Exploring the Impact of Perceived Convenience, Autonomy, and Satisfaction on Citizens' Continuance with Government Chatbots

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Abstract

Chatbots are computer programs that utilize artificial intelligence techniques to simulate human-like conversations with users. Governments worldwide are increasingly employing them to engage with citizens, provide information and services, and support government activities. By employing the Information Systems Continuance Model and Resources Matching Theory as theoretical frameworks, this study explores the influence of perceived convenience, autonomy-related control, and citizens' satisfaction on their continuance with government chatbots. The findings of the study indicate that citizens' decision to continue using government chatbots is directly affected by their perceived convenience, autonomy-related control, and satisfaction and indirectly influenced by expectation confirmation. Theoretical and practical implications for the use of chatbots in government contexts are discussed.

Keywords: AI chatbots, GoodPy, government chatbots, AI chatbot

1. Introduction

Empowered by Artificial intelligence (AI) technologies, chatbots have gained enormous popularity and dramatically changed the way how organizations and people deliver information and communicate with each other nowadays (Vassilakopouloua et al, 2023). Chatbot is a computer program that is deployed on websites, messaging apps, or other platforms to understand and respond to user requests and messages (Chen et al., 2023). When a user types a message or speaks to a chatbot, the chatbot uses natural language processing (NLP) to understand what the user is asking. The chatbot then generates a response using pre-written scripts or using machine learning (ML) algorithms to generate a new response (Aoki, 2020; Vassilakopouloua et al, 2023). The benefits of the chatbot for customer service include but are not limited to 24/7 availability, improved customer satisfaction, and cost savings (Lin et al., 2022; Chen et al., 2023).

It's not surprising that numerous organizations have recognized the potential of chatbots and begun to use them to enhance their performance (Lin et al., 2022; Vassilakopouloua et al, 2023). For example, 80% of businesses are projected to integrate some form of chatbot system by 2023 (Chen et al., 2023). Similarly, Lin et al. (2022) predict that the global market size for chatbots will reach $1.3 billion by 2025. Governments around the world are also increasingly using chatbots to improve citizen engagement, deliver information on public events and initiatives, gather feedback on government policies, and provide better services (Aoki, 2020). According to the 2020 United Nations E-Government Survey, the number of countries that use chatbots doubled from 28 in 2018 to 59 in 2020. Similarly, as of November 2019, 70% of provincial governments in China had launched chatbots (Ju et al., 2023). In South Korea, the subscribers of GoodPy, a smartphone-based government chatbot have soared to 14 million by December 31, 2021 (World Bank, 2022).

The success of any e-government initiative relies upon citizens' willingness to continue utilizing their services (Tang et al., 2021). As the use of government chatbots becomes more widespread and citizens become increasingly interested in them, there is a growing need to understand factors that influence individuals' attitudes and intentions toward these tools (Aoki, 2020; Ju et al., 2023; Vassilakopouloua et al., 2023). Additionally, studying how chatbots are being utilized by citizens can offer valuable insights into how to improve their design, implementation, and effectiveness in serving citizens. Furthermore, by studying how citizens are using these chatbots, governments can gain a better understanding of the needs and preferences of their users, which can inform the development of more user-centered chatbots. This, in turn, can help governments select chatbot features that are more aligned with citizen needs and expectations, ultimately leading to more effective and

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efficient use of government resources (Vassilakopouloua et al., 2023).

The number of studies that have investigated the government chatbot phenomenon from a behavioral perspective remains limited (Vassilakopouloua et al., 2023). Most existing studies on government chatbots either concentrate on providing an overall description of the chatbot phenomenon or comparing it with previous e-government applications (e.g., Androutsopoulou et al., 2019; Kankanhalli et al., 2019), or illustrating how a chatbot can foster the performance of public organizations (e.g., Mikalef et al., 2023). While government agencies are urged to seek solutions from academics to better design the chatbot and grow their user base, limited research attention has been paid to exploring what motivates the continued use of such systems. There is a clear need to extend the current literature by exploring the following research question: *What factors motivate citizens to continue using the government chatbot?*

