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**A Systematic Review of the Use of Artificial Intelligence in Managing Innovation in
E-Government Organizations Worldwide**

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Abstract

Purpose: This paper delivers a methodical literature review that focuses on the application of artificial intelligence (AI) to handle innovation within e-government organizations globally.

Methodology: Showcasing meticulousness, the review utilized a structured method to scrutinize 11 academic studies obtained from established, globally renowned databases, such as Scopus and Web of Science.

Findings: The findings underscore an expansive array of AI applications within e-government's innovation management, incorporating data-led decision processes, chatbots for effective consumer service, sentiment inspection for useful citizen critique, and predictive analysis for service refinement. Conversely, incorporating AI within e-government establishments encounters considerable hurdles regarding data presence and integrity, transparency and interoperability concerns, ethical considerations, as well as sustainability and expansion challenges. The review strongly underlines the necessity for calculated investments towards resource augmentation and technological infrastructure.

Unique Contribution to Theory, Practice and Policy: The integration of artificial intelligence (AI) into e-government innovation may shape the direction of ensuing research in digital governance and public administration. Beneficiaries of the comprehensive insights this scholarly study offers include e-government experts, scholars, and tech innovators hailing from manifold geographical spaces. The findings of this study could be resourceful for top-tier decision-makers in national and local e-government organizations, allowing them to refine their strategies for AI amalgamation and enhance service provision.

Keywords: *Artificial Intelligence, E-Government, Systematic Literature Review, Sentiment Analysis*

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INTRODUCTION

Governments' operations, interactions with citizens, and public service delivery have tremendously transformed with the expeditious adoption of digital technologies. They have evolved and progressed from basic electronic service delivery to Web 2.0 technologies and social media usage, leading to profound changes in the role of governments and citizens in the delivery of public services (Vrabie 2023). Nevertheless, emerging new technologies, including the Internet of Things (IoT), blockchain, and artificial intelligence (AI) have paved the way for a new e-government era. This updated idea iteration provides the potential to revolutionize public service delivery and government operations by integrating cutting-edge technologies into administrative processes. The widespread AI adoption in managing innovation in e-government organizations is stimulating many opportunities. AI integration in the public sector and governmental services is rapidly changing conventional methods of enacting policies, implementing regulations, and providing services (Hamirul et al. 2023; Reis et al. 2019). These technologies have been found to boost effectiveness and efficiency in service offerings, cultivate citizens' trust, and improve public service quality.

Governments are harnessing AI to simulate intricate systems and accurately generate predictions. This has ensured experimentation with different policy options (Al-Besher and Kumar 2022). These benefits transcend numerous governmental functions (De Sousa et al. 2019); these include law enforcement, public health, transportation, and decision-making. Nevertheless, AI application in e-government organizations has significant challenges. Despite its potential to boost citizens' trust in governance, it may also lead to mistrust in government decisions due to concerns related to privacy violations (Dreyling et al. 2022).

Furthermore, the lack of black-box systems' transparency presents more challenges, including ambiguous responsibility and accountability, when these technologies are incorporated into decision-making (Mariani et al. 2022). Such realities raise significant risks for governments since errors in AI use may cause serious adverse impacts on society and governance.

Problem Statement

For decades, AI has attracted the attention of researchers. Studies on chatbots, algorithms, agent-based systems, and expert systems have deep historical roots (Ayanouz et al. 2020; Reis et al. 2019). Recent remarkable developments and increased policy focus have reignited AI research. However, notable knowledge gaps still exist. To start with, AI use in government has lagged behind the private sector, leading to its overemphasis on the public sector (Dreyling et al. 2022). Private-sector digital transformation and AI practices cannot be directly implemented in government organizations because of the need to maximize public value. Comprehending AI issues particular to governmental organizations is limited (Aoki, 2020). Besides, AI is becoming less predictable and increasingly intricate, and governments have inadequate knowledge of the effect of this complexity on public governance (Dreyling et al. 2022; Wirtz et al. 2019). Most governmental organizations grapple to understand the varied ramifications of utilizing AI in governance. Notably, thought leadership in AI and governance is struggling to keep pace with dramatic AI use in these organizations, presenting a considerable hurdle, as they battle the political, socioeconomic, and ethical consequences of AI-driven changes (Mikhaylov et al. 2018). These integral components necessitate further insights into this field of research.

Considerable AI studies address technical domains, traversing specific technological problems and solutions in computer science. Although research has transcended beyond technical aspects, the literature is scarce on AI regulation, policy, and governance (Zuiderwijk et al., 2021). Additionally, there is a lack of consensus on how to resolve the AI challenges related to regulation and governance in public administration (Zuiderwijk et al., 2021). Despite the increasing focus on AI regulations, policies, and governance, a comprehensive systematic review of the use of AI in managing innovation in e-government organizations is scarce.

