

The Adoption and Implementation of Artificial Intelligence Chatbots in Public Organizations: Evidence from U.S. State Governments

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Abstract

Although the use of artificial intelligence (AI) chatbots in public organizations has increased in recent years, three crucial gaps remain unresolved. First, little empirical evidence has been produced to examine the deployment of chatbots in government contexts. Second, existing research does not distinguish clearly between the drivers of adoption and the determinants of success and, therefore, between the stages of adoption and implementation. Third, most current research does not use a multi-dimensional perspective to understand the adoption and implementation of AI in government organizations. Our study addresses these gaps by exploring the following question: what determinants facilitate or impede the adoption and implementation of chatbots in the public sector? We answer this question by analyzing 22 state agencies across the US that use chatbots. Our analysis identifies ease of use and relative advantage of chatbots, leadership and innovative culture, external shock, and individual past experiences as the main drivers of the decisions to adopt chatbots. Further, it shows that different types of determinants (such as knowledge-base creation and maintenance, technology skills and system crashes, human and financial resources, cross-agency interaction and communication, confidentiality and safety rules and regulations, and citizens' expectations and the COVID-19 crisis) impact differently the deployment and implementation processes and, therefore, determine the success of chatbots in a different manner. Future research could focus on the interaction among different types of determinants for both adoption and implementation, as well as on the role of specific stakeholders, such as IT vendors.

Introduction

Over the past decade, governments worldwide have sought to employ artificial intelligence (AI) to improve public services (OECD, 2019). In general terms, AI has the potential to answer questions, draft, fill out, and search documents, route requests, and translate text (Mehr, 2017). Among a range of different AI technologies, chatbots serve as an innovative tool that governments can use to address citizens' information and service requests (Aoki, 2020; van Noordt & Misuraca, 2019). Also known as intelligent virtual assistants, digital assistants, or conversational interfaces, chatbots are text-based or voice-driven computer programs that use natural language to converse with users (Dale, 2016; Shawar & Atwell, 2007). Due to their 24/7 availability and efficiency in handling user questions, chatbots have been deployed widely to supplement customer service in the business sector (Dale, 2016).

In the same vein, governments around the world have started to explore other ways to use chatbots for providing information and public services (Aoki, 2020; NASCIO, 2020; Neumann et al., 2022). For instance, in the US, in 2017, only a handful of state, county, and municipal governments had begun utilizing basic chatbots (Quaintance, 2017). By 2019, Gartner reported that chatbots had become the top application of AI in the enterprise, and government Chief Information Officers (CIOs) recognized them as one of the most influential technologies for government organizations over the next five to ten years (Moore, 2019). Furthermore, in 2020, more state, city, and county governments started to employ chatbots due to the COVID-19 pandemic, making chatbots a "necessity" for governments (Miller, 2020). More broadly, a global survey conducted in 2021 indicated that chatbots were the most widely adopted technology among government organizations. According to the survey, twenty-six percent of the respondents had already deployed chatbots. Moreover, an overwhelming fifty-nine percent of the participants

expressed their intention to deploy a chatbot within the next three years (Gartner, 2021). In essence, chatbots are significantly altering the way in which citizens interact with the public sector (Androutsopoulou et al., 2019).

Despite the importance of this topic, research on the use of chatbots in public administration is very scarce. Some studies have focused on the technical aspect of government chatbots, namely, how to design and construct databases, user interfaces, and technical architecture to ensure a better response to citizens' inquiries (Androutsopoulou et al., 2019; Lommatzsch, 2018). Other studies have shed light on the organizational, institutional, and contextual factors that affect the use of chatbots (Baldauf & Zimmermann, 2020; Petriv et al., 2020; Wang et al., 2022; Wright, 2021). Still others have focused on the typology of chatbot-mediated services and associated public values (Makasi et al., 2020). However, the existing studies of chatbots in the public sector have some limitations. First, little empirical evidence has been collected about the use of chatbots in public organizations. In addition, while the current research has identified some factors that influence the adoption and implementation of chatbots, it neither distinguishes clearly between the drivers of adoption and the determinants of success, nor uses a multi-dimensional perspective to understand the deployment of AI in public sector organizations.

In this context, the present study explores the use of chatbots from a holistic perspective. Our research is guided by the following question: *what determinants facilitate or impede the adoption and implementation of chatbots in the public sector?* We treat adoption and implementation as two distinct concepts, defining *adoption* as deciding whether to use a chatbot, and *implementation* as the process that follows the decision to adopt a chatbot, including activities designed to fulfill the intended goals. We have consulted the existing literature on the value of chatbots and technology-driven innovation adoption and implementation to guide this empirical investigation of chatbots

in public organizations.

The remainder of this article is structured as follows. The first section reviews the literature on chatbots in the public sector and the next introduces frameworks of government technology-driven innovation adoption and implementation. These are followed by an explanation of the methodological approach. The core section outlines and discusses the results of the analysis. Finally, the conclusion summarizes the article, reveals the potential limitations of the study, and offers several suggestions for future research.

AI Chatbots in the Public Sector

Although scholars have characterized chatbots in myriad ways, several primary features can be derived across various characterizations. Typically, information retrieval and natural-language processing (NLP) serve as the technological backbones of chatbots (Aoki, 2020; Baldauf & Zimmermann, 2020; Lommatzsch, 2018; Petriv et al., 2020). Thanks to these technologies, chatbots can act as experts, understanding spoken or written inputs and offering useful and accurate responses to narrowly defined requests (Androutsopoulou et al., 2019; Lommatzsch, 2018; van Noordt & Misuraca, 2019). In another essential feature, the user interface is designed to make users feel that they are interacting with humans, for example, by presenting the ability to communicate in plain language, send greetings, and manage small talk (Lommatzsch, 2018; Makasi et al., 2020). In the private sector, chatbots are growing in popularity in multiple industries, due to their strengths in reducing the costs of handling customer requests while allowing for more customized user experiences. Having witnessed the potential benefits of chatbots in the business sector, governments around the world are seeking to leverage chatbots in internal management by using them to respond to citizen questions and deliver public services. For instance, EMMA,

deployed by the U.S. Department of Homeland Security, provides users with specific immigration-service information, covering issues related to green cards and passports. Similarly, Alex, the Australian government chatbot, and Botty Bonn, a German city-government chatbot, enable citizens to pay their bills and taxes. Finally, citizens in Singapore can use the “Gov.sg” chatbot to raise and track the status of complaints about public-service delays.