To address the research question, we have employed the Information Systems (IS) Continuance Model (Bhattacherjee, 2001) and Resources Matching Theory (RMT) (Zhu et al., 2007; Tan et al., 2010; Collier et al., 2015) as theoretical frameworks for this study. The IS Continuance Model (ISM) proposes that users' continued use of an IS is influenced by three key factors: perceived usefulness, satisfaction, and expectation confirmation. Developed by Bhattacherjee in 2001, this model has been widely used in research on IS user behavior (Brown et al., 2014; Franque et al., 2021). RMT builds on Social Cognitive Theory by focusing on the match between individuals' abilities and the resources available to them. Specifically, perceived control and convenience are critical factors when applying RMT to explore users' behavior regarding self-service technologies (e.g., Collier & Sherrell, 2010; Tan et al., 2010; Collier et al., 2015). As chatbots allow customers to start a conversation and receive information or assistance without human intervention, they are considered a type of self-service technology. We believe that using the ISM and RMT as theoretical frameworks will provide a valuable perspective for this investigation.

This study is expected to offer the following theoretical and practical implications. First, literature on the government chatbot phenomenon is still in its early stage, most existing studies on this topic are either focused on illustrating what is government chatbot (e.g., Androutsopoulou et al., 2019; Kankanhalli et al., 2019) or how a government chatbot can improve performances of public organizations (e.g., Mikalef et al., 2023). The investigation focuses on identifying factors that influence users' usage or continued usage of government chatbots from a behavioral perspective is still limited (Aoki, 2020; Ju et al., 2023; Vassilakopouloua et al., 2023). Additionally. Our study will enrich the literature in this domain by offering a theory-driven, empirically supported framework for understanding users' behavior in the government chatbot context. Second, by exploring the motivations behind individuals' continued usage of government chatbots, we add to the growing literature on the use of AI in public governance (Zuiderwijk et al., 2021). This study responds to recent calls to conduct more complex studies on the topic of AI-based government services (Vassilakopouloua et al., 2023). Finally, it is expected to offer rich insights into how practitioners can effectively attract and maintain users in emerging AI platforms.

2. Theoretical background

2.1. Government use of Chatbot

Chatbots are one of the most common types of AI tools used by local, state, and federal governments to improve citizen engagement, service delivery, and overall efficiency in public sector operations (Aoki, 2020; Ju et al., 2023; Vassilakopouloua et al., 2023). Programmed with a set of predefined responses to common queries and questions from citizens, the government chatbot can handle a wide range of inquiries, such as providing information on government programs and services, processing requests for forms and documents, and offering guidance on how to access various services and benefits. Some government chatbots can also provide support for more complex issues, such as legal advice and emergency response (Kankanhalli et al., 2019; Mikalef et al., 2023). According to a report by the National Association of State Chief Information Officers (NASCIO), nearly half of the states in the United States have deployed chatbots or other forms of conversational AI to support their citizen services (NASCIO, 2020). Some examples of government chatbots that have gained popularity include the "Ask MyNavy HR" chatbot launched by the United States Navy to provide HR assistance to sailors and families, and the "Ask Jamie" chatbot launched by the General Services Administration (GSA) to provide information on the federal acquisition process (Mikalef et al., 2023).

It is not surprising that studies on government chatbots have emerged in recent years (e.g., Kankanhalli et al., 2019; Aoki, 2020; Ju et al., 2023; Mikalef et al., 2023; Vassilakopouloua et al., 2023). The current research on this topic can be broadly categorized into three distinct but related groups. The first group of studies concentrated on illustrating the government chatbot phenomenon and its potential benefits by using a qualitative approach (e.g., Androutsopoulou et al.,

2019; Kankanhalli et al., 2019; Makasi et al., 2022). For example, Makasi et al. (2022) propose a typology to classify public service chatbots based on their technical properties and capabilities. The proposed typology can be a useful tool for chatbot designers, as it allows them to conduct a high-level evaluation of the technical properties required for designing chatbots in various service delivery contexts. Similarly, Androutsopoulou et al. (2019) highlight numerous critical issues related to the implementation of a government chatbot, including concerns over trust and security.

