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Adoption of Artificial Intelligence in Chatbot Recommendation Systems for Complex Customer Preferences: A Case Study of Shopee E-Commerce

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Abstract.
Purpose: This study identifies and analyzes factors influencing AI chatbot recommendation system adoption and proposes optimization strategies based on user perceptions and organizational decisions.
Methods: A qualitative case study was conducted with Shopee as the unit of analysis. Nine participants three internal Shopee personnel and six active users were interviewed and selected via purposive sampling. Thematic analysis followed three stages (open, axial, and selective coding) guided by the TOE–TAM framework. Trustworthiness was ensured through member checking, peer debriefing, and four criteria: credibility, transferability, dependability, and confirmability.
Result: Shopee's AI chatbot delivers personalized recommendations but users frequently experience information overload from irrelevant results. Three TOE dimensions technology readiness, organizational readiness, and external pressure, were found to drive adoption, while four TAM factors perceived usefulness, ease of use, trust, and satisfaction, shape user acceptance. Five strategic recommendations are proposed: algorithm enhancement, data quality improvement, adaptive personalization, deeper customer profiling, and information overload reduction.
Novelty: Prior studies examine organizational adoption (TOE) or user acceptance (TAM) of AI chatbots in isolation, leaving a gap in understanding how macro-level institutional readiness interacts with micro-level user cognitive barriers. This study addresses that gap by integrating TOE and TAM as a dual-perspective lens, explaining how institutional readiness spanning technology, organization, and environment directly reduces cognitive barriers during automated recommendations. The study further foregrounds the "Complex Customer Preferences vs. Information Overload" paradox as a central challenge: AI chatbots deployed to manage complex preferences often generate overload that undermines user trust and satisfaction, a tension prior TOE–TAM integrations have not addressed.

Keywords: AI chatbot, Recommendation, Preferences, E-commerce

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INTRODUCTION

E-commerce evolves rapidly, predominantly due to the ongoing digital transformation and enhancements of internet-related technologies [1]. One of the major contributors to its rapid growth is attributed to the emergence of various artificial intelligence (AI)-based solutions disrupting the e-commerce sector [1]. AI assistants are commonly employed in customer services as assistants to human agents, aiming to improve productivity and customer service quality [2]. The quality of customer service in addition to products/services being offered is among the determining factors of e-commerce businesses' success [3]. Digital shops that fail to satisfy modern consumers' needs risk becoming obsolete. Therefore, the majority of e-commerce businesses seek novel solutions to satisfy their customers – one of such solutions is AI-based chatbots [1], [4].

AI chatbots are the newest advancement in customer service tools, deployed to provide each customer with personalized shopping experiences utilizing algorithms embedded with NLP and Machine Learning systems allowing chatbots to understand user requests [1], [4]. Chatbots have become one of the most popular AI-based deployments and have been adopted in various e-commerce websites to aid users in performing various tasks [5]. Chatbots are considered to be one of the greatest innovations in the ever-growing e-commerce sector; they are available 24/7 to provide assistance to customers by providing

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consistent and precise answers to users' inquiries and delivering personalized service to each individual user [1].

AI-chatbots in e-commerce, however, face numerous obstacles during their development and deployment. The problem with chatbots being deployed as shoppers' assistants is one of the issues affecting this technology [6], [7]. Complex customer preferences is an obstacle chatbots face when aiding customers during their shopping experience [6], [8], [9]. Complex customer preferences can be defined as various requests that each user is entitled to such as event-based recommendations, specific to each individual's lifestyle, local trends, rigid budget-limitations, and high-low expectations – making it difficult for chatbots to generate precise and related suggestions to users [6], [8]. Personalization through AI is one of the current solutions to this problem, where the bot scans through each shopper's shopping history and provides suitable product suggestions [6], [8], [9], [10], [11]. AI-enabled personalization is proposed to be the leading method of handling each customer's complex and changing needs [8].

This solution, however, faces the same issue as providing many products to users, failing to personalize according to context, and providing many irrelevant products to users [6]. Having many options can make users tired and incapable of choosing what they want due to the overload of options [6]. To gain a more comprehensive understanding of this issue, the researcher engaged with AI chatbots across several e-commerce platforms—Shopee, Lazada, and Tokopedia—to examine how complex customer preferences are addressed in practice. The interactions conducted are illustrated in Figure. 1 below.

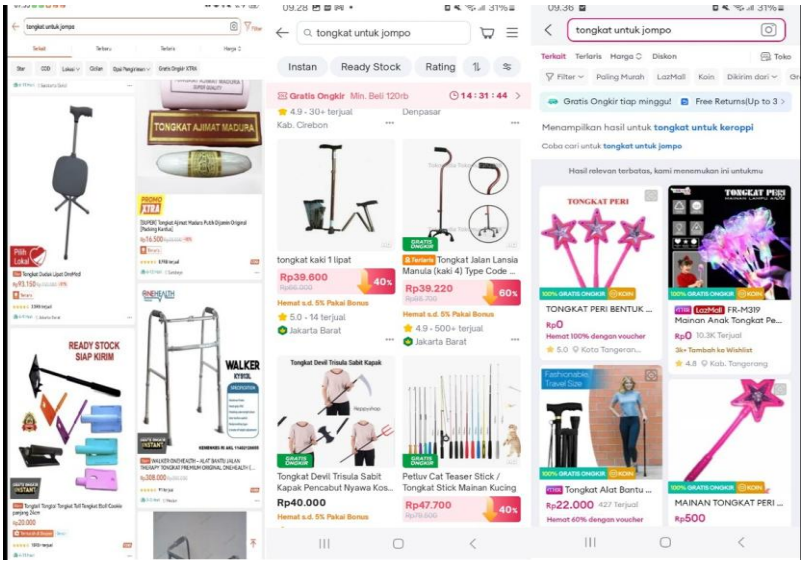

Figure 1. Interaction with Shopee, Lazada, and Tokopedia platforms

The researcher conducted interactions by entering the keyword "walking stick for the elderly" into the search features of the three platforms. Based on the results, Shopee displayed a large number of product options, most of which were relevant compared to Lazada and Tokopedia. Lazada presented products similar to those found on Shopee, but with a lower level of relevance. In comparison, the product listings on Shopee and Lazada were significantly more relevant than those on Tokopedia. The issues identified from prior studies and the researcher's direct interaction with e-commerce platforms served as a motivation to conduct this study. The objective of this research is to identify and analyze the factors influencing e-commerce platforms' decisions to adopt AI technology in order to improve the accuracy of chatbot recommendations. This analysis considers the perceptions of active users as strategic input to provide recommendations for optimizing the adoption and development of AI chatbot technology in the future.

Based on this objective, the research questions are formulated as follows:
RQ1: What are the factors that influence the adoption of AI technology in enhancing the accuracy of chatbot recommendations?
RQ2: What strategic recommendations can be made to optimize the adoption of AI technology in improving chatbot recommendation accuracy, based on the factors identified in RQ1?

Although research related to the adoption of AI-based chatbots in e-commerce has been widely conducted, most previous studies still view the adoption process partially, by separating the organizational perspective and the user perspective. Studies that use the Technology Organization Environment (TOE) framework generally emphasize readiness and adoption decisions at the organizational level, while studies based on the Technology Acceptance Model (TAM) focus more on users' perceptions of the usefulness and ease of use of technology. Nonetheless, limited studies have attempted to combine these two views into one conceptual viewpoint on utilizing AI chatbots serving as recommendation systems to solve complex customer preferences in an e-commerce environment.