Nonetheless, despite increasing interest in the use of chatbots in public organizations in recent years, few studies have attempted to investigate the phenomenon in depth; these approach government chatbots from various perspectives. First, most studies discuss the functionalities that chatbots provide in public organizations. One way to differentiate chatbot applications is by the complexity of the tasks that they handle. On a basic level, chatbots can provide information in response to a user’s service query without the need for user authentication (Makasi et al., 2020; van Noordt & Misuraca, 2019). All of the chatbots examined in a comparative case study in Germany, conducted by van Noordt and Misuraca (2019), engaged with this level of information service, providing straightforward answers to often-asked questions. Moving further, public organizations can employ chatbots to offer transactional services (van Noordt & Misuraca, 2019). To enable a transaction to happen, the system requires the user’s personal information to personalize a response (Makasi et al., 2022). The most complicated task that chatbots can assist with is service negotiation: they present detailed information on the service options and negotiate the best alternative to address each citizen’s needs (Makasi et al., 2020, 2022). Enabling chatbots to carry out service-negotiation functions is a challenge because it requires collaboration among various public organizations, which must share data and knowledge to enable the system to provide integrated service recommendations (Makasi et al., 2020). Chatbot functions can also be categorized by technical capability. For instance, Makasi et al. (2021) distinguish between two

categories: basic versus advanced chatbots. The basic chatbots use a retrieval-based algorithm model, have limited natural-language-processing capabilities, and make limited use of real-time data. By contrast, advanced chatbots rely on a generative algorithmic model, have high NLP capabilities, and use real-time service-related data.

Second, scholars have paid much attention to the benefits that chatbots can bring to public organizations and citizens as well as some costs related to the usage of chatbots. From the users' perspective, chatbots alleviate user information overload by displaying the information that is most relevant to the requested service or question (Lommatzsch, 2018; van Noordt & Misuraca, 2019). In addition, artificial chatbots ensure a constant level of answer quality (Cantador et al., 2021; Keyner et al., 2019; Lommatzsch, 2018). They also reduce waiting times, thanks to their 24/7 availability (Carvalho & Barbosa, 2019; Makasi et al., 2020, 2022). From the government's side, the most frequently highlighted advantage is that chatbots help to reduce the administrative burden of public organizations, relieving staff from mundane tasks (Androutsopoulou et al., 2019; Carvalho & Barbosa, 2019; Lommatzsch, 2018; Makasi et al., 2022; Petriv et al., 2020; van Noordt & Misuraca, 2019). Chatbots can also be a valuable tool for improving citizen-government interactions and enhancing civic engagement by conducting surveys and gaining citizen feedback (Androutsopoulou et al., 2019; Petriv et al., 2020; van Noordt & Misuraca, 2019). As another benefit, they reduce service-delivery costs (Carvalho & Barbosa, 2019; Keyner et al., 2019; Makasi et al., 2022). Regarding costs, similar to other AI-based technologies, chatbots also come with several expenses associated with building and maintaining an AI infrastructure, as well as staff training and education (The Government Digital Service, 2020). Interestingly, the benefits and costs summarized above are the anticipated outcomes that, in an ideal scenario, chatbots are expected to contribute to the public sector and society. Due to a lack of empirical evidence on the

realized promise of chatbots, however, researchers do not completely understand what motivates governments to use chatbots. For this reason, it is necessary to investigate whether and how the alleged benefits of chatbots impact the decision to use chatbots in public organizations.

Third, another topic illuminated by the existing literature is the process of implementing chatbots and the potential challenges that public organizations may confront and need to deal with. In this regard, scholars have focused on the technical aspects of chatbots, with some studies offering demonstrations of system design and development (Androusoy et al., 2019; Cantador et al., 2021; Carvalho & Barbosa, 2019; Keyner et al., 2019; Lommatzsch, 2018). While researchers have proposed various system architectures, these approaches have several components in common. Since the chatbot is at heart a question-answering system, it needs a user interface or communication channel that allows end users to submit service requests and service providers to respond to their requests. Natural-language processing must be used to detect the intent of each question and the sentiment within each audio or text. Techniques such as data mining, indexing, classification, clustering, and abstraction can also be used to examine government documents and past citizen-government interactions, enabling the system to interpret requests more accurately and tailor appropriate responses. Thus, it is essential to create a knowledge base from which the system can extract the answers that best fit the proposed questions. Elements related to data management, including access, storage, sharing, and processing, are critical for establishing and maintaining such a knowledge base.

A few studies have focused on the organizational, institutional, and contextual factors that public organizations may encounter while adopting and implementing chatbots. For example, governments considering adoption must first consider the public's perception of and willingness to accept AI, given that levels of public trust directly determine the acceptance and use of AI

chatbots (Aoki, 2020; Baldauf & Zimmermann, 2020). In addition, previous research suggests that chatbot adoption is influenced by the political context in which a government is embedded (Wang et al., 2022). In relation to implementation, studies have shown that financial capability, strategic-management ability, technical knowledge, information governance, existing organizational rules, the support of public employees, and politics all influence the implementation of chatbots in government organizations (Baldauf & Zimmermann, 2020; Petriv et al., 2020; Wright, 2021). Furthermore, other research has shown that chatbots create a trade-off between simplification and precision in service advice, causing some legal concerns related to service equality, system oversight, and user liability (Blank & Osofsky, 2020).

Scholars engaged in the academic discussion (summarized above) about the use of chatbots in public organizations have focused on chatbot projects at different stages. While some studies explore the adoption stage, others consider implementation. A clear distinction between these two stages is crucial and necessary, in our view, as they are quite dissimilar in nature. During the adoption stage, organizations must make decisions about whether to use chatbots. By contrast, the implementation stage occurs after chatbots are adopted and involves the process of actualizing the intended goals. The factors that influence these two stages can thus be very different. Although a series of technical and non-technical factors impact the adoption and implementation of chatbots, efforts to identify those factors have been fragmented and limited, with each study considering one specific factor only, while neglecting others. As a result, researchers and stakeholders lack a holistic understanding of the determinants that affect the adoption and implementation of chatbots in the public sector.

Technology-Driven Innovation Adoption and Implementation in the Public Sector:

An Analytical Framework

The goal of the present study is to fill the current knowledge gap by investigating the factors that underpin the decisions and behaviors of public organizations as they adopt and deploy chatbots. As the use of chatbots can be considered a technology-driven innovation in public organizations, we base this empirical investigation on the existing literature on government technology-driven innovation and implementation to generate comprehensive and systematic insights into the adoption and implementation of AI chatbots.

The adoption of innovation in public organizations has been well-researched by public-management and policy scholars. Recently, efforts have been made to systematize the extant knowledge on innovation adoption and to provide a more comprehensive picture of the topic (De Vries et al., 2016; De Vries et al., 2018). Such systematic reviews and meta-analyses reveal that the determinants of innovation adoption can be categorized into four levels: environmental, organizational, innovation-related, and individual/employee-related. Each level presents a different set of drivers that motivate public organizations to adopt an innovative idea, as well as barriers that hinder government innovation.

Specifically, first, the environmental level reflects the external context that an organization is embedded in and interacts with continually. Studies have suggested that innovation can be triggered by the pressures associated with media attention, political and public demands, participation in networks and inter-organizational relationships, the legal mandate provided by upper-level government authorities, opportunities to copy or mimic similar organizations, and competition with other organizations. In many cases, regulation can impose constraints on innovation. Some of these findings can be well explained by institutional theory, which emphasizes that organizations tend to adopt similar structures, practices, and behaviors, a phenomenon known

as "isomorphism," due to external pressures and social expectations. According to DiMaggio and Powell (1983), organizations do not change so much because of external competition, or a strong efficiency orientation, but rather by a strong tendency of organizations to becoming more homogeneous over time. These authors, further argue that institutional isomorphism is driven by three forces: coercive, mimetic, and normative. Interestingly, all of these forces have been found to influence government decision-making regarding innovation adoption (De Vries et al., 2016; Jun & Weare, 2011).