The second group of studies, on the other hand, focuses on designing the government chatbot by using design science or mathematical modeling approaches (e.g., Hasan et al., 2018; Petriv et al., 2020). For instance, Hasan et al. (2018), by using Google Dialogflow, designed a conversational chatbot for answering user queries and administrative support. A domain-specific semantic model was used to test its intelligence abilities. Petriv et al. (2020), by analyzing a government chatbot from Ukraine, identified several important factors when designing a government chatbot: user needs, language and tone, security, accessibility, testing and optimization, and integration with existing systems.

The third group of investigations places emphasis on illustrating how a chatbot can foster the performance of public organizations (e.g., Mikalef et al., 2023; Sienkiewicz-Małyjurek, 2023). For example, Mikalef et al. (2023), by collecting data from 168 municipalities in three European countries, found that chatbot's AI capabilities have a positive effect on process automation, cognitive insight generation, and cognitive engagement, which further influence an organization's performance. By using a survey approach, Sienkiewicz-Małyjurek (2023) state that the adoption of AI chatbot can lead to various challenges for public managers such as a replacement of human work by AI, insufficient AI policies, and the inability to identify responsibility for AI.

The last group of studies pays attention to government chatbots from a behavioral perspective (e.g., Aoki, 2020; Ju et al., 2023; Vassilakopouloua et al., 2023). Some studies in this stream of literature concentrate on understanding the determinants of the government's adoption of chatbots (e.g., Wang et al., 2022; Neumann et al., 2023). For example, based on the literature on e-government adoption and innovative policy innovation diffusion, Wang et al. (2022) find that pressure factors (vertical administrative pressure, horizontal competition pressure) and readiness factors (e.g., technological application level) significantly influence the government's decision to adopt chatbots. Some studies, alternatively, focus on exploring why citizens trust government chatbots (e.g., Aoki, 2020; Ju et al., 2023). For instance, by using a multinomial logit model, Ju et al. (2023) state that emotional intelligence, productivity, identity consistency, and conscientiousness significantly influence citizens' trust in government chatbots.

In conclusion, despite the growing interest in government chatbots, current studies on their usage and effectiveness are still in the early stages (Vassilakopouloua et al., 2023), with much more research needed to fully understand their potential impact on public service delivery. Although current studies on government chatbots from a behavioral perspective have made progress in identifying trust factors that influence user participation (e.g., Aoki, 2020; Ju et al., 2023), there is a need to broaden the scope of research to encompass other important factors, such as user experience, satisfaction, and perceived usefulness.

2.2. Information Systems Continuance Model

Built upon the Expectation Confirmation Model (ECM) and the Technology Acceptance Model (TAM), the Information System Continuance Model (ISC) is a theoretical framework that predicts users' intention to continue using a particular IS (Bhattacherjee, 2001). According to ISC, individuals' intention to continue using an IS is determined by their expectation confirmation, their satisfaction with the system, and their perceived usefulness of the system (Bhattacherjee, 2001). ISC highlights the importance of considering factors beyond initial acceptance and adoption and is a useful framework for understanding users' post-adoption of certain IS (Bhattacherjee, 2001; Brown et al., 2014; Franque et al., 2021). In the upcoming subsection, we will introduce the resources matching theory (RMT), which we have selected as the theoretical foundation for our study, and demonstrate how it complements and works in conjunction with the ISC model.

2.3. Resources Matching Theory

According to Anand and Sternthal (1990), Resource Matching Theory (RMT) posits that customers are faced with constraints on their cognitive resources (e.g., attention, memory, and comprehension), which limit their ability to process information and complete tasks effectively. As a result, customers must carefully select and process information that is most relevant to their goals, while ignoring or avoiding irrelevant or distracting stimuli. Overall, RMT provides a useful framework for understanding how individuals allocate their limited cognitive resources to process information and accomplish tasks in a variety of contexts such as

online applications and self-service technology (SST) (e,g., Zhu et al., 2007; Tan et al., 2010; Collier et al., 2015).