This study offers a novel theoretical contribution by positioning the integrated TOE–TAM model as a dual-perspective lens that bridges Macro-Organizational Capabilities (TOE) with Micro-Individual Cognitive Barriers (TAM), explaining how institutional readiness spanning technology, organization, and environment directly reduces cognitive barriers during automated product recommendations. Critically, the study foregrounds the "Complex Customer Preferences vs. Information Overload" paradox as a defining challenge in AI recommendation ecosystems: while chatbots are adopted to handle complex preferences, irrelevant outputs generate overload that undermines trust and satisfaction a tension prior TOE–TAM integrations have not resolved. Through qualitative interviews and thematic analysis, this study contributes a more contextually grounded account of AI chatbot adoption in e-commerce, assisting companies in aligning technology strategies with evolving user needs.

Theoretical framework

E-commerce

The rapid growth of e-commerce in recent years has been driven by advances in digital technology and the internet [1]. AI-based innovations have also played a significant role in shaping the increasingly dynamic competitive landscape of e-commerce [1]. Currently, customer service plays a big role in whether online shoppers decide to shop from certain e-commerce businesses or not. It is no longer just about what you are selling or how much you are selling it [3]. Some services that e-commerce businesses can provide to help improve customer service include; 24/7 service, instant help through the use of chatbots and AI, leveraging data to provide more personalized services [12]. Digital solutions should be implemented through a contextual approach.

History of chatbots in e-commerce

AI-based systems have enabled chatbots to be integrated into applications, allowing them to mimic human behavior and interact naturally with humans. For instance, in the early 2000s, chatbots started to be adopted in E-commerce applications. Chatbots development began in the 1950s which span generation one up to 2010 where Apple launched Siri on iOS application, while generation two began in 2014 with the launch of Amazon Alexa and continues till date with the launch of Gemini (initially Bard AI) in 2023 [13].

First Generation: From 1950 when Alan Turing introduced the Turing Test to 2010 when Apple launched Siri. The Turing Test asked "can machines communicate like humans" [14]. ELIZA was created in 1966 by Joseph Weizenbaum to mimic conversations between a therapist and patient using prebuilt scripts that utilized pattern matching and substitution methodology. PARRY on the other hand was created in 1972 by Kenneth Colby to mimic the language patterns of a patient with paranoid schizophrenia and was said to be more complex than ELIZA [13]. In 1995, Richard Wallace created ALICE which utilized AIML to allow better comprehension when deployed on websites. IBM launched Watson in 2006 which utilizes natural language understanding and machine learning approaches to give proper answers to complex questions but could only understand the English language at launch [13]. In 2010, Apple launched Siri which became the first voice assistant that used speech recognition and machine learning on iOS devices [13].

Second Generation: Chatbots generation two launched in 2014 with Amazon's Alexa, this cloud-based voice assistant gave more accurate responses than Siri and could connect to smart lights and appliances that allow customers to use voice commands to turn different appliances such as lights, temperature, play music, buy products online etc. [13]. Microsoft then launched Cortana a year later in 2015, which was an artificially intelligent virtual assistant that worked on windows phone and windows 10 operating systems by allowing users to send commands by voice which Cortana would search and retrieve information for the user such as managing user's schedules and giving recommendations [13]. Google followed by introducing Google assistant in 2016 which could give personalized and contextual answers using AI to users that had android devices [13]. Open AI launched ChatGPT, an AI-powered chatbot in 2022 pre-trained with GPT-

3.5 capable of answering questions across various topics as intelligently and conversationally as another human being would [13]. Google then went on to launch Gemini (initially Bard AI) in 2023, this chatbot is built on an LLM and utilizes generative AI to bring people the most powerful chatbot that can respond naturally across modalities such as text, voice, and images [13]. Figure. 2 is Chatbot Evolution Chart Summary

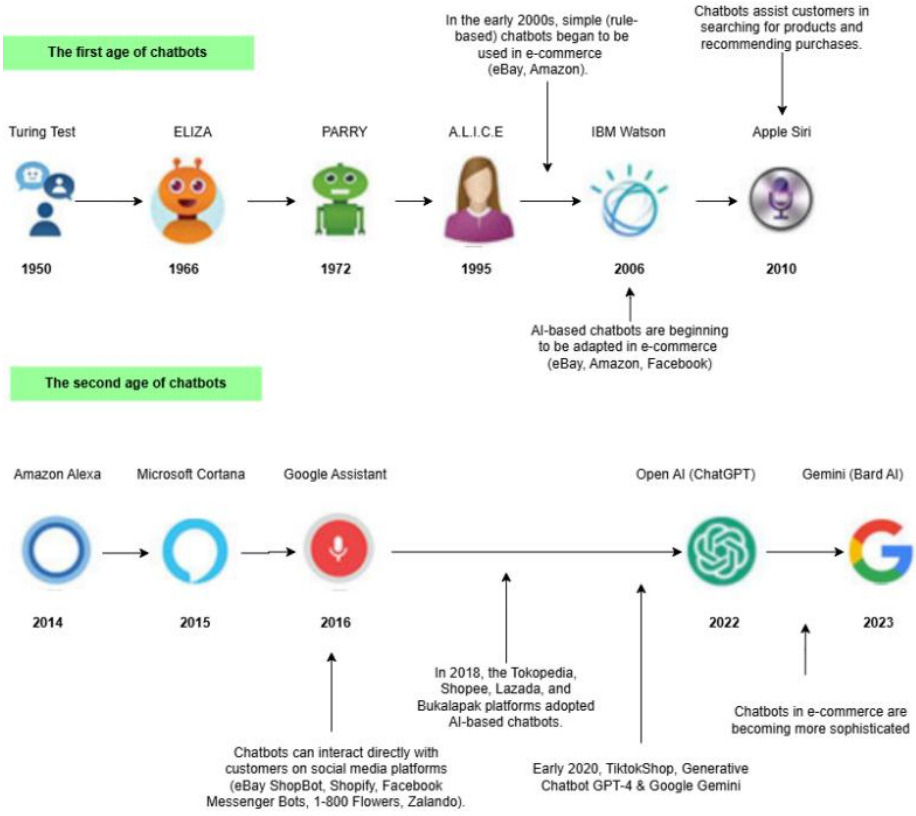

Figure 2. Brief timeline of chatbots

Today's chatbots have evolved from rule-based machines to complex deep learning-based machines that allow intelligent conversation systems, analyzing contexts and personalizing interactions in various sectors including commerce and education.

AI-based chatbots

The evolution and improvement of artificial intelligence have been supported by the ever-growing technology development and improved access to data that can be analyzed to solve many challenges within the commercial world. Artificial intelligence today is commonly used to support customer service roles by improving efficiency and service delivery [2]. AI is now being used strategically by businesses to improve customer experience within the ecommerce sector [15]. CX is now recognized as a vital factor that directly influences loyalty, brand perception, and overall business success [4]. With increasing customer expectation, businesses have been forced to adopt digital solutions like AI-based chatbots so as not to lose customers and fall behind the competition [1], [4], [5]. Artificial intelligence-based chatbots have been found to be an impactful invention to help solve customer service relate problems [1], [4]. Studies show that systems like NLP and Machine Learning help chatbots effectively understand and respond to consumer inputs [1], [4]. Ecommerce applications are increasingly integrating chatbots in order to help customers with various tasks such as offering recommendations, offering product/promotional information, processing transactions, tracking orders and parcels, and accepting returns [5]. AI chatbots also provide fast, consistent, personalized, and always-available services 24/7 [1]. Studies prove that chatbots are not only effective but efficient in helping ecommerce businesses solve customer service and order-processing problems because they help save time and cost while improving business competitiveness by simplifying customer transactions and offering satisfying experiences [1].