Further, at the environmental level, crises can also spark innovation (Gkeredakis et al., 2021; Sorensen & Torfing, 2012; Borins, 2001), which may be explained by the Punctuated Equilibrium Theory (PET) (Baumgartner & Jones, 1991, 1993). The PET suggests that public policies generally experience long periods of stability or incremental change, interspersed with shorter periods of significant policy shifts. The theory posits that policy stability is maintained by the power balances within policy subsystems, consisting of interest groups, bureaucrats, and lawmakers. Conversely, punctuations occur when external events, such as economic and health crises, alter the policy landscape, disrupting the policy subsystems and creating a push for significant policy change. In the context of government innovation studies, PET helps elucidate the interactions between organizations and the external environment, explaining how these dynamics contribute to the adoption of innovative ideas (Boushey, 2012).

Second, the organizational level encompasses an organization's structural and cultural features. At this level, the extent to which an organization is likely to adopt an innovation is determined mainly by its access to slack resources (e.g., time, money, and IT tools), alongside its leadership style, degree of risk aversion, and potential incentives and rewards. Third, the level of innovation is seen as an intrinsic attribute of innovation. According to the literature, the ease of

use of innovation; the relative advantages it offers, compared to existing practices; its compatibility with organizational values, norms, and experiences; and its trialability are critical attributes associated with innovation adoption. In the case of technological innovations, these determinants seem to be well aligned with those proposed by the Technology Acceptance Model (Davis, 1989), which is one of the most influential models to explain technology adoption, and in particular with perceived ease of use and perceived usefulness. Lastly, the characteristics of individuals who innovate are explored at the individual/employee level. Employee autonomy, organizational position, professionalism, creativity, and demographic features are essential prerequisites for innovation adoption.

Our study also differentiates between adoption and implementation. The implementation of technology-driven innovation in public organizations can be defined as the series of steps that follow from the decision to adopt a technology; these steps include planning, building, and evaluating the innovative tools, as well as their deployment and maintenance (The Government Digital Service, 2020). A distinction must be made between adoption and implementation, as past research has shown that it can be challenging to realize the anticipated benefits of information technology in the public sector (Chan et al., 2008). Studies have found that many projects fail during the process of translating intention into reality (e.g., Anthopoulos et al., 2016; Gil-Garcia et al., 2007; Heeks, 2006).

To better understand the factors that influence chatbot implementation, we use a comprehensive framework based on Gil-Garcia (2012) and Gascó Hernández et al. (2013) studies that propose and investigate the critical challenges and enablers that determine success in the implementation of technology-driven innovation. While various approaches can be used to study the implementation of technology-driven innovation in government, we believe that the

combination of these two perspectives offer particular advantages for our investigation. First, taken together, they result in a comprehensive framework, which considers as many relevant factors as possible, allowing to a more extensive and in-depth investigation. This is important for the literature on the implementation of technology-driven innovations has tended to be less systematic, focusing on specific factors while neglecting others. Second, these two frameworks have been consistently used by digital government scholars (e.g., Hu, 2017; Picazo-Vela et al., 2018) and have, therefore, already proved useful in the study of a wide range of technology-driven innovations, from online and mobile services to interoperability and information sharing. In this respect, we argue that chatbots, and AI in general, may also be conceptualized as a technology-driven innovation. Third, as a result, the use of this comprehensive framework may enable comparing the implementation of chatbots to the implementation of other technological innovations, which is an interesting avenue of research that may spark scholarly discussions to better understand how technology-driven innovation happens in the public sector.

The framework includes six primary categories. The first category comprises the data and information that public organizations collect, manage, store, and distribute. The key factors include data availability, accuracy, quality, timeliness, privacy, and standardization, which are vital to the success of an IT project. The second category consists of factors related to technology and the characteristics of the adopted technology, including technology compatibility, perceived ease of use, and complexity. The third category includes organizational factors: the characteristics, processes, structures, and relationships within an organizational setting. Examples include resource availability, performance evaluation, organizational culture, willingness to change, leadership, and organizational structure.

Inter-organizational factors, the fourth category, come into play when more than one organization or stakeholder within or across different sectors is engaged in the implementation process. In this setting, implementation is affected by the clarity of roles and responsibilities and the organization's interest in collaboration, power, trust, and communication. Fifth, institutional factors, including political characteristics, laws, policies, and regulations, also play an essential role. Finally, contextual factors encompass the social, economic, cultural, and demographic characteristics of the societies that public organizations are embedded in, which can facilitate or impede the implementation of technology-driven innovation.

Research Design

To answer our research questions, we have adopted the case-study approach and focused on the use of chatbots across state agencies in the United States. A case study is an empirical inquiry that “investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin, 1989: 14). The present study adopts this approach because it offers an advantage when studying a decision or set of decisions, enabling researchers to answer questions, such as why particular decisions were taken, how they were implemented, and with what result (Schramm, 1974). To gain insights from individual cases, we conducted semi-structured in-depth interviews with government officials and public employees responsible for managing the use and maintenance of chatbots in state agencies.

Given the lack of information about state-level public organizations that use chatbots, we adopted a purposeful sampling technique to identify potential participants. Purposeful sampling enables researchers to identify and select information-rich cases in order to investigate particular issues (Patton, 2015). Our sampling process was carried out in two stages. First, we conducted

targeted searches on Google.com, using the keywords [“state government” AND “chatbots” AND “US”]. The search identified 47 state agencies that used chatbots. We contacted these organizations and sent interview invitations to their employees and officials.

We received responses indicating interest in participating in the study from 22 state agencies. In terms of geographic location, nine states were located in the Midwest, three in the Northeast, five in the South, and the remaining five in the West. The participating agencies were implementing a diverse range of functions, including unemployment insurance (nine), social welfare (three), tax (three), IT (three), education (one), administrative services (one), public health (one), and transportation (one). Two agencies utilized the centralized chatbots established by the state government, while the remaining agencies adopted and implemented their own chatbots independently. Based on this geographical and functional variation, we concluded that these cases could provide a rich and diverse account of chatbot use, enabling us to draw generalized inferences, while also identifying differences.

