al., 2019).

## MANAGERIAL IMPLICATION

This study provides an overview and becomes a reference for managers of state-owned banks and chatbot developers in the Indonesian financial sector. It provides insight for these parties to continue improving the quality, features, and benefits of chatbots to the maximum. First, the results show that chatbots are useful and have begun to spread to state-owned bank customers along with the advancement of existing technology. Bank managers and chatbot developers, therefore, are suggested to develop the quality of chatbot technology to make it more sophisticated and easier to use.

Second, state-owned bank managers are suggested to be more aggressive in socializing the effectiveness and convenience of chatbots to the wider community to make chatbots widely known by the wider public. After this covid-19 pandemic era, chatbots are considered effective since they minimize the direct contact between a bank and its customers. Customers can directly get the solution for their banking problems just with the help of chatbots.

Third, the security aspect is indeed an important aspect for users. This aspect can boost users' confidence in using chatbots so they are willing to share the data needed. Therefore, bank managers must ensure the level of chatbot security and always improve it to answer the doubts of the users and create a sense of security when using the technology.

Fourth, besides the security aspect, chatbot features also need to be developed. Chatbot providers are suggested to improve chatbot services and features in order to increase customer engagement in using the technology.

Fifth, chatbots are more cost-effective and more efficient to be used since they provide services faster. Therefore, banks and providers must always maintain the technology properly and ensure that it is always updated. That way will make the intention, trust, and engagement better from both the bank side and the customer side.

## LIMITATIONS AND FUTURE RESEARCH

Despite its implications, this study bears some limitations that can be addressed by future research. First, the number of samples was limited due to few users having knowledge about chatbots and having used chatbots in their life. Second, this study only observed state-owned banks in Indonesia. Future research is suggested to investigate other types of banks, such as private banks, to generate more comprehensive results. Future studies may also investigate other variables such as Perceived Intelligence and Perceived Risk. In addition, the scope can be further expanded to various other business sectors that already use chatbots for their business operations. Third, this study was not

targeted to a certain distribution area of respondents. Future studies, therefore, can investigate chatbot users in other regions of Indonesia.