Studies have generally agreed that perceived convenience and perceived control are two determining factors of resource allocation in the context of online applications and SST (e,g., Zhu et al., 2007; Tan et al., 2010; Collier et al., 2015). Specifically, RMT suggests that customers are more likely to perceive an SST as convenient and controllable if they perceive a match between their resources and the resources required to use the technology. A chatbot can be considered an SST because it allows users to obtain information or complete a task without the assistance of a human agent. In this study, perceived convenience and autonomy-related control have been added to the ISC to predict citizens' continuance with government chatbots. We believe that perceived convenience and autonomy-related control are more comprehensive constructs than simply examining ease of use and usefulness perceptions in our contexts (Collier & Sherrell, 2010).

3. Hypotheses development

We propose a research model based on IS continuance model and resources matching theory to explore the impacts of perceived convenience and autonomy-related control on users' continuance of government chatbots. We consider age, gender, education, and income as control variables, which may affect the aforementioned relationships. Figure 1 outlines the proposed model and its associated hypotheses, with theoretical justifications provided in the following section.

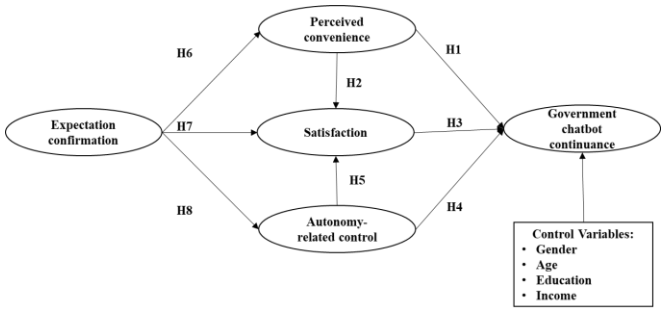

Figure 1. Research model.

Perceived convenience is one's subjective perception of how easy or convenient to perform a certain task or activity (Collier & Sherell, 2010). When viewed through a resource-matching lens, convenience is closely tied to the amount of time and effort (or resources) required to complete a given task. Perceived convenience is a critical factor that influences one's use of certain online application or self-service technology (e.g., Collier & Sherell, 2010; Tan et al., 2010; Collier et al., 2015). For example, by employing a multi-studies design, Collier et al. (2015) state that perceived convenience positively influences consumers' evaluation of self-service technologies through trust and satisfaction. In this study, the perceived convenience of a government chatbot refers to the extent to which individuals believe that using the chatbot is an easy and convenient way to interact with the government and access services or information. A government chatbot with high perceived convenience is likely to be more widely used and satisfied by citizens. This leads to the following hypotheses:

H1: Perceived convenience is a positive predictor of users' continuance with government chatbots.

H2: Perceived convenience is a positive predictor of users' satisfaction with government chatbots.

Satisfaction is defined as an individual's positive evaluation or perception of a particular experience, product, or service (Bhattacherjee, 2001). Satisfaction is a critical factor in determining the long-term success and adoption of various online applications and self-service technologies in previous literature (e.g., Bhattacherjee, 2001; Brown et al., 2014; Franque et al., 2021). Satisfaction can play an important role in a government chatbot user's continuance, which refers to their decision to continue using the chatbot over time. If users are satisfied with their experience using the chatbot, they are more likely to continue using it in the future. On the other hand, if users are dissatisfied, they may abandon the chatbot and seek other ways to interact with the government or access the services they need. This leads to the following hypothesis:

H3: Satisfaction is a positive predictor of users' continuance with government chatbots.

In the context of self-service technology, perceived control is an individual's belief in their ability to control and influence both the process and outcome of self-service technology (Collier & Sherell, 2010). Previous literature has documented perceived control as a crucial aspect of the "interactivity" between humans and technology (Collier & Sherell, 2010). Mencarelli et al. (2022) emphasize that perceived control should be evaluated as a lower-order construct comprised of three interrelated but distinct dimensions: security-related control, skills-related control, and autonomy-related control. In this study, we focused on autonomy-related control. Autonomy-related control in the context of government chatbots refers to the user's sense of independence and freedom to navigate and control the

chatbot interaction without external interference or guidance (Mencarelli et al., 2022). Promoting autonomy-related control in government chatbots can enhance user satisfaction and continuance by giving users a sense of independence and control over their interactions with the chatbot. This leads to the following hypotheses:

H4: Autonomy-related control is a positive predictor of users' continuance with government chatbots.

H5: Autonomy-related control is a positive predictor of users' satisfaction with government chatbots.