In-depth interviews were conducted between May and July 2022. One interview was conducted per agency, resulting in 22 completed interviews. The interview guide (see appendix) had five sections, covering the interviewee’s background, current use of chatbots, adoption, implementation, and impact. In relation to the adoption and implementation of chatbots, we began with open-ended questions, asking what motivated each agency to adopt a chatbot and how it was deployed; the interviewees were probed using prompts, based on factors identified in the existing literature. The interviews were carried out via Zoom, an online communication tool; they lasted approximately one hour. In most cases, the participants requested a group interview so that multiple teams or staff members engaged in the chatbot project could respond to the interview questions together, supplementing each other’s views. Hence, a total of 39 individuals took part in

the interviews. Nearly half of the interviewees were at the top-management level, such as Chief Information Officers (CIOs), Chief Strategic Officers (CSOs), department/division directors, and communication directors. One-third of the respondents served at the middle-management level, including service coordinators, program managers, and service supervisors. Finally, some respondents were non-managerial employees, such as programmers and analysts. Prior to the interviews, the confidentiality and anonymity of all participants were guaranteed.

This research has followed a multivariate paradigm of inquiry, aiming to identify the factors that explain a particular phenomenon (Alford, 1998). For this reason, the factor-identification process has played a vital role during data analysis. A mixed inductive/deductive strategy was adopted to code the interview transcripts. We relied primarily on a deductive coding strategy to identify the determinants, based on the analytical framework, with four levels of factors related to technology-driven innovation adoption, and six categories of factors related to implementation. When coding the interviews, the coder went back and forth between the data and prior research on the two frameworks to ensure that the factor identification was carried out correctly. At the same time, we remained open to new codes emerging from the data; these were later evaluated and categorized by the researchers. The data were coded manually by one author to ensure consistency; the coding results were then checked and assessed by all researchers to ensure that the coding of the transcripts and the interpretation of the codes align appropriately with the frameworks employed in the study (Saldaña, 2015). All of the transcripts were coded using MAXQDA 22.2.9 software.

Findings

The findings are organized to reflect the two distinct strands of this investigation. We begin by showing that the decision to adopt a chatbot was determined mainly by: (1) the chatbots' relative advantage and ease of use; (2) the dynamic interactions among citizens, other government bodies, and IT vendors, driven by the COVID-19 pandemic; (3) leadership and innovative culture; and (4) individual past experiences, as summarized in Table 1. Regarding chatbot implementation (Table 2), our findings indicate that the following factors have had varying degrees of impact on the deployment process and chatbot success: (1) knowledge-base creation and maintenance, (2) technology skills and system crashes, (3) human and financial resources, (4) cross-agency interaction and communication, (4) confidentiality and safety rules and regulations, and (6) citizens' expectations and the COVID-19 crisis.

[Insert Table 1 here]

[Insert Table 2 here]

Drivers of AI Chatbot Adoption

Innovation-level factors. Regarding innovation characteristics, our data indicate that the relative advantage and ease of use provided by chatbots account for most public organizations' adoption decisions. The data show that chatbots bring multiple benefits, which improve the status quo. Most notably, many interviewees viewed chatbots as a crucial alternative for reaching and helping more constituents. This viewpoint was based on the perceptions and understanding of the

clients they interacted and communicated with. According to one agency associate director, “We know taxpayers have questions but sometimes are afraid to pick up the phone.” Another interviewee noted that, “Many agencies have very limited customer-service hours and certainly not on the weekends, so this was an additional channel we would be able to provide to agencies to serve our customers.” Based on the 24/7 availability and self-service nature of chatbots, the agencies chose to use them as an alternative communication channel for people who did not want to call the government, preferring to seek information outside regular office hours.

Another key advantage that motivated agencies to use chatbots was their ability to present essential information in direct response to questions frequently asked by citizens. This feature helped to reduce call volume and freed up staff to undertake more complex cases. For instance, many unemployment-insurance agencies reported that people often called to ask basic questions about certain benefits or programs, such as “How to file an unemployment insurance claim” and “Am I eligible for an unemployment insurance claim?” With chatbots, one division deputy director explained, “We might be avoiding them having to make a phone call, which allows us to serve other people that might not be as technically savvy and need to call and get service directly from one of our representatives.”

The final feature involved the data-analytics tool that documents the functions of chatbots. The metadata provide valuable information about the questions that customers are interested in, which may vary over time. These metadata enable agencies to tailor responses that fit people’s information needs more closely and to upgrade and add new features to chatbots, where necessary.

The chatbots’ ease of use was another theme related to chatbot characteristics. While the information fed into chatbots – including questions and corresponding answers – was similar to the content of the agencies’ Frequently Asked Questions (FAQ) web pages, interestingly, the

interviewees perceived chatbots as easier for members of the public to use. They pointed out that users had to scan through lengthy FAQ pages on the website to find answers to their questions. In addition, the respondents mentioned that many FAQ pages presented information in PDF format, which was even more difficult for users to navigate. According to multiple interviewees, while tech-savvy users may know how to press Ctrl and F to obtain the information they need instantly, many people are not familiar with that technique. Furthermore, FAQ information generally involves technical and legal terms, which are familiar to organizational staff but not to the general public. By contrast, the conversational feature of a chatbot makes it possible for users to quickly gain concise, direct, and digestible answers. Moreover, the NLP that underpins a chatbot enables users to input questions in various ways. As one government CSO put it: “The AI technology behind the chatbot is good at figuring out that people may not ask the question the exact way, but it understands what people are asking and gets people the answer.”

Environment-level factors. An agency’s chatbot-adoption decision is significantly shaped by citizens, the IT industry, and other government agencies. Initially, these influences were driven primarily by an external shock: the COVID-19 pandemic. Customers’ service and information demands – particularly for unemployment benefits and social services – grew overwhelmingly during the pandemic. As one unemployment insurance director recalled, “Prior to the pandemic, we had an average of 12,000 to 15,000 calls per week. At the peak of the pandemic, we were receiving more than 200,000 a week.” Several interviewees noted that as information requests soared, an enormous number of people lacked the experience to file claims and needed to know about the program and application procedure. The agencies could not manage the skyrocketing demand for information and searched frantically for solutions that would help them cope with the

challenge. Chatbots emerged as a valuable option because they made it possible to interact with members of the public with less staff intervention.

The experiences and suggestions of other agencies constituted another environmental factor that influenced the agencies' adoption decisions. The data revealed patterns of within-state and between-state information seeking and/or sharing. In the within-state cases, interviewees learned about other agencies' chatbot-development processes and functionalities, obtaining a basic understanding of what it would take to establish a chatbot and align its features with their own needs. In addition, several agencies were approached by their state IT departments, which recommended chatbots as a way to bridge and resolve the unmet information demand. Regarding cases of information-sharing that crossed state borders, the agencies in question checked and tested the chatbots used by organizations in other states to learn what they could and could not do. In addition to looking for examples of chatbots in use in other states, some agencies learned that neighboring states were using chatbots to enhance their work through an existing collaborative network, established to facilitate the exchange of useful policy information. Finally, the idea of using chatbots flowed within national networks. One prominent example was the National Association of State Workforce Agencies (NASWA), the national organization that represents workforce agencies across the U.S. During the pandemic, the NASWA held weekly meetings at which agencies shared the challenges they had encountered and their coping strategies. Several respondents recalled that chatbots were a recurrent theme, presented and discussed in these meetings as a helpful solution to address the surging information demand from the public.