Personalization for product recommendations

Automatically tailoring product recommendations is one way AI has been used to personalize interactions within ecommerce applications [10]. AI chatbots help companies better understand user preferences by providing automated services [9], [11]. By looking at historical data provided by consumers, chatbots will provide better recommendations that are both efficient and accurate [16], [17].Most personalization tactics use previous user history and current user interaction to tailor recommendations to the used however personalization can also occur without the use of history by utilizing user profiling and dynamic content [6], [17]. Automating product recommendations with the use of AI chatbots not only improves efficiency and accuracy but improves how recommendations are tailored to each customer's individual style [6]. Providing customers with better recommendations also improves confidence in artificial intelligence which can help increase acceptance of AI technologies [8]. Overall, by better understanding user behavior with AI chatbots, businesses are able to improve how they relate with complex customer preferences, increase customer satisfaction while staying adaptable to changing customer needs [8], [9], [11].

Complex customer preferences

Customers have complex preferences such as expecting recommendations based on an event, lifestyle, trends around their location, customer service representatives' expectations, and budget [6], [8]. Meeting all these customer expectations when providing recommendations can be quite challenging [8]. AI provides technologies such as past purchase history, in depth customer profiling, multimodal analysis, and adaptive methods to help provide better recommendations by better responding to customer needs [6]. Some challenges such as information overload, lack of contextual personalization, and lack of empathetic chatbot responses have been identified [6]. Customers today expect more personalized recommendations that align with their past interactions and purchasing history with the ecommerce website [6]. AI chatbots should ideally not only provide customers with better recommendations but contextual based recommendations that fit customers' needs in order to improve user acceptance of artificial intelligence [8].

Technology-organization-environment (TOE)

The TOE conceptual framework explained by Tornatzky and Fleischer back in 1990 has since been established as a standard theoretical basis for illustrating contextual factors that lead to organizational decisions for adopting a specific innovation [18], [19]. The three contexts include technology, organization, and environment (TOE) that may influence businesses to adopt and implement the preferred technological innovation; artificial intelligence (AI) technology working as a chatbot to provide relevant recommendations based on complex customer preferences [20], [21]. Technology context entails characteristics associated with the innovation itself such as complexity, security, ease of use, and infrastructure readiness that support implementation [18], [19], [21]. Characteristics of AI working as a chatbot on an e-commerce site may include infrastructure readiness including availability of effective recommendation algorithms ensuring trustable and consistent recommendations, assurance of effective NLP, as well as algorithms that integrate customers' previous search and purchase histories for more personalized recommendations to fit complex needs [18], [20]. Internet connection availability and data protection are further added to technology factors based on the innovation [18], [21]. Organization entails all internal factors that may affect the firm's decision to adopt the said innovation and its capacity to implement it [18], [19]. The organizational function of the chatbot technology indicates internal factors such as effective IT team technical expertise, strategic leadership and planning, top management support, and business processes that are ready to be automated for improved convenience with the use of artificial intelligence (AI) technology [18], [20], [21]. Previous studies show that top management support and business processes act as pre-requisites that improve chatbot efficacy when integrated into the firms' e-commerce system [18], [19]. Environment, on the other hand, illustrates factors external to the organization that may push or pull the innovation into the organization [18], [21]. External factors include competition, customer demands for personalized offers, existing and emerging technology trends in the industry, and existing policies or regulations [18], [19]. As far as e-commerce platforms are concerned, business adoption of AI chatbots was as well influenced by external factors such as business needs to keep up with customer demands for real-time customer experience as well as automating processes to further cut short operating costs as competition from digital platforms increases [18], [20], [21]. In summation, this study will use the TOE theoretical framework as a basis for developing an organized perspective of various factors that may affect business decisions to adopt AI technology working as a chatbot to provide better recommendations to complex customer e-commerce needs [18], [20].

Technology acceptance model (TAM)

Technology Acceptance Model (TAM) was originally developed by Davis in 1989 to define user's willingness to use specific technology based on two variables: perceived usefulness (PU) and perceived ease of use (PEOU) [5], [7], [22], [23]. TAM has been commonly used to assess consumer acceptance of new technologies, such as the acceptance of artificial intelligence (AI)-based chatbots [5], [7]. PU is defined as users' belief that by using AI chatbots, it will enhance their performance, such as fastening product search, answering customer complaints, and allowing smooth transaction procedures [5], [7], [22]. PU was found to positively impact users' intention to adopt AI chatbots directly [7], [22]. PEOU means the level of perception of how easy the chatbot system is to use, including straightforward chatbot interface, uncomplicated interactions, and processes [5], [22]. When users do not struggle using chatbots, they are more likely to recognize it as useful and adopt the technology [7], [23]. User Satisfaction (US) towards adopting AI chatbots can be defined as how satisfied consumers are with the system after using it. Research shows that satisfaction is affected by PU and PEOU, and acts as a mediator that significantly affects users' intention to continued usage [5], [7]. When users receive pleasant experiences and services that fulfill their needs, they build satisfaction and loyalty towards using the chatbot [5], [23] Perceived Trust (PT) towards adopting AI chatbots represents how users feel the chatbot can keep them reliable, private, and secure on their data. When interacting with AI-based systems, customers need to trust that the chatbot tells them the truth about the products and services while keeping their private information secure [5], [7]. Trust was found to have direct positive effect on user satisfaction and intention to continued usage of AI chatbots [7], [23]. Lastly, Intention to Adopt AI Chatbots is defined as users' willingness to continuous usage of chatbots for their e-commerce needs [7], [22]. This was found to be the end factor that is influenced by PU and PEOU, satisfaction, and user trust when deciding to accept a technology [5], [23]. In summary, TAM can provide substantial ground for this study because it allows the study to understand what factors lead consumers to accept using AI chatbots, despite complicated customer preferences in e-commerce websites.