## REFERENCES

- Abdulrahman Al Moosa, H., Mousa, M., Chaouali, W., Mjahed Hammami, S., McKnight, H., & Danks, N. P. (2022). Using humanness and design aesthetics to choose the “best” type of trust: a study of mobile banking in France. *International Journal of Retail and Distribution Management*, 50(2), 251–275. doi: 10.1108/IJRDM-04-2021-0159
- Ahmad, A., AlMallah, M. M., & AbedRabbo, M. (2022). Does eWOM influence entrepreneurial firms’ rate of diffusion of innovation? *Journal of Research in Marketing and Entrepreneurship*, 24(1), 92–111. doi: 10.1108/JRME-01-2021-0012
- Akca, Y., & Ozer, G. (2014). Diffusion of Innovation Theory and Animplementation on Enterprise Resource Planning Systems. *International Journal of Business and Management*, 9(4). doi: 10.5539/ijbm.v9n4p92
- Alsmadi, D., Halawani, M., Prybutok, V., & Al-Smadi, R. (2022). Intention, trust and risks as core determinants of cloud computing usage behavior. *Journal of Systems and Information Technology*. doi: 10.1108/JSIT-09-2020-0180
- Chen, Q. Q., & Park, H. J. (2021). How anthropomorphism affects trust in intelligent personal assistants. *Industrial Management and Data Systems*, 121(12), 2722–2737. doi: 10.1108/IMDS-12-2020-0761
- Cheng, Y., & Jiang, H. (2022). Customer–brand relationship in the era of artificial intelligence: understanding the role of chatbot marketing efforts. *Journal of Product and Brand Management*, 31(2), 252–264. doi: 10.1108/JPBM-05-2020-2907
- Chua, P. Y., Rezaei, S., Gu, M. L., Oh, Y. M., & Jambulingam, M. (2018). Elucidating social networking apps decisions: Performance expectancy, effort expectancy and social influence. *Nankai Business Review International*, 9(2), 118–142. doi: 10.1108/NBRI-01-2017-0003
- Davis, F. . (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology (Vol. 13 No). *MIS Quarterly*.
- Dean, D., Suhartanto, D., & Kusdibyo, L. (2019). Predicting Destination Image in Creative Tourism: A Comparative between Tourists and Residents. *International Journal of Applied Business Research*, 1(01), 1–15. doi: 10.35313/ijabr.v1i01.36
- Ewe, S. Y., Yap, S. F., & Lee, C. K. C. (2015). Network externalities and the perception of innovation characteristics: Mobile banking. *Marketing Intelligence and Planning*, 33(4), 592–611. doi: 10.1108/MIP-01-2014-0006
- Fonseka, K., Jaharadak, A. A., & Raman, M. (2022). Impact of E-commerce adoption on business performance of SMEs in Sri Lanka; moderating role of artificial intelligence. *International Journal of Social Economics*. doi: 10.1108/IJSE-12-2021-0752
- Gao, L., Li, G., Tsai, F., Gao, C., Zhu, M., & Qu, X. (2022). The impact of artificial intelligence stimuli on customer engagement and value co-creation: the moderating role of customer ability readiness. *Journal of Research in Interactive Marketing*. doi: 10.1108/JRIM-10-2021-0260
- Hair, J. F., et al. (2017). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Thousand Oaks. Sage, 165.
- IDX Channel. (2022). *Marak Digunakan di Indonesia, Ini Manfaat Chatbot Bagi Pengembangan Bisnis*. <https://www.idxchannel.com/economics/marak-digunakan-di-indonesia-ini-manfaat-chatbot-bagi-pengembangan-bisnis>
- Jami Pour, M., Rafiei, K., Khani, M., & Sabrirazm, A. (2021). Gamification and customer experience: the mediating role of brand engagement in online grocery retailing. *Nankai Business Review International*, 12(3), 340–357. doi: 10.1108/NBRI-07-2020-0041