The interviewees recognized the role played by IT vendors as crucial sources of chatbot-related information. In numerous cases, call-center IT contractors brought chatbots to the attention of agencies. For example, one client service manager in a social service department vividly recalled

that when agency employees were chatting with the call-center vendor about the growing number of calls during COVID-19, the vendor asked: “Have you ever thought about a chatbot?” They replied: “What is that? What does that entail? How do we do it?” After learning more about chatbots from the vendor, they decided to adopt one. In other cases, chatbot vendors proactively contacted agencies to offer a free-trial deal. As one interviewee remembered, “The [company name] contacted our agency and conducted a demonstration through an online meeting. They showed us what the chatbot is, what it can do, how it can be implemented, and who could maintain it.” Then “the information was brought up to upper management to approve it.” Relatedly, since the chatbot vendors had collaborated with a range of state agencies across the nation in establishing chatbots, the vendors also shared those use cases and experiences with the agencies, giving them a better understanding of the use of chatbots in a government context.

Organization-level factors. Among the interviewees, the cultures of leadership and innovation were two of the most frequently mentioned organizational factors. Agency leadership can be characterized as an open mindset and willingness to try new things. According to the respondents, no chatbot project could be approved unless agency leaders recognized the value of chatbots. Moreover, when making adoption decisions, some agencies worried about having sufficient resources to invest in the project. In such circumstances, leaders helped to alleviate their agencies’ concerns by using their own authority to ensure that necessary resources were prioritized and dedicated to the project once it was adopted. As one operational services supervisor recalled, “Without that leadership pushing and being a champion for this technology, it would have been very difficult.”

An organizational culture of innovation and previous experiences also matter. Multiple interviewees noted that their agencies had undertaken projects to modernize service processes and technology systems and were always searching for new ways to enhance customer service. Automation and self-service were two key goals that these agencies wished to achieve through innovation. As a director of the unemployment-insurance office explained, “We had implemented a modern benefits application in late 2018. Since then, we have continually looked at ways to extend automation wherever possible. [...] Chatbots were certainly one of those things.” Similarly, a taxation manager shared:

We always tried to brainstorm ways to answer more calls and redirect calls. We were already trying to use a system where people could find the refund status without contacting a customer agent. They could help themselves.

Individual-level factors. Our data show that some agencies were exposed to chatbots because of individuals’ past chatbot-related experiences. Some staff members had interacted with chatbots in their private lives. For instance, during one interview, education-agency staff members remembered that it was their department director who initiated the first chatbot discussion within the team. When we approached the director after the interview and probed how she learned about chatbots, she replied that she had encountered them during a personal customer-service experience.

During another interview, an interviewee said:

We have all used chatbots in our daily life, like booking an airline ticket, so we are all familiar with what it is and what it can do. We just had never considered it for our website until the pandemic occurred.

In other cases, Chief Information Officers (CIOs) and other managers introduced chatbots, drawing on their own knowledge and private-sector experiences. As these individuals had worked

in IT for years before moving to the government, they were aware of the existence of chatbots and familiar with their characteristics.

Factors that Determine AI Chatbot Implementation Success

Data and information factors. Knowledge-based creation and maintenance were widely recognized as the core tasks in chatbot deployment because they determine which information content users will receive from chatbots. The organizations of our sample appear to have focused on implementing data-related best practices, taking an active approach to avoid data-related challenges. Several best practices were mentioned frequently by our interviewees. When the agencies were crafting questions and answers for the chatbot, they had to figure out what questions people were asking and develop answers to those questions. Various strategies were employed to identify users' information needs. The first strategy involved examining the website analytics or back-end data of existing customer-service channels (e.g., social media and mailbox). As one manager suggested:

We looked at the top ten terms that were being searched on our official website. Those top ten search terms were maybe 70% of what the users were coming to the site for. That is where we started.

Collaborating with customer-service staff was another useful approach. Some agencies asked call centers for assistance in pulling out data and tracking the top questions. Working with IT vendors was cited as a helpful approach. The vendors were able to share exemplar questions and answers that they had worked on with other agencies to guide the agencies in creating new chatbot content. Finally, many agencies used current FAQ information on their own websites to develop chatbot content.

The ongoing enhancement and updating of chatbot content were also crucial. One significant problem was that people asked the same question in myriad ways. For example, although “Where is my refund;” “Where is my tax refund;” and “When are you going to send me my check?” are all versions of the same question, the chatbots could not capture this diversity. Agencies had to therefore monitor chatbot performance routinely, identifying the key terms that underpin similar questions and incorporating those terminologies into the knowledge base to help the chatbot identify questions more precisely. In addition, while the interviewees acknowledged that chatbots should be as conversational as possible, it was hard for the agencies to draft chatbot content in plain, user-friendly language. As a division director in an education department reflected, “A lot of our programs are very technical in nature. Hence, there is the challenge of making the bot answer properly so that people won’t be reading legal jargon.” Again, it seemed essential for agencies to analyze their users’ chatbot interactions continuously. As this interviewee went on to say, “our chatbot-management team would let us know how those parents and students were communicating. If they wanted to know X, Y, and Z, how did they pose that question? That helped us design the database.” The last challenge was to handle questions that the chatbot could not answer. Some agencies designed a small-talk response that would ask users to try again using different keywords or shortened phrases. In addition, the agencies paid close attention at the back end to unsuccessful conversations and then made necessary modifications to the chatbots.

Technology factors. Technology was considered a challenging aspect of chatbot implementation in the interviews. One common challenge that the agencies faced was a lack of the technology skills needed to build a chatbot. However, this difficulty was relatively easy to manage by partnering with an IT vendor or the state IT department. During the collaboration process, the

agencies used their business expertise to design chatbot content, while the IT vendor or department was responsible for developing the technology infrastructure and providing necessary guidance on content design. As one department CIO noted, “we have partnered with a third-party vendor who brought the technical expertise and linguists to help make sure that we are asking the question in the right way.”

In addition, the agencies lacked the skills needed to manage a chatbot. As one division deputy director shared, “chatbots on the business side is not something we had a lot of experience with. [...] There was a learning curve.” Several interviewees noted that both the training provided by IT partners and the new staff hired to work on the implementation process were very helpful in enabling staff members to learn how to manage a chatbot. For example, one agency sent a manager to be trained by the state IT department, ensuring that s/he was capable of monitoring and adjusting the chatbot when it was handed over. Another respondent, an IT employee, emphasized the importance of training, as agencies “don’t want to leave the chatbot solely in the hands of a vendor,” leading to an over-reliance on the IT vendor and an inability to use the tool once the vendor was no longer available.

Finally, the interviewees mentioned one minor issue: system crashes, which occur when a chatbot is launched on a website for the first time and cannot support a large number of users simultaneously. One agency that experienced a crash shared that they immediately asked the vendor to bring the chatbot down, revise the technical infrastructure to increase its capacity, and then relaunch it. Another organization, which had anticipated that their chatbot system might be overloaded, purposely took a “soft launch” approach by making the chatbot publicly available without any announcement or advertisement during the first few weeks.