Thematic analysis

Thematic analysis is a method of identifying, analyzing, and reporting patterns within data sets that are important to the description of a research phenomenon and are often derived from user stories or interview results [24], [25]. We argue thematic analysis is suitable for the study because it is designed to interpret meanings both explicit and implicit from users' experiences with technology including AI-based chatbots [26]. Customer preferences of systems are constantly changing in an e-commerce setting, and thematic analysis allows researchers to identify how users react to AI chatbot systems, how users build trust with the chatbots, and how their technology usage experience influences their decisions to adopt said technology [27], [28]. Therefore, thematic analysis will allow researchers to illustrate experiences users go through when interacting with chatbots and extract embedded factors affecting cognition and emotions when interacting with chatbots. Braun and Clarke [24] identify six steps in conducting thematic analysis: (1) familiarizing with the data, (2) generating initial codes using a systematic approach to the data set, (3) searching for themes based on generated codes, (4) reviewing potential themes, (5) defining and naming themes, and (6) producing the final report. Thematic analysis using these steps is flexible and do not have to be rigidly linear which allows for an exploratory approach when interpreting participant opinions of AI chatbots. Clarke et al. [25] provide guidelines when conducting thematic analysis and highlight the importance of specifying one's theoretical perspective when reporting results from thematic analysis. If researchers aim to simply identify patterns that exist within customer data, then taking an inductive (data-driven) approach is best. However, if researchers have a pre-determined conceptual understanding of chatbot technology adoption within e-commerce, then taking a deductive (theory-driven) approach may be best. Nazir et al. [26] successfully utilized thematic analysis to design core themes around users' experiences with digital technology adoption. Themes on user experience were then connected to factors that influenced technology adoption. Momeni et al [27] provides evidence that thematic analysis allows researchers to interpret social and psychological underpinnings when describing how users perceive technology and technology usage in a digital world. Lastly, Sharma et al.'s [28] study on E-commerce sites gives arguments supporting the use of thematic analysis to dive deeper into mapping out user perceptions towards system features (trust, transparency, personalization expectations) and how those factors caused users to adopt or not adopt chatbot systems. In conclusion, thematic analysis allows researchers to adopt an approach that can understand many factors influencing individuals' adoption of AI chatbots in E-commerce from the diverse perspectives of users about how accurately the system makes recommendations for them and how their unique preferences are considered through AI-based conversations [24], [25], [27], [26], [28].

Previous research

This study bases its search for research gaps and model development on several previous studies. These studies were taken from various online journal sources such as Emerald Insight, IEEE Xplore, ProQuest, Science Direct, Scopus, Taylor & Francis, ACM Library, and AIS eLibrary. To obtain relevant references, the author conducted a search using a number of keywords that were a combination of terms such as "Chatbot", "Chatbot-based AI", "E-Commerce", "Online Shopping", "TOE Framework", and "Technology Acceptance Model". From the search results, nine studies were identified that specifically addressed the adoption of artificial intelligence (AI) technology in the context of e-commerce and related domains. Table 1 shows the extraction from these studies, highlighting the theoretical frameworks applied, key variables examined, and the research gaps identified.

Table 1. Previous research

Ref	Context	Methodology	Theoretical Framework	Key Variables	Gap
[7]	E-commerce chatbot	Quantitative and SEM	TAM	Perceived Usability, Interactivity, Perceived Intelligence, Anthropomorphism, Cognitive Attitude, Affective Attitude, Intention to Adopt AI Chatbots	No TOE
[5]	E-commerce chatbot	Quantitative PLS-SEM	TAM	Perceived Usefulness, Perceived Ease of Use, Information Quality, Perceived Trust, Perceived Enjoyment, User Satisfaction, Behavioral Intention to Use	No TOE
[8]	E-commerce AI chatbot	Quantitative EFA	TOE	Technology, Organization, Environment	No TAM
[23]	E-commerce chatbot Thailand	Quantitative PLS-SEM	TAM	Perceived Usefulness, Perceived Ease of Use, Perceived Convenience, Perceived Information Quality, Perceived Time Risk, Perceived Privacy Risk, Technological Anxiety, Openness to Experience, Attitude Toward Continued Use, Intention to Continued Use	No TOE
[29]	E-commerce adoption, SMEs, Palestine	Quantitative – PLS-SEM	TOE (extended)	AI Integration, Customer Tech-Savviness, Innovation Culture, Competitive Pressure, Business Partner Pressure, E-Commerce Adoption, Marketing Performance	No TAM; no chatbot or recommendation system context
[30]	AI adoption, Construction firms, South Korea	Quantitative and SEM	TAM + TOE	Technology, Organizational, Environmental, Personal, Perceived Usefulness, Perceived Ease of Use, Attitude towards Utilization	TAM+TOE integrated but not in e-commerce or chatbot recommendation context
[31]	AI adoption, Apparel MSMEs, China	Quantitative – PLS-SEM	TAM + TOE (extended)	Perceived Usefulness, Perceived Ease of Use, Organizational Complexity, Organizational Readiness, Competitive Pressure, Supplier Involvement, Market Uncertainty, Government Support and Policy, Knowledge Absorptive Capacity, Open Innovation, AI Adoption	TAM+TOE integrated but not in e-commerce or chatbot recommendation context
	AI adoption, Higher Education, Indonesia	Quantitative – Survey	TAM + TOE	Perceived Usefulness, Perceived Ease of Use, Technology, Organizational, Environmental, Behavioral Intention, AI Readiness, Attitude Toward AI, Digital Literacy, Top Management Support	TAM+TOE integrated but not in e-commerce or chatbot recommendation context
[32]	Digital transformation adoption, SMEs, Vietnam	Quantitative – PLS-SEM	TOE	Technology, Organizational, Environmental, Digital Transformation Adoption	No TAM; no chatbot context

As shown in Table 1, studies applying TOE in isolation [8], [29], [32] identify organizational and environmental drivers of adoption but overlook individual user acceptance factors. Conversely, TAM-only studies [5], [7], [23] capture user perceptions effectively but ignore macro-level institutional conditions. While three studies integrate both frameworks [30], [31], they do so in non-e-commerce contexts such as construction, apparel manufacturing, and higher education. No existing study applies an integrated TOE–TAM model to AI chatbot recommendation systems addressing complex customer preferences in e-commerce, the gap this study addresses.

METHODS

Research approach

This study uses a qualitative approach to explore in depth the phenomenon of adopting artificial intelligence-based chatbots in e-commerce. This approach was chosen because it is considered most appropriate for examining complex issues that are difficult to explain in a structured manner through quantitative instruments such as questionnaires [27]. Qualitative research enables researchers to understand the meaning, context, and subjective experiences of participants, resulting in more interpretive and contextual findings [24], [25]. In the study of technology and user interaction, this approach is also considered effective for identifying behavioral patterns, perception dynamics, and technology adoption factors that are difficult to capture through numerical data [26], [28]. Figure 3. shows the stages of this research.