- Jia, Q., Lei, Y., Guo, Y., & Li, X. (2021). Leveraging enterprise social network technology: understanding the roles of compatibility and intrinsic motivation. *Journal of Enterprise Information Management*, 72061127002. doi: 10.1108/JEIM-05-2021-0225
- Karjaluoto, H., Shaikh, A. A., Leppäniemi, M., & Luomala, R. (2020). Examining consumers' usage intention of contactless payment systems. *International Journal of Bank Marketing*, 38(2), 332–351. doi: 10.1108/IJBM-04-2019-0155
- Kritzing, R., & Petzer, D. J. (2020). Motivational factors, customer engagement and loyalty in the South African mobile instant messaging environment: moderating effect of application usage. *European Business Review*, 33(4), 642–666. doi: 10.1108/EBR-04-2020-0104
- Lee, J. H., Jun, J., Park, J., Yoo, J. W., & Park, H. (2021). The role of characters featured on digital stickers in forming usage intention: internet-only banks in Korea. *Asia Pacific Journal of Marketing and Logistics*, 33(8), 1743–1757. doi: 10.1108/APJML-07-2020-0506
- Lim, X. J., Cheah, J. H., Morrison, A. M., Ng, S. I., & Wang, S. (2022). Travel app shopping on smartphones: understanding the success factors influencing in-app travel purchase intentions. *Tourism Review*, 77(4), 1166–1185. doi: 10.1108/TR-11-2021-0497
- McKinsey. (2021). Global survey: The state of AI in 2021 | McKinsey. [www.mckinsey.com. https://www.mckinsey.com/capabilities/quantumblack/our-insights/global-survey-the-state-of-ai-in-2021](https://www.mckinsey.com/capabilities/quantumblack/our-insights/global-survey-the-state-of-ai-in-2021)
- Michaelis, M., Woisetschläger, D. M., Backhaus, C., & Ahlert, D. (2008). The effects of country of origin and corporate reputation on initial trust: An experimental evaluation of the perception of Polish consumers. *International Marketing Review*, 25(4), 404–422. doi: 10.1108/02651330810887468
- Mostafa, R. B., & Kasamani, T. (2022). Antecedents and consequences of chatbot initial trust. *European Journal of Marketing*, 56(6), 1748–1771. doi: 10.1108/EJM-02-2020-0084
- Mozafari, N., Weiger, W. H., & Hammerschmidt, M. (2022). Trust me, I'm a bot – repercussions of chatbot disclosure in different service frontline settings. *Journal of Service Management*, 33(2), 221–245. doi: 10.1108/JOSM-10-2020-0380
- Nayal, K., Raut, R., Priyadarshinee, P., Narkhede, B. E., Kazancoglu, Y., & Narwane, V. (2021). Exploring the role of artificial intelligence in managing agricultural supply chain risk to counter the impacts of the COVID-19 pandemic. *International Journal of Logistics Management*. doi: 10.1108/IJLM-12-2020-0493
- Nyagadza, B., Muposhi, A., Mazuruse, G., Makoni, T., Chuchu, T., Maziriri, E. T., & Chare, A. (2022). Prognosticating anthropomorphic chatbots' usage intention as an e-banking customer service gateway: cogitations from Zimbabwe. *PSU Research Review*. doi: 10.1108/prr-10-2021-0057
- Rania Badr Mustofa dan Tamara Kasmani (2021). Antecedents and consequences of chatbot initial trust. *Journal of marketing*, doi 10.1108/EJM-02-2020-0084
- Richad, R., Vivensius, V., Sfenrianto, S., & Kaburuan, E. R. (2019). Analysis of factors influencing millennial's technology acceptance of chatbot in the banking industry in Indonesia. *International Journal of Management*, 10(3), 107–118. doi: 10.34218/IJM.10.3.2019.011
- Rogers, E. (1995). *Diffusion of Innovations*. Free Press.
- Rui-Hsin, K., & Lin, C. T. (2018). The usage intention of e-learning for police education and training. *Policing*, 41(1), 98–112. doi: 10.1108/PIJPSM-10-2016-0157
- Samala, N., Katkam, B. S., Bellamkonda, R. S., & Rodriguez, R. V. (2020). Impact of AI and robotics in the tourism sector: a critical insight. *Journal of Tourism Futures*, 8(1), 73–87. doi: 10.1108/JTF-07-2019-0065
- Shaikh, I. M., Bin Noordin, K., Arijo, S., Shaikh, F., & Alsharief, A. (2020). Predicting customers' adoption towards family takaful scheme in Pakistan using diffusion theory of innovation. *Journal of Islamic Marketing*, 11(6), 1761–1776. doi: 10.1108/JIMA-02-2018-0037
- Srivastava, M., & Sivaramakrishnan, S. (2021). Mapping the themes and intellectual structure of customer engagement: a bibliometric analysis. *Marketing Intelligence and Planning*, 39(5), 702–727. doi: 10.1108/MIP-11-2020-0483

- Thakur, R., & Srivastava, M. (2014). Adoption readiness, personal innovativeness, perceived risk and usage intention across customer groups for mobile payment services in India. *Internet Research*, 24(3), 369–392. doi: 10.1108/IntR-12-2012-0244
- Yussaivi, A. M., Lu, C. Y., Syarief, M. E., & Suhartanto, D. (2021). Millennial Experience with Mobile Banking and Mobile Banking Artificial Intelligence Evidence from Islamic Banking. *International Journal of Applied Business Research*, 3(1), 39–53. doi: 10.35313/ijabr.v3i1.121
- Zhu, D. H., & Chang, Y. P. (2020). Robot with humanoid hands cooks food better?: Effect of robotic chef anthropomorphism on food quality prediction. *International Journal of Contemporary Hospitality Management*, 32(3), 1367–1383. doi: 10.1108/IJCHM-10-2019-0904