Organizational factors. In relation to organizational factors, our interviewees mainly discussed the human and financial resources required for chatbot deployment. Many interviewees noted that, although it took some staff hours to create the chatbot content and manage the tool, the process was not very difficult; agencies were able to manage the workload by reallocating existing staff. As one deputy director of unemployment insurance recalled, “We were able to kind of sneak some time from other business units, so we didn’t really hire any dedicated human resources.” In terms of financial resources, there was some variation across agencies. Many agencies were building chatbots at no additional cost, either because the chatbots had been provided by vendors as part of a free trial or because the initial costs were covered by a master contract between the IT vendor and the state government. Furthermore, some agencies were able to use state- or federal-government special funds to cover their expenses. Agencies that did not have spare resources had to change their budget plans to carve out funding for the project.

Sustainable financial support is crucial for maintaining chatbot use in the long run, especially after the free trial and contract periods end. Senior-management and political support are critical to the acquisition of long-term financial investment. A number of agencies recalled that convincing their leaders and legislators of the chatbot's value was the key to obtaining their support. According to one state CIO:

Because we had all of the statistics, we were able to meet with the legislators, talk with them, and testify in open hearings about the chatbot’s effectiveness. That was very convincing. We were able to get the ongoing maintenance rather easily.

Another interviewee noted that:

Our leadership has seen just how successful the bot is, and they are completely all in on it and interested in helping it grow, so we have got a lot of support there.

Inter-organizational factors. In some cases, the state established a centralized chatbot that could be modified in accordance with the needs of each participating department and then installed on its websites. In such cases, cross-agency interaction and communication were essential. However, some agencies were hesitant to implement the project because they envisioned the deployment process as complicated and burdensome. For instance, some staff members were concerned that they would not be able to come up with a large enough number of questions and answers to make the chatbot function correctly. From a technical perspective, however, that was not a problem. Accordingly, the state IT team reached out to agencies and let them know that it was acceptable to start with a small number of questions and scale them up later as necessary. At the same time, showcasing the value of chatbots also encourages agencies to invest more effort into chatbot implementation, according to several interviewees.

Communicating with executive-level stakeholders across various agencies to align their perspectives on the chatbot was vital as well. Because chatbots are a new technology for most governments, stakeholders may have unrealistic expectations about what they can achieve—or varied views on how they should be deployed. Clarifying the scope of the chatbot was therefore of paramount importance, helping to aligning stakeholder expectations and ensuring that the project was able to move forward. As one workforce department CIO suggested, “I was helping our agency leadership and leadership in the legislative and governor’s offices understand that the chatbot cannot do everything. It is limited in scope.”

Institutional factors. Institution-wise, our data reveal that state and federal rules, policies, and regulations have a moderate impact on chatbot deployment. Although most interviewees recognized that information confidentiality and safety were common concerns for all government

IT projects, in the case of chatbot implementation, the challenges do not appear to have been severe and were relatively easy to manage. This was true in part because the function of the chatbot was to answer FAQs, which by nature involved public information. As one interviewee said, “People do not have to sign in to ask questions. Everything in the bot is public information. There is no personal information in there.” Nevertheless, in some situations, privacy legislation had to be taken into account. The most common scenario was for people to enter personal identifiable information (PII) into the chatbot, such as a social security number or date of birth, violating personal-data-privacy and security rules. In such cases, the agencies configured techniques to identify and encrypt the shared information to ensure that their use of chatbots conformed to the relevant regulations. A few agencies also placed instructions on the chatbot’s landing page to remind people not to provide their PII when using the chatbot.

Contextual factors. The end-users’ perceptions and expectations of the chatbots were critical, according to our informants. Some users expected the chatbots to be able to provide specific details about their service requests and were therefore dissatisfied with the generic information offered by the chatbot. According to one interviewee, just as the agencies had to manage the expectations of internal stakeholders, they also had to communicate with users, pointing out explicitly that “it is answering general questions that many people are asking. It does not specifically answer questions about your claim.”

The COVID-19 pandemic was seen as an influential contextual factor that affected chatbot deployment in two key ways. First, the pandemic pushed federal and state governments to establish special funds to help agencies provide better support to citizens in need. Many agencies, in

particular those responsible for unemployment insurance and social-welfare programs, used fiscal assistance grants to install chatbots. As one employment security division official recalled:

With the pandemic, there was a lot of money through the U.S. Department of Labor to implement automated or technical-based solutions to help serve the greatest number of people. Hence, funding was not an issue.

Second, the public-health emergency altered and accelerated the procurement process. One department CIO recalled that an IT project “would have taken months and years in our procurement cycle during normal times.” By contrast, with an executive order in place during the pandemic, the agencies could bypass the rules and obtain rapid procurements. As fiscal and administrative flexibility increased during the pandemic, the agencies were able to boost their chatbot-implementation processes.

Discussion

The study’s main goal was to explore the adoption and implementation of chatbots in public organizations. By combining empirical evidence from 22 state agencies in the U.S. with Makasi et al.'s (2020) typology of chatbot functionalities, we show that chatbots are predominantly used for service-information provisioning, which does not require users to provide personal information; in future, such services are likely to be extended to provide targeted assistance and service negotiation, supported by user authentication.

Our data also help to answer the research questions presented in this study. In general, our results indicate that chatbot adoption and implementation are multi-dimensional processes, involving both technical and non-technical factors; these results identify factors that determine chatbot adoption and implementation, contrasting with studies that emphasize the role of technical

factors (Androutsopoulou et al., 2019; Cantador et al., 2021; Carvalho & Barbosa, 2019; Keyner et al., 2019; Lommatzsch, 2018). More importantly, the factors that determine the two stages differ significantly, a point that will be further elaborated below. The analytical framework is instrumental in helping to identify and analyze these determinants.

In relation to chatbot adoption, our study highlights the role played by the two primary factors of the Technology Acceptance Model (Davis, 1989). First, in terms of perceived usefulness, our results seem to indicate that the use of chatbots is perceived to bring several/advantages benefits to the organization despite the potential implementation-related challenges, such as 24/7 availability, self-service capability, automation, and freeing-up staff (Androutsopoulou et al., 2019; Carvalho & Barbosa, 2019; Lommatzsch, 2018; Makasi et al., 2022; Petriv et al., 2020; van Noordt & Misuraca, 2019). In this respect, it seems that, as the literature regarding private organizations shows, it is perceived that the use of chatbots may contribute to increase organizational capacity and, as a result, to improve service support and efficiency (e.g., Zhang et al., 2023; Wang et al., 2022). Although recently, health-related studies have referred to the need to increase outreach and expand public health response as drivers of the adoption of chatbots during the COVID-19 pandemic, our study shows that public agencies in different fields may also benefit from the capacities and agility provided by the use of chatbots and that those perceptions actually drive adoption in these non-health related contexts.