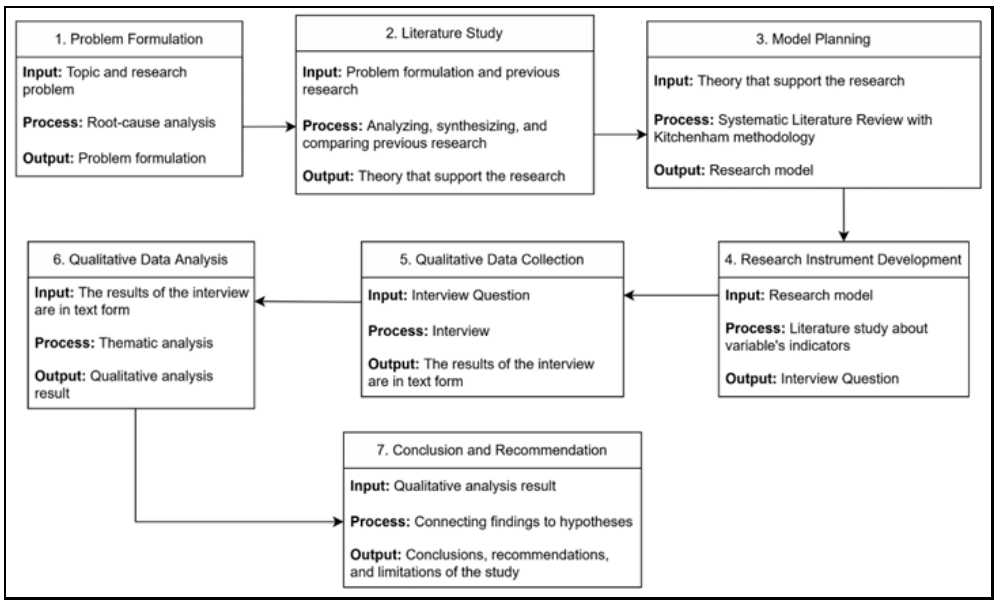

Figure 3. Research approach

Research model

The research model was developed as a reference for the author in conducting the research process, particularly in the data collection and analysis stages. The development of this model is based on background studies and literature reviews, with the aim of helping the author formulate answers to research questions. Based on the results of literature reviews that have been adapted to the context of the study background, the research model was formed by referring to a number of factors derived from TOE and TAM theories, as shown in Figure 4. This research model will explain the factors that influence the adoption of AI technology, both from the organizational side and from the user side. User perceptions of the AI system that has been used provide strategic input for Shopee in assessing the success and direction of the technology's development. Factors from the TOE theory will identify the factors that drive decisions to adopt AI technology to improve the accuracy of chatbot recommendations, while factors from the TAM theory will focus on how users perceive the usefulness, ease of use, trustworthiness, and intention to use the AI-based chatbot system provided by e-commerce.

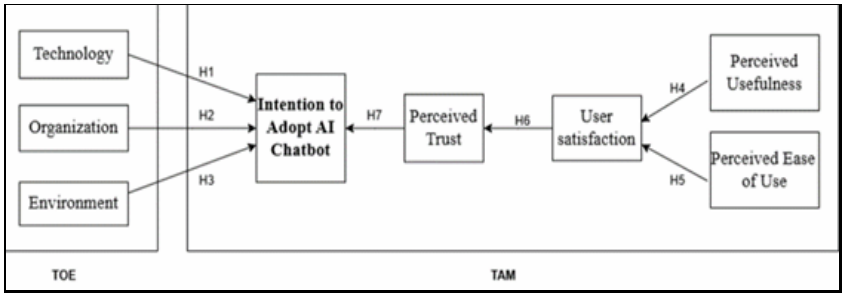

Figure 4. Research model

Based on the research model shown in Figure 4, the researchers formulated seven theoretical propositions, as follows:
P1: Technology readiness acts as a structural catalyst for the intention to adopt AI chatbots [18], [20], [21].
P2: Organizational readiness serves as an enabling condition for the adoption of AI chatbots [18], [19].
P3: Environmental pressures act as external drivers that strengthen the intention to adopt AI chatbots [18], [20], [21].
P4: Perceived usefulness is conceptually linked to higher user satisfaction with AI chatbots [5], [7], [22], [23].
P5: Perceived ease of use is conceptually linked to greater user satisfaction with AI chatbots [5], [7], [23].
P6: User satisfaction is conceptually associated with the formation of perceived trust in AI chatbots [5], [23].
P7: Perceived trust is conceptually associated with the intention to adopt and continuously use AI chatbots [7], [23].

P1: Technological characteristics such as compatibility, system reliability, and IT infrastructure readiness shape organizational actors' perception of AI chatbot feasibility. When technology is perceived as mature and operationally aligned, thematic evidence suggests a stronger propensity to adopt [18], [20], [21]. P2: The organizational dimension reflects a company's internal readiness, including top management support, resource availability, and innovation-oriented culture. Thematic evidence suggests that adequate organizational support reduces internal resistance and fosters confidence in adoption decisions [18], [19]. P3: Environmental factors competitive pressure, customer demands, and regulatory influence drive organizations to adopt AI chatbots to improve service efficiency and competitiveness. Increasing expectations for fast, responsive service function as external drivers of stronger adoption intent [18], [20], [21]. P4: Perceived usefulness explains the extent to which users believe AI chatbots help them perform activities more effectively. When chatbots provide accurate, efficient responses, thematic evidence suggests users perceive greater usefulness, which aligns with higher satisfaction [5], [7], [22], [23]. P5: Perceived ease of use reflects how effortless users find a system to operate. Chatbots with intuitive interfaces and simple interaction flows thematically align with more positive experiences and greater satisfaction [5], [7], [23]. P6: User satisfaction plays a foundational role in trust formation. Consistent positive experiences and reliable responses are thematically associated with stronger perceptions of trustworthiness in AI chatbots [5], [23]. P7: Perceived trust is critical in AI adoption, particularly where automated interactions and personal data are involved. Thematic evidence suggests that trust in chatbot security and consistency is associated with reduced uncertainty and stronger intention to continue use [7], [23].

Data collection
This study's data gathering was executed through semi-structured interviews. Semi-structured interviews are interviews that involve open-ended questions that explore one's perception. This allows interviewers to be flexible when questioning contextual information based on the person's role or background [24], [25]. Semi structured interviews are viewed as a qualitative research method because they allow for conversations to be open but focused while allowing new themes to develop that may not have been predictable [27], [28]. Semi structured interviews are also an appropriate method to understand users' complicated perception of AI technology as it relates to e-commerce. Understanding human behavior is complex and includes many subjective variables [26].

Case study
Shopee was chosen as case study because it is the most visited e-commerce website in Indonesia which has high user counts and large transaction numbers [5], [33]. It also hosts millions of products and categories allowing users to personalize their shopping experience to great lengths [5]. Shopee additionally introduced AI based chatbots to answer questions regarding products, recommended products to consumers, and aid them in completing transactions quickly and conveniently [7]. Shopee scored above average on all aspects of usability and user experience, though there is room to improve efficiency [33]. Its popularity, implementation of AI chatbots, and available features make Shopee a good context to apply when assessing chatbots' effectiveness in personalizing e-commerce recommendations.

Participant selection and sample justification
This study involved two participant groups selected through purposive sampling, which prioritizes depth of insight over sample breadth [24], [25]. The first group comprised internal Shopee personnel with a minimum of six months tenure, ensuring sufficient familiarity with the AI chatbot recommendation system.

The second group comprised active Shopee users aged at least 17 years who had used the platform regularly in the preceding six months, capturing a range of first-hand experiences with its recommendation features. In qualitative inquiry, sample adequacy is determined by theoretical saturation rather than statistical representativeness [24], [34]. Saturation was evaluated iteratively across interviews, and by the final session no new conceptual dimensions emerged, indicating saturation had been reached. The concept of information power [29] further supports the sample's adequacy: given the narrow study aim, specific inclusion criteria, established theoretical framework, and quality interview protocol, a smaller sample of well-informed participants is sufficient for rigorous qualitative conclusions. Participant profiles are presented in Tables 3 and 4.

Trustworthiness

To ensure the rigor and trustworthiness of the qualitative findings, this study applied the four criteria established by Lincoln and Guba [29]: credibility, transferability, dependability, and confirmability. Credibility was strengthened through member checking, where thematic findings were shared with two participants who confirmed the interpretations reflected their intended meanings, and through peer debriefing with a research supervisor to minimize interpretive bias. Transferability was supported by providing rich, contextual accounts of the study setting and participant profiles, enabling readers to assess the applicability of findings to similar contexts. Dependability was ensured through a structured thematic analysis protocol across all three coding stages, each documented iteratively. Confirmability was maintained through a reflexivity log in which the lead researcher recorded assumptions and interpretive decisions throughout the process.