Expectation confirmation refers to users' perception of how well a government chatbot's performance aligns with their initial expectations of its use (Bhattacherjee, 2001). Expectation confirmation plays a crucial role in determining users' continuance with certain information systems (Bhattacherjee, 2001; Brown et al., 2014; Franque et al., 2021). If users' initial expectations of an information system are confirmed, they are likely to be satisfied and feel the system to be useful. This, in turn, may lead to their continuance with the system. In the context of government chatbots, if users' initial expectations of the chatbot are confirmed, they are more likely to perceive the chatbot as convenient and easy to use. Furthermore, when users' initial expectations are confirmed, they are more likely to feel that they have control over the interaction with the chatbot. Finally, when users' initial expectations are confirmed, they are more likely to be satisfied with the chatbot's performance. This leads to the following hypotheses:

H6: Expectation confirmation is a positive predictor of users' perceived convenience.

H7: Expectation confirmation is a positive predictor of users' satisfaction with government chatbots.

H8: Expectation confirmation is a positive predictor of users' perceived autonomy-related control.

4. Methodology

4.1. Data collection

An online survey approach was used to acquire data to assess the proposed research model. GoodPy, the most popular government-affiliated AI chatbot in South Korea was chosen and a survey was conducted in January 2023 by an online survey agency, Surveyeasy (gosurveasy.com). Overall, 322 informants participated in the survey. Among them, only 276 samples were used for this study after eliminating invalid responses (e.g., no GoodPy experience, same answers to every question, etc.). Table 1 provides demographic information on the samples.

Table 1. Demographic information

	Characteristic	Frequency	Percent
Gender	Male	122	44.2%
	Female	146	52.8%
	Other or prefer not to mention	8	3%
Age	18-25	81	29.3%
	26-30	48	17.4%
	31-40	49	17.8%
	41-50	62	22.5%
	51-60	34	12.3%
	More than 60	2	0.7%
Education	Less than high school	5	1.8%
	High school	100	36.2%
	Junior college	29	10.5%
	Undergraduate	128	46.4%
	Graduate or above	14	5.1%
Yearly Income	Less than ₩10m	75	27.2%
	₩10m - ₩50m	120	43.5%
	More than ₩50m	81	29.3%

4.2. Measurements

The scales in the questionnaire are measured on a 7-point Likert scale from "strongly disagree" (1) to "strongly agree" (7). Most of the survey items of the questionnaire have been modified from previous studies, with a few changes in the wording to fit the research of our study. Liu et al. (2015) used the measurements of perceived convenience (CON). Each of these constructs measuring satisfaction (SAT), expectation confirmation (EXP), and government chatbot continuance (CONT) was modified and taken from Bhattacherjee (2001). The autonomy measure developed by Jiménez-Barreto et al. (2021) was adopted to measure autonomy-related control (AUT).

5. Results

5.1. Measurement model

The measurement model was assessed by examining their reliability, convergent validity, and discriminant validity. The composite reliability (CR) values were greater than 0.85, the values for Cronbach's alpha were greater than 0.80, and the AVEs were greater than 0.70, exceeding the suggested thresholds of 0.7, 0.7, and 0.5, respectively (Fornell & Larcker, 1981). These results reveal that all constructs in our study have acceptable levels of reliability.

The high factor loadings (above 0.60) of all items indicate acceptable convergent validity of the

constructs. To examine the construct's discriminant validity, we use the Fornell-Larcker criteria. Table 2 shows that the square root of AVE that shows more than the correlations between constructs.

Table 2. Correlation matrix and square roots of the AVEs

	AUT	CON	CONT	EXP	SAT
AUT	**0.844**				
CON	0.396	**0.862**			
CONT	0.547	0.565	**0.872**		
EXP	0.613	0.597	0.702	**0.861**	
SAT	0.526	0.703	0.654	0.752	**0.840**

Note: the diagonal elements are the square root of AVE of each construct.

5.2. Structural model

Following the suggestion of Hair et al. (2021), a bootstrapping method is used to test our hypotheses with a 95% confidence interval. The results of the structural model are displayed in Figure 2 and Table 7, including the path coefficients, t-values, and R-squared values. SmartPLS 4 software was employed to test the structural model.