Second, in terms of perceived ease of use, although previous literature on digital government suggests that many information technology-related projects fail during the first stages of implementation (e.g., Heeks, 2006), it seems that the current form of chatbots used by the state agencies we talked to is not as complex as other AI-based technologies, given that it mainly focuses on providing public information. This lack of technological complexity results in manageable

implementation challenges, which confirms perceptions of chatbots ease of use. We also argue that this is an interesting finding given that most literature on AI has widely recognized the complexity of AI systems and, therefore of implementing AI projects (e.g., Campion et al., 2020; Mikhaylov et al., 2018), which may point to the existence of different types of drivers of adoption for different types of AI systems. Through comparative qualitative studies, further research could explore the extent to which the type of project and its related complexity determine the factors that influence adoption decisions.

Our findings also show that environmental factors, and particularly the COVID-19 pandemic seem to play a prominent role in the adoption of chatbots by state agencies. Recent public-management studies have only just begun to investigate government innovation during the COVID-19 crisis (see e.g., Yuan et al., forthcoming; Eom & Lee, 2022; Fischer et al., 2022; Phillips et al., 2021). Our findings contribute to the current discussion by showing how COVID-19 has influenced the adoption of chatbots in public organizations, an analysis that aligns well with the perspective provided by the PET. In this respect, the rapid evolution of the disease and its widespread effects (the external/critical event) resulted in an unprecedented need for timely and accurate information from government agencies that altered the policy landscape, resulting in organizational decisions that accelerated the adoption of chatbots. Interestingly, although we have observed that the COVID-19 pandemic has generated increased demand for chatbots, the willingness to use chatbots may differ based on organizations' decision to employ them for various purposes or in the post-pandemic period. Thus, future research could analyze the prevalence of other environmental factors, which could help determine their real influence in adoption decision. Further, new studies could be dedicated to investigating the impact of the COVID-19 pandemic on chatbot adoption by comparing drivers of adoption during and after this era.

In addition, institutional isomorphism seems to also explain the adoption of chatbots by state governments. The proponents of institutional isomorphism argue that public organizations are susceptible to institutional pressures, which motivate them to take similar actions and become more alike (De Vries et al., 2016; Frumkin & Galaskiewicz, 2004). Research indicates that conformity can be a consequence of regulations (coercive isomorphism), as organizations participate in associations of peer organizations (normative isomorphism) and examine the practices of other organizations (mimetic isomorphism) (Frumkin & Galaskiewicz, 2004; Powell & DiMaggio, 1991). Our results show that normative and mimetic pressures predominantly account for agency decisions to adopt chatbots.

Further, our findings seem to indicate that governments are not the only voices encouraging others to adopt chatbots and that IT vendors also play a role in this regard. Given that AI chatbots are an emerging technology in public organizations, the influence of vendors reveals as crucial to raise awareness among state agencies of the benefits of using chatbots. These findings suggest that IT vendors can serve as critical partners during the adoption (and also implementation as we explain below) of new technology-driven innovations, going beyond the traditional role they play in public procurement processes. They also suggest that, following what the literature on strategic communication calls public interest framing (Strömback & Kioussis, 2011), IT vendors may be promoting chatbots by arguing for public value (administrative efficiency in this case).

In relation to chatbot implementation, our results confirm some of the challenges identified in the literature on digital government implementation (Gil-Garcia, 2012) and AI deployment (Campion et al., 2020a). These challenges include system crashes at the launch stage and a lack of the skills needed to build and maintain chatbots. Staff training and collaboration with the IT sector or state IT department are crucial strategies for dealing with such challenges. In addition, in cases

where a centralized approach was used to implement chatbots, we discovered that many agencies lacked a sufficient understanding of the required data or the necessary alignment with stakeholder expectations, in line with the findings of Campion et al. (2020b) on collaboration in AI implementation.

However, our study also presents relevant contributions compared to previous research. First, it shows that data and information-related factors as well as technological factors play an important role in the implementation of chatbots, even more important than organizational and institutional factors. This is particularly interesting for research on digital government has shown a different trend overtime: as the use of technology by public organizations has matured and institutionalized, organizational and institutional factors have become more important than data and information and technology-related ones (e.g. Campion et al., 2020b, 2020a; Gichoya, 2005; Glyptis et al., 2020). We argue that these differences are related to the nature and characteristics of chatbots: as a specific type of AI-based systems, chatbots are highly technological and heavily based on data (Campion et al. 2020b). We also argue that, as the use of chatbots expands across organizations, the need for resources will become critical in guaranteeing their sustainability, as previous research on digital government shows (e.g., Kumar & Best, 2006; Nurdin et al., 2014). Similarly, as agencies add functionalities to chatbots and make them more complex (for example, by offering authentication services), data security and confidentiality regulation will become important factors that will facilitate implementation.

Second, our findings start to point to the existence of relationships among different categories of factors, a facet that has received limited attention in the existing literature on technology-driven innovation in the public sector. Specifically, our results show that the COVID-19 pandemic (contextual factor) not only determined the level of available financial resources, but also allowed

for the relaxation of procurement regulations (organizational factors). Using quantitative methods, further research could assess additional relationships within categories of factors as well as between them, which may have practical implications in terms of prioritizing investments, particularly in the face of limited budgets.

Third, our study indicates that inter-organizational factors (reflected in the collaboration with IT vendors) play a crucial role in the implementation of chatbots. In this respect, vendors' knowledge sharing, product promotion, and technical support seem to play a vital role in helping organizations deploy chatbots smoothly. As previously stated, this fact points to a change of the role played by vendors in the implementation process and, therefore, of the interaction dynamics of vendors and state agencies. Further studies could investigate what new arrangements may allow government agencies leverage existing vendors' expertise when implementing chatbots as well as what systems and processes may facilitate the most seamless interactions possible.

Conclusion

This research has investigated the adoption and implementation of AI chatbots in the public sector. After analyzing interview data collected from 22 state agencies across the U.S., we identified a series of factors that led public organizations to decide to adopt chatbots and also determined how they implemented the tools.

The present study makes various contributions to the study of AI chatbots and technology-driven innovation adoption and implementation in the public sector. First, we have introduced empirical evidence to the current discussion about the use of AI chatbots in the public sector; this advances our understanding of the field from a managerial perspective, going beyond the legal,

ethical, and governance-related issues frequently addressed in the government AI literature. Second, we have highlighted the significance of distinguishing between the adoption and implementation of technology-driven innovation. Our research not only delved into the reasons behind the adoption of chatbots in public organizations, a topic that has received considerable scholarly attention, but also explored the process of integrating chatbots into practical use. In this respect, from a broader perspective, we have shown that because the goals of the adoption and implementation stages of technology-driven innovation are different, determinants of adoption may also be different from the factors that influence implementation. That is, once the decision to adopt a technology-driven innovation is made, state agencies may have to pay attention to very different issues in its implementation process. Thus, as Campion et al. (2020) indicate, when taking the overall deployment process into account, organizations need to consider long term issues, such as potential benefits and creation of public value, as well as short-term actions that may contribute to addressing specific implementation issues.