Research instruments

The measurement tool: Semi structured interview guide is used in this study to collect data from each respondent allowing for detailed information to be captured. Questions are developed based on objectives of the study and made relevant to the context of implementing AI based chatbots for e-commerce purposes. See Table 2 for questions.

Table 2. Research instruments

Model	Code	Factor	Question
TAM	PU	Perceived Usefulness	Do you find the chatbot feature in Shopee helpful in assisting your online shopping activities?
	PEOU	Perceived Ease of Use	How easy is it for you to use Shopee's chatbot feature?
	PT	Perceived Trust	How much do you trust the Shopee chatbot feature to provide accurate and reliable information or recommendations?
	US	User Satisfaction	How satisfied are you with the Shopee chatbot feature in your shopping experience?
	ITA	Intention to Adopt AI Chatbot	Do you plan to use Shopee's chatbot as a tool to help you decide which products to purchase?
TOE	TEC	Technology	In your opinion, how prepared and reliable is the AI technology used by Shopee for its recommendation chatbot feature, and what are the main technical challenges faced in its implementation?
	ORG	Organization	How do you view the support from management, the readiness of internal teams (both in terms of human resources and infrastructure), and the role of AI adoption in Shopee's business strategy?
	ENV	Environment	In your opinion, how do external factors such as competitive pressure, feedback from users or the customer experience team, as well as considerations regarding regulations, data security, and ethics influence the adoption of AI at Shopee?

Data analysis

Thematic analysis was used to analyze the data which consisted of open coding, axial coding, and selective coding stages. This type of analysis allows the researcher to determine significant themes found within respondents' quotes and stories. It also structures the connection between themes [24], [25]. Themes can be used to categorize meaningful information to develop a rich understanding of one's experiences and perceptions on topics, such as using artificial intelligence based chatbots in e-commerce [28], [26]. When utilizing thematic analysis, the researcher makes reflective and contextual conclusions about the data in an iterative manner [28]. This is ideal for understanding the intricacies of customer preferences.

RESULT AND DISCUSSION

Respondent demographics

In this subsection, we will describe the demographics of our respondents. There were two parties involved in our research; Shopee's parties and active Shopee users. You can see the respondents' demographics in full below in Table 3 and Table 4.

Table 3. Demographic profile of internal Shopee respondents

Initials	Position	Years of Service	Educational Background	AI/Chatbot Familiarity
YEP	Product Owner	2023 - present	Computer Science / Product Management	High: manages AI chatbot rec. system daily; involved in A/B testing and AI strategy
JHA	Developer	2020 – present	Computer Science / Software Engineering	High: builds and maintains ML pipelines; daily experience with model training and deployment
STH	Quality Assurance	2023 - present	Computer Science / QA Engineering	High: validates AI recommendation outputs; familiar with MLflow, TensorBoard, and regression testing

Table 4. Demographic profile of active Shopee users

Initials	Gender	Age	Position	Years of Service	Usage Frequency	AI Chatbot Familiarity
NAP	Female	25	Student	2020 - present	Frequent (several times/week)	High: uses specific keywords; high search literacy
AMA	Female	29	Student	2021 – present	Regular (weekly)	Moderate: uses search primarily for gifts and personal items; trusts results conditionally
MNL	Female	21	Student	2020 - present	Regular (weekly)	Moderate: familiar with search features; relies on specific keywords for better results
FWH	Male	28	Student	2020 - present	Regular (weekly)	High: recognizes UI patterns; aware of algorithmic filtering
MZH	Female	25	Private Employee	2020 – present	Frequent (daily/near-daily)	High: uses Shopee Lens (image search); prefers specific keywords
GPN	Female	26	Private Employee	2022 - present	Regular (weekly)	Moderate: satisfied with recommendations; uses image search features; trusts displayed ratings

Thematic analysis results

The analysis method adopted for processing the interview transcripts data was thematic analysis with three stages, namely open coding, axial coding, and selective coding. Each stage was performed iteratively, where open coding is identifying preliminary categories, axial coding is clustering related categories together, and selective coding is developing the main meanings which showcase the significant information gathered from the interviews. The outcome from selective coding demonstrates that the seven categories identified from axial coding were Technology, Organization, Environment, PU (Perceived Usefulness), PEOU (Perceived Ease of Use), User Satisfaction, Perceived Trust, and Intention to Adopt AI Chatbot are Shopee's driving forces to adopt AI as Shopee's chatbot recommendation system. Table 5 illustrates the results obtained from both open coding and axial coding stages of thematic analysis.

Table 5. Thematic analysis results from the open coding and axial coding

Open Coding	Axial Coding
• Efficiency and personalization goals	Technology
• AI is sufficiently reliable	
• Technical barriers in integration and data. AI is scalable and adaptive	
• Technological readiness with regular monitoring	
• Technical barriers in real-time performance & data quality	
• AI enhances context and efficiency	
• System weaknesses in uncommon cases	
• Challenges in validating and testing dynamic models	
• Strong support from management	Organization
• Developing human resources	
• AI integrated into business strategy	
• Organizational support from headquarters	
• The internal technical team is available and growing. AI as the foundation of Shopee's system	
• Cross-team participation from the early design phase	
• Adaptation of QA roles for AI systems	

• AI as a key driver of user satisfaction and trust • Competitive pressure drives adoption • User input as the basis for iteration • Compliance with AI regulations and ethics • Competitive pressure from the industry • User input influences AI tuning • Compliance with data regulations and ethics. Competitive pressure in the e-commerce sector • User feedback plays a major role in QA • Verification of AI ethics, fairness, and data compliance	Environment
• Features are very helpful • Time efficiency • Features are highly supportive • Beneficial • Supports efficiency and exploration • Highly dependent on search features • Features are very beneficial • Time-saving • Extremely useful and efficient	Perceived Usefulness
• Ease of feature use • High ease of use • Easy to use • Items are easy to find • User-friendly • Easily recognizable even by new users • Very accessible and easy to use	Perceived Ease of Use
• Moderate satisfaction • Result ranking needs improvement • High level of satisfaction • Good level of satisfaction • High satisfaction due to ease and efficiency • High satisfaction and aligned with expectations	User Saticfaction
• Conditional trust in the system • Trust with the expectation of improvement • Trust depends on keyword specification • High level of trust • Strong trust based on experience	Perceived Trust
• Intention to reuse • Usage efficiency • Strong intention to continue using • High intention to keep using • Notes for improving relevance • Used as a basis for decision-making • Intends to continue using • Feature is considered essential • High intention to keep using the feature	Intention to Adopt AI Chatbot

Thematic verification and model refinement

The thematic analysis of qualitative data resulted in verification of all seven theoretical propositions (P1–P7). It can be concluded that qualitative findings are aligned with all proposed propositions because main themes extracted from the data are consistent, recurrent, and conceptually coherent with the direction of relationships specified in the research model. As such, thematic evidence supports P1 through P7, which means that informant statements and themes provide empirical grounding for the conceptual relations among all variables under study.

With regards to the TOE framework, thematic analysis reveals dominant themes related to technology readiness and characteristics (easy to integrate, stable, fits our service needs) which conceptually align with the proposition that technology factors catalyze the intention to adopt AI chatbots. The empirical data thus supports P1. Themes demonstrating organizational readiness to support AI chatbot implementation were also prominent, including management support, HR readiness, and resource availability, which thematically reinforce the notion that organizational factors strengthen adoption intention; this finding supports P2. Themes concerning the external environment (market competition, customer expectations of fast service, industry shifts to automated services) were consistent across participants and enrich our understanding of how environmental pressures drive adoption intent; therefore, the narrative supports P3.