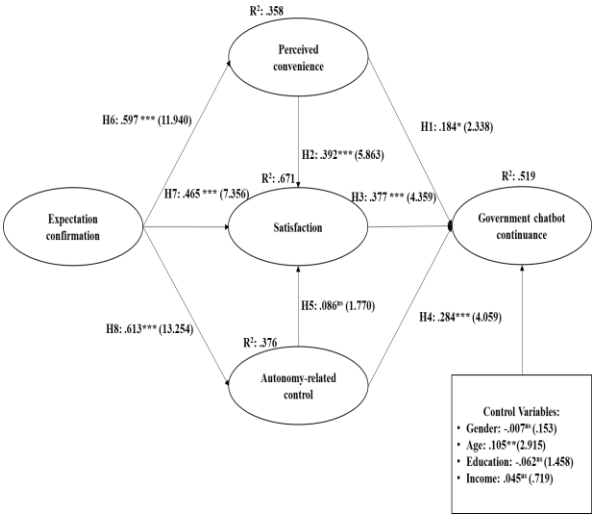

Figure 2. Structural model results

The R square values for perceived convenience, satisfaction, autonomy-related control, and government chatbot continuance are 0.358, 0.671, 0.376, and 0.519, respectively. Seven out of the eight proposed hypotheses are statistically supported. Perceived convenience, satisfaction, and autonomy-related control have been found to positively influence chatbot users' continuance, validating H1, H3, and H4. Expectation has been found to positively influence perceived convenience, satisfaction, and autonomy-related control, supporting H6, H7, and H8. The relationship between perceived convenience and satisfaction has been supported, validating H2. Contrary to our expectations, the association between autonomy-related control and satisfaction was not supported. Interestingly, age has been found to positively influence government chatbot continuance.

Table 3. Results of the structural model

Hypothesis	Path description	Path coefficient	Standard deviation	T-value	Supported
H1	Perceived convenience to government chatbots continuance	$\beta = 0.184^{*}$	0.079	2.338	Yes
H2	Perceived convenience to satisfaction	$\beta = 0.392^{***}$	0.067	5.863	Yes
H3	Satisfaction to government chatbots continuance	$\beta = 0.377^{***}$	0.086	4.359	Yes
H4	Autonomy-related control to government chatbots continuance	$\beta = 0.284^{***}$	0.070	4.059	Yes
H5	Autonomy-related control to satisfaction	$\beta = 0.086$	0.049	1.770	No
H6	Expectation confirmation to perceived convenience	$\beta = 0.597^{***}$	0.050	11.940	Yes
H7	Expectation confirmation to satisfaction	$\beta = 0.465^{***}$	0.063	7.356	Yes
H8	Expectation confirmation to autonomy-related control	$\beta = 0.613^{***}$	0.046	13.254	Yes

6. Discussion

6.1. Key findings

This investigation applies Information Systems Continuance Model and Resources Matching Theory as theoretical frameworks to explore how perceived convenience and autonomy-related control influence citizens' continuance with AI-enabled government chatbots. A survey was conducted in South Korea to collect data and test the proposed research model. The research findings are summarized as follows. First, seven out of eight of the proposed relationships were statistically supported. 51.9% of the variance of citizens' continuance with government chatbots can be explained by our research model, indicating that the IS continuance model and RMT are valuable theoretical perspectives to elucidate and predict users' behavior within government chatbots and possibly other AI and e-government contexts. Second, perceived convenience, satisfaction, and perceived autonomy-related control have all been found to positively influence our dependent variable. Satisfaction was found to be the strongest direct antecedent of users' continuance. This finding is in line with the results of earlier literature, which suggest that satisfaction plays an important role in user's post-adoption of an IS and users are more likely to keep using the IS (Bhattacherjee, 2001; Brown et al., 2014; Franque et al., 2021). Perceived autonomy-related control showed the second strongest impact on user continuance. In other words, users are more like to continue to use the government chatbot if they feel they have the independence and freedom to navigate and

control the interaction with the chatbot. This finding is consistent with literature that highlights the critical role of perceived control on users' acceptance and usage of self-service technologies (e.g., Collier et al., 2015). The relationship between perceived convenience and user continuance has also been established. Users tend to continue using the government chatbot when they recognize chatbot can help them interact with the government easily and conveniently. Expectation has been found to influence users' continuance through perceived convenience, perceived control, and satisfaction. When users find the chatbot meets their initial expectations, they perceive the tool as more convenient, controllable, and more likely to be satisfied with the chatbot. Lastly, different from our expectations, the relationship between perceived autonomy-related control and satisfaction was not statistically established. The association between perceived autonomy-related control and satisfaction could be more complex than a direct, linear relationship.