This study is not exempt from limitations. First, the process of identifying cases of chatbot deployment might be constrained by the Google search function and the recommendations of participants. It is possible that some agencies may use chatbots that we have not identified through this search. Second, as interviewees were recruited on a voluntary basis, some self-selection bias may have been unavoidable, although we attempted to increase sample diversity by considering service type and geographic location. In particular, while we observed that some agencies had decommissioned their chatbots during the case search and interviews, we received a response from only two agencies. As such, our data may be biased towards the perspectives of agencies that have had successful adoption and implementation experiences and are still using chatbots. Third, it is important to note that our study only examines the challenges and opportunities faced by

government agencies during chatbot adoption and implementation. We acknowledge that there are other important issues related to the use of chatbots in the public sector that require further exploration. These include investigating how chatbots align with public values and democratic principles, understanding citizens' perspectives on chatbot usage, and examining the potential negative consequences that chatbots may have on both government and citizens.

As interpretative qualitative scholars, we have focused on providing in-depth explanations and meanings rather than generalizing findings. Yet, we argue that our study is generalizable to a certain extent. On the one hand, according to Yin (2013), often, generalization in qualitative research relies on the descriptive representativeness of the set of participants or settings on which data are collected, in terms of the distribution of properties of individuals or groups, for the larger population to which the researcher wants to generalize. In this respect, we argue that our sample of interviewees is representative of the type of actors involved in chatbots implementation processes in state public organizations. On the other hand, we also argue that, although our emphasis is not on the generalizability of the findings or interpretations, our study is transferable to new situations and contexts (Maxwell & Chmiel, 2014). This said, we also acknowledge that our study does not allow us to generalize our findings to other contexts and that further research should adopt other methodologically approaches that extent the validity and generalizability of studies on the implementation of chatbots.

Finally, the interpretation of our findings may be limited by the context of our study. While we identified several challenges across different dimensions, interviewees expressed that they were mostly manageable. This may suggest that the current form of chatbot implementation, which primarily focuses on providing public information, is not particularly complex for organizations. Besides, since this research was conducted within the context of U.S. states, our results may not

be generalizable to other U.S. government levels or other countries with different political and socio-economic characteristics. Nevertheless, our findings can serve as a reference for future scholars interested in cross-context comparisons.

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Table 1: Drivers of AI Chatbot Adoption

Factor	Second-order code	First-order code
Innovation	Relative advantage	<ul style="list-style-type: none"> • Reach and help more constituents (9) • Ability to reply to FAQs (11) • Data-analytics tool (3)
	Ease of use	<ul style="list-style-type: none"> • Easier for citizens to use (13)
Environment	Citizens	<ul style="list-style-type: none"> • A surge in customers' service and information demands (11)
	Other agencies	<ul style="list-style-type: none"> • Within-state sharing of chatbot experiences (7) • Between-state sharing of chatbot experiences (6)
	IT vendors	<ul style="list-style-type: none"> • Introduce chatbots as a potential solution (6) • Share use cases and experiences (3)
Organizational	Leadership	<ul style="list-style-type: none"> • Willingness to try new things (7)
	Culture of innovation & Previous experiences	<ul style="list-style-type: none"> • Keep exploring new ways to enhance customer service (9)
Individual	Past chatbot-related experiences	<ul style="list-style-type: none"> • Having interacted with chatbots in private lives (3) • Knowledge and private-sector experiences (3)

Notes: Number of interviews in the parenthesis

Table 2: Determinants of AI Chatbot Implementation Success

Factor	Second-order code	First-order code (Challenge)	First-order code (Enabler)
Data and information	Knowledge-base creation		<ul style="list-style-type: none"> Examine the website analytics or back-end data of existing customer-service channels (10) Collaborate with customer-service staff (3) Use current FAQ information (4)
	Content enhancement	<ul style="list-style-type: none"> People asked the same question in myriad ways (4) Draft chatbot content in plain, user-friendly language (3) Handle questions that the chatbot could not answer (3) 	<ul style="list-style-type: none"> Monitor chatbot performance routinely (3) Monitor chatbot performance routinely (2) Design a small-talk response (1) Make necessary modifications to the chatbots (1)
Technology	Technology skills	<ul style="list-style-type: none"> Lack of skills to build chatbots (12) Lack of skills to manage chatbots (4) 	<ul style="list-style-type: none"> Partner with an IT vendor or the state IT department (12) Receive training (2)
	System	<ul style="list-style-type: none"> System crashes (2) 	<ul style="list-style-type: none"> Use a soft launch approach (2)
Organizational	Human resources	<ul style="list-style-type: none"> Increase in workload (9) 	<ul style="list-style-type: none"> Reallocate existing staff (3)
	Financial resources	<ul style="list-style-type: none"> Sustainable financial support in the long run (2) 	<ul style="list-style-type: none"> Utilize free trial, master contract, or special funding for building chatbots (12) Senior-management and political support (2)
Inter-organizational	Expectations of staff in collaborating agencies	<ul style="list-style-type: none"> Consider the deployment process complicated and burdensome (2) 	<ul style="list-style-type: none"> Cross-agency interaction and communication (2) Showcase the value of chatbots (2)
	Expectations of executive-level stakeholders	<ul style="list-style-type: none"> Have unrealistic expectations about the value of chatbots and the deployment process (2) 	<ul style="list-style-type: none"> Clarify the scope of the chatbot project (2)

Institutional	Information confidentiality and safety regulation		<ul style="list-style-type: none"> • The current usage of chatbots doesn't require personally identifiable information (11)
Contextual	End-user's perceptions and expectations COVID-19 pandemic	<ul style="list-style-type: none"> • Citizens expect chatbots to provide specific details (2) 	<ul style="list-style-type: none"> • Communication and clarification (2) • Provide funding opportunities (12) • Accelerate procurement process (3)

Notes: Number of interviews in the parenthesis

Appendix: Interview Guide⁴

1. Current Use of Chatbots

- (1). What types of chatbots does your organization have and what are they used for?
- (2). What are the main functionalities that your chatbots are performing?

2. Adoption of Chatbots

- (1). Why did your organization decide to adopt an AI chatbot? What motivated your organization to adopt it?

Prompts:

- i. Innovation level: Experimentation/trialability; cost; complexity; relative advantage; ease of use; compatibility.
- ii. Organization level: leadership; top-management support; past experiences
- iii. Environmental level: private sector; public demands; legal mandate; other organizations

3. Implementation of Chatbots

- (1). What were the challenges that you encountered in the implementation process?

Prompts:

- i. Data and information factors: Accuracy; availability; standardization; quality; timeliness.
 - ii. Technology-related factors: customization; reliability of the provided answers; translate formal administrative language into user language.
 - iii. Organizational factors: financial resource; human resource; existing rules, norms and culture; lack of common vision; rigid authority structure; lack of strategies and plans.
 - iv. Inter-organizational factors: lack of interest; lack of collaborative culture.
 - v. Institutional factors: political support; local, state, or federal laws, policies, and regulations.
 - vi. Contextual factors: Covid-19; national economic situation.
- (2). How did your organization cope with those difficulties?
 - (3). What were the main costs you had during the implementation process?

⁴ The questions and prompts may vary according to the flow of the interview and the comments made by the interviewee.