Moving on to the TAM framework, thematic evidence indicates perceived usefulness was the theme that appeared most frequently when respondents were asked about factors that lead to satisfaction. The empirical data conceptually aligns with the proposition that perceived usefulness positively influences user satisfaction; informants described AI chatbots as useful because they provide fast responses, reduced workload for service representatives, and efficient problem solving, thus supporting P4. Additionally, perceived ease of use was another theme that emerged throughout analysis. Informants consistently described how simple and intuitive interactions reduce frustration and ultimately lead to greater satisfaction, and the narrative enriches our understanding of how PEOU shapes satisfaction, thus supporting P5. Thematic evidence further suggests that satisfaction is foundational to perceived trust; consistent positive experiences and helpful responses became key reasons why users trust AI chatbots, and the data conceptually aligns with P6. At the final stage of the model, themes related to trust (reliability, security, confidence in AI chatbots) were prevalent when participants discussed their reasons for continued adoption. The thematic evidence supports P7, indicating that higher perceived trust is associated with stronger intention to adopt and continue using AI chatbots.

In summary, the themes that emerged from the data provide conceptual grounding for integrating the TOE and TAM frameworks in order to explain the intention to adopt AI chatbots for the purposes of this study. Thematic evidence further indicates that perceived trust was the most dominant theme throughout all stages of analysis. This can be explained by the complexity of purchase decisions and customer preferences that AI-based recommendation systems must respond to. While technology readiness, organizational support, and environmental pressure may catalyze an organization's decision to adopt a new technology, long-term usage of AI chatbots will ultimately be shaped by the extent to which users trust the accuracy, relevance, and consistency of the recommendations provided.

TOE model analysis

TOE framework looks at technological, organizational, and environmental aspects as external factors affecting technology adoption efforts by organizations. For the purposes of this study, we apply TOE as a lens to break down Shopee's reasoning and decision-making process when adopting artificial intelligence technology to power its chatbot recommendation system. Shopee is an online platform that processes millions of visitors and daily transactions. Breaking down our observations through TOE allows us to categorize artifacts and information into technology, organization, and environment; the three elements that drive Shopee's decisions when implementing digital innovations.

Technology: Shopee chose AI to power chatbot recommendations in order to increase relevance and efficiency. Attributes that led to this decision included managing huge data sets, creating dynamic personalization at scale, and enabling frictionless, contextual speed. This was clearly reflected in participants' accounts. YEP described the core rationale: "*AI enables us to deliver more relevant and personalized product recommendations automatically. With the enormous volume of data and user interactions, AI helps us surface the right content for each user without manual intervention.*" JHA emphasized the scalability advantage: "*AI was chosen because of its scalability and adaptability. Machine learning models can be continuously retrained based on the latest user behavior, this is fundamentally different from static, conventional systems.*" STH noted the ongoing QA challenge this introduces: "*The most challenging aspect is validating recommendation results. Because the system keeps learning, its outputs can shift over time. QA cannot rely on one-time testing, we need an automated regression pipeline and specific metrics to measure recommendation quality.*" Areas of friction include real-time latency, data sample training, and edge cases of recommendation failures. Engineering and QA need to build robust technical infrastructure as well as automated validation and testing suites to ensure AI drift is managed in a constantly evolving model.

Organization: Adoption of AI at Shopee is heavily influenced by buy-in from leadership at local and regional levels. The feature is seen as core to the business and not an afterthought. YEP articulated the strategic positioning clearly: "AI is highly strategic. We tie it directly to business metrics such as conversion, user retention, and session duration. This is not just a technology initiative, it is part of the company's core strategy." JHA described how deep this integration goes technically: "From a technical perspective, AI is not just an add-on feature but a new foundation. Many other features now depend on this AI engine, so it has genuinely become part of the core architecture." STH highlighted the cross-functional dimension of organizational readiness: "Management is very supportive. Even QA is involved from the beginning in the design and evaluation process, not just at the final stage." Shopee is also dedicated to

internal capacity building through training initiatives, recruitment, and AI tooling such as MLflow and TensorBoard. These observations confirm that organizational readiness encompasses not only technical systems but also culture and cross-functional collaboration.

Environment: Shopee operates within a large and intensely competitive e-commerce ecosystem. Pressure to stay ahead of market players and meet customer demand directly fuels AI adoption. JHA noted the competitive imperative: "AI has effectively become the industry standard. If we do not move quickly, users will migrate to smarter platforms. We also benchmark competitor features extensively." YEP described how user feedback loops into AI development: "Feedback from the CX team and in-app user reviews are our primary data sources for adjusting recommendation outputs. We have even built a dedicated dashboard to monitor daily feedback." STH highlighted the ethical and regulatory dimension: "QA is also involved in verifying that the model complies with sensitive data restrictions and that outputs are not biased. We also monitor fairness metrics on outputs that are personal in nature." Shopee's adherence to data regulation, including sensitive data masking, AI bias audits, and fairness thresholds, further reinforces that successful AI adoption is defined not only by technical capability but also by responsiveness to the external environment and ethical responsibility.

TAM model analysis

This study uses TAM analysis to measure how Shopee users perceive and accept the newly implemented chatbot technology based on artificial intelligence. Users' experience and opinion towards usefulness, ease of use, satisfaction and trust towards the system will be analyzed to determine how well was the adopted technology implemented by Shopee.

Perceived Usefulness (PU): Most users agreed that Shopee's chatbot feature enabled them to find products faster and made their shopping experience more efficient. NAP captured this succinctly: "*It is very beneficial. Instead of manually browsing through categories, I can just type what I want and it comes up right away. Very useful, not just somewhat useful.*" Similarly, FWH noted: "*It is extremely helpful. Without it, I would have to scroll through every single shop. It is more efficient and saves time.*" However, usefulness was found to be highly contextual. MZH observed: "*The top results are relevant, but as you scroll further down it gets strange, products with suspiciously low prices, or things that are not even what I was looking for.*" GPN also noted: "*When it shows products I actually want to buy or have searched before, the chatbot is very useful.*" These accounts indicate that perceived usefulness is contingent on recommendation relevance, high when results are accurate, diminished when they are not.

Perceived Ease of Use (PEOU): The majority of respondents found Shopee's chatbot easy to use because it is prominently placed on the homepage and responds quickly. NAP stated: "*Very easy. The search feature is already fairly common across apps, so there is nothing new to learn. You just type what you want and press search.*" MZH added: "*Easy for me, because the search box placement is eye-catching, and there is an auto-suggest feature so I do not have to type everything one by one.*" However, some participants noted room for improvement. FWH observed: "*It is easy from the display side, but when the results show too many items, I have to filter again to find what I actually need.*" MZH also remarked: "*The search itself is easy, but Shopee's homepage is quite cluttered, there is a lot happening with live streams and banners, so finding the search bar can be confusing for new users*." These accounts suggest that ease of use is generally perceived as high, but can be undermined by interface complexity and information overload in the results.