6.2. Theoretical and practical contributions

This study offers the following theoretical implications. First, literature on the government chatbot phenomenon is still nascent, with the majority of existing studies primarily focused on defining the concept of government chatbot (e.g., Androutsopoulou et al., 2019; Kankanhalli et al., 2019) or illustrating how a government chatbot can improve performances and efficiency of public organizations (e.g., Mikalef et al., 2023). Research concentrating on identifying factors that affect the use or continued use of government chatbots from a behavioral perspective remains scarce (Aoki, 2020; Ju et al., 2023; Vassilakopouloua et al., 2023). By proposing a theory-based, empirically supported framework for understanding users' continuance within the government chatbot context, this study contributes to the current literature on the government chatbot phenomenon. Second, our study also contributes to the existing literature on the use of AI public governance. While governments and public organizations worldwide are recognizing the potential benefits of AI and increasingly designing and implementing AI applications to transform how they deliver services and engage with citizens, the body of literature concerning AI in public sectors remains conspicuously sparse compared to its counterparts in sectors like marketing, tourism, and customer service. By studying the motivations behind citizens' continued usage of government chatbots, we contribute to the expanding body of literature on the use of AI in public governance (Zuiderwijk et al., 2021). This study responds to recent calls for more intricate investigations concerning AI-empowered government services (Vassilakopouloua et al., 2023).

Our study also offers rich insights for practitioners. The success of any e-government application relies on attracting and maintaining a large user pool. The results of our study highlight that expectation confirmation, perceived convenience, satisfaction, and perceived autonomy-related control play important roles in users' decisions to continue using a government chatbot. Consequently, these factors should be considered by designers when creating future government chatbots or other similar applications, ensuring these systems are convenient and satisfying for users, while also fostering a sense of control.

6.3. Relevant ethical issues and limitations

This study provides several ethical issues that need to be considered. The first ethical issue that could arise in the use of chatbots in government contexts is the potential for these tools to collect and store sensitive personal information about citizens. This could include information about their health, finances, or other personal details. It could be argued that chatbots should be designed in a way that respects users' privacy and gives them control over their personal information. Another ethical issue that could arise in the use of chatbots in government contexts is the potential for bias in the algorithms that power these tools. For example, if a chatbot is designed to provide information about government benefits, but the algorithm is biased against certain groups of people, this could result in unequal access to services. From an ethical perspective, it could be argued that chatbots should be designed in a way that is fair and unbiased, and that takes into account the needs of all users. A third ethical issue that could arise in the use of chatbots in government contexts is the potential for these tools to perpetuate existing power imbalances. For example, if a chatbot is designed to provide information about government services, but it is only available in certain languages or only accessible to people with certain levels of digital literacy, this could result in unequal access to services. From an ethical perspective, it could be argued that chatbots should be designed in a way that is inclusive and accessible to all users, regardless of their background or level of digital literacy. Accordingly, an interesting future research direction is to investigate the relationship between users' ethical concerns and their perception of AI-empowered chatbots.

The study has several limitations that need to be addressed in late investigations. First, our research data was collected by surveying Korean GoodPy users. The design of GoodPy and Korean culture (e.g., respect for authority, family loyalty, structure, and hierarchy) may

limit the generalizability of our results. Future investigations may extend the generalizability of our study by testing the same research model in multiple government chatbots in different countries. Second, while our research model can explain a considerable amount of the variance in the dependent variable, factors not covered by the IS continuance model and RMT are also worthy of investigation. Lastly, this study does not take actual usage behavior into account in the research model. Future research may extend the research model and consider integrating actual government chatbot user behavior and employing longitudinal or experimental designs.

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