User Satisfaction (US): Users expressed satisfaction when the chatbot delivered targeted and relevant recommendations. AMA shared: "*Very beneficial, especially because it suggests new items. Since it has learned my preferences, it saves time and helps me discover relevant products.*" GPN described her satisfaction numerically: "*So far I am very satisfied, about 8 out of 10.*" Conversely, dissatisfaction emerged when results felt random or impersonal. MZH explained: "*I always buy long-sleeved clothes for going out, I have never bought short-sleeved ones. But when I search, short-sleeved items still appear at the top. So I feel like it does not really match what I have previously bought.*" MZH noted: "*Already quite satisfied with the feature, but it needs improvement so that less relevant products are not placed at the top.*" These accounts confirm that satisfaction is driven primarily by personalization and recommendation accuracy rather than technical functionality alone.

Perceived Trust (PT): Users' trust in the chatbot was closely tied to the specificity and consistency of recommendation results. FWH expressed conditional trust: "*I am fairly confident because when I search,*

Shopee directly recommends items with 5-star ratings, good reviews, and the best sales, so I trust that what is shown is good." AMA similarly described trust as qualified: "*I trust it, but not 100%. I still look at the lower-ranked recommendations too, because there are too many options and I am not fully sure about the top ones.*" MZH tied trust to keyword specificity: "*It depends on context. If I want to buy something but do not know exactly what, I trust it less, because the results can be quite random. But if I already know the specifics of what I want, it is more reliable.*" These accounts confirm that trust is built on consistent and accurate outputs; when results are too broad or irrelevant, confidence in the system diminishes.

Intention to Adopt AI Chatbot (ITA): All respondents expressed a clear intention to continue using Shopee's chatbot feature. NAP stated: "*I will definitely keep using it. I am the type of person who already knows what I want to buy, so I go straight to search. I will keep using it.*" FWH confirmed: "*Yes, because it really makes things easier. Without it, I would not know where to look for products.*" AMA also noted: "*Yes, for sure. If I did not use it, I would not know how to find things. It is practically the main feature, when I open Shopee, searching is the first thing I do.*" However, some respondents noted their intention was conditional on use case. MZH clarified: "*I use Shopee only when I already know what I want to buy, not to decide between options. I decide elsewhere, through TikTok or Instagram, then I search specifically on Shopee with a precise keyword.*" These accounts indicate that intention to adopt is high overall, with the chatbot regarded as an indispensable tool for product discovery, albeit used most confidently with specific rather than exploratory queries.

Final conceptual model

The research questions this study aims to answer is why Shopee adopted AI technology in their chatbot recommendation system. Theories aside, I believe by combining both TOE and TAM models, a more holistic viewpoint can be analyzed regarding technology adoption. In the case of recommending systems, technology adoption does not solely rely on the organization's readiness and environmental pressures. The end-users who will be using the innovation play a major role on whether the technology will be accepted, perceived, and satisfied on the product. By combining the two models, technology adoption can be analyzed from two viewpoints: the provider of the technology and service, and the user of the product. The findings from the interviews suggest that the null hypothesis stated in the beginning of the report can be rejected. The conceptual model developed in the beginning of the study will not be modified and all constructs will be validated. Hence, the proposed model is appropriate for this study. Figure 5 below is the final conceptual model.

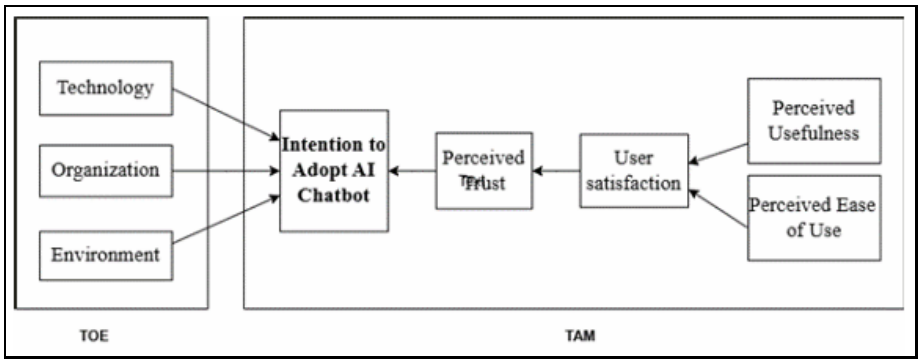

Figure 5. Final conceptual model

As shown in the figure above, the integrated TOE–TAM was able to be validated using qualitative data collected from semi-structured interviews. In this study, we will not be statistically testing if the model is validated. Rather, we will be able to validate the model by conducting thematic analysis on whether the themes discovered are consistent with the constructs of the model. Through the process of open coding, axial coding, selective coding, we were able to show that all constructs in the proposed model stemmed from what the participants had to say about their experiences and perceptions. This show that the model is built based on empirical evidence and not created solely from theory. Also, since the themes of why the organization adopted a technology matched with what influences users to accept a technology, the proposed model can be validated as appropriate to explain the adoption of AI-based chatbot recommendations system to better solve complex customers' product preferences.

Data analysis result

Based on the results gathered from RQ1, below are a few recommendations made with regard to considerations that can be taken to ensure optimized adoption of AI technology in chatbots for accurate results. Recommender Systems: Shopee can work towards enhancing and expanding the AI algorithms implemented into its chatbot, including finetuning aspects that pertain to accuracy of recommendation results and relevancy of items being recommended (taking into account more robust modelling of user preference and contextual processing of conversation). Clean and Complete Data: Inconsistent and irrelevant data found in the user's search and purchase history that is used to build the recommendation should be cleaned. Garbage in garbage out; if the structured data being used to formulate recommendations is poor, the output provided will be inconsistent at best and fail to meet the needs of the consumer. Contextual and Personal Recommendations: User behavior can be inferred through the analysis of users' search and purchasing history. The recommendation results can then be modelled to be both personal and contextual, tailored to fit the user's needs. Building Deeper Customer Profiles: Recommendation should not be solely based on previous transactions. Shopee has the capacity to build profiles of customers based on their preference, interest, and shopping habits which allows them to better map out the needs of each customer. Avoid Information Overload: The scope of the recommendation engine should value depth over breadth. By nesting intelligent filtering processes into the system, the engine will allow users to be comforted by a smaller number of choices and more efficient at satisfying the needs of the consumer. The recommendation answers were created in accordance to the pain points discovered during the process of AI technology adoption for the use of chatbot recommendation results. These changes should allow Shopee to enhance its chatbot to function better in an accurate, adaptive, and contextual manner.

CONCLUSION

This study concludes that the adoption of AI-powered chatbot technology on the Shopee e-commerce platform is driven by a combination of organizational and user-side factors, as revealed through the integrated application of the TOE and TAM frameworks. From the organizational perspective, adoption decisions are shaped by technological readiness, institutional support, and external market pressure, while from the user perspective, acceptance is primarily determined by perceived usefulness, ease of use, trust, and satisfaction with the system. Although the chatbot system is recognized as beneficial in enhancing service efficiency and product recommendation personalization, users still encounter cognitive overload caused by an abundance of options that are not always contextually relevant to their preferences. In response, this study proposes five strategic directions — algorithm enhancement, data quality improvement, adaptive personalization, deeper customer profiling, and information overload reduction — as a practical framework for optimizing chatbot performance. The research impact lies in its theoretical contribution through a novel integrative conceptual model combining TOE and TAM, which offers a more holistic lens for analyzing digital technology adoption, as well as its practical value in guiding developers and e-commerce practitioners toward designing AI chatbot systems that are more responsive, personalized, and aligned with the complexity of contemporary customer preferences.

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