Research Objectives

The research gaps highlighted offer insightful aspects for this review to address the limitations by comprehensively analyzing the topic and exploring the AI technical domains, techniques, applications, and implications. The specific objectives included the following:

- i. To determine the role of predictive analytics for service optimization in the public sector.
- ii. To explore sentiment analysis for citizen feedback in e-government innovation management.
- iii. To establish the significance of chatbots for improving customer engagement and satisfaction.
- iv. To establish the contribution of AI in data-driven decision-making in e-government organizations.

Research Questions

- i. What is the role of predictive analytics for service optimization in the public sector?
- ii. What are the sentiment analysis for citizen feedback in e-government innovation management?
- iii. What are the significance of chatbots in improving customer engagement and satisfaction?
- iv. What is the contribution of AI in data-driven decision-making in e-government organizations?

LITERATURE REVIEW

Theoretical Underpinning

This literature review on utilizing artificial intelligence (AI) to orchestrate innovation in electronic government entities is predicated on a number of theoretical underpinnings. These collectively form a schematic for interpreting AI's impact and future course in the public sphere. The Innovation Diffusion Theory, for instance, scrutinizes the infiltration of AI technologies across e-government bodies (El-Ebiary, 2018). It investigates the dissemination and acceptance of innovative ideas, taking into account aspects such as the perceived merits of an innovation and the influence wielded by key stakeholders. In contrast, the Resource-Based View (RBV) of Innovation emphasizes the importance of an organization's internal resources—data, competencies, and technological infrastructure, to name a few—in spearheading innovation (Lukovszki et al., 2020). This theory suggests that the success of AI in managing innovation is largely contingent upon the effective utilization of these inherent resources. The Technology Acceptance Model (TAM), conversely, assesses the inclination of government employees and the citizenry to adopt AI-powered e-government services (Mohammad Ebrahimzadeh Sepasgozar et al., 2020). It illuminates factors that could either catalyze or hinder AI

acceptance, such as its ease of use and perceived improvements to service provision. By synthesizing insights gleaned from these theories, the research aims to provide a multi-faceted understanding of AI's function, its advantages, and potential obstacles in nurturing innovation within e-government establishments. This comprehensive approach allows for a more robust and nuanced exploration of AI's role in the public sector, thereby contributing to the broader discourse on AI's integration into governmental processes.

The Need for AI Technology in the Public Sector

Today's citizens expect efficient, timely, and high-quality services from their governments. Such is coming against the backdrop of increasing mistrust in governmental bodies and their services worldwide, amplifying the desire for adaptable leadership, improved services, and enhanced infrastructure (Reis et al. 2019). However, constrained public budgets and rising demands offer considerable barriers to meeting these anticipations. The ultimate effects are delayed effective solution provision, deficiency of adequately skilled staff, and decrease in administrative capability efficiency (Busuioc 2021; Votto et al. 2021). Technological developments provide solutions relevant to the public and private sectors. Scholars have emphasized AI integration's potential to positively influence environmental outcomes and global productivity (Vinuesa et al. 2020). Based on this, sustainable business model formulation has become imperative.

Impact of AI on E-government Organizations

Mounting public management evidence demonstrates that AI applications can be effective in addressing these concerns and establishing and maintaining good governance. Manita et al. (2020) and Wirtz et al. (2020) highlighted this technology's potential to improve public service delivery efficiency and quality and support decision-making processes. This perspective has been supported by studies that have shown revealed that predictive analytics and machine learning algorithms can be effective in analyzing complex data sets and offering insights for policy formulation, risk evaluation, and resource allocation (Alexopoulos et al. 2019; Belhadi et al. 2022). Governmental bodies can use AI algorithms to identify trends, patterns, and relationships in large datasets and make informed decisions. Authors have also pointed out that AI-decision support systems are invaluable in scenario simulation and analysis, allowing policymakers to assess the possible effect of various policies before implementation. However, challenges, including transparency and algorithmic bias, have been reported in AI-driven decision-making processes (Belhadi et al. 2022). Therefore, use of AI technologies should be used ethically and accountably.

In this regard, AI has been linked to increased accountability, transparency, citizen participation, and engagement. Researchers employed advanced statistical techniques in assessing the challenges confronting emerging economies to deal with challenges related to deficiency of governance in public services (Chohan and Hu 2022). Virtual assistants and chatbots automate routine tasks and give instant responses to people's queries, thus enhancing service delivery efficiency. In their studies, Cantador et al. 2021 and Vrabie (2023) indicated that natural language processing methods and AI-powered chatbots provide user-friendly and personalized experiences, enabling citizens to conveniently access services and information. Furthermore, governments have gauged public sentiments and opinions through social media monitoring and sentiment analysis, thus ensuring more responsive policymaking (Babu and Kanaga 2022). Thus, AI can profoundly transform

public governance and management by improving citizens' expectations and confidence in their services.

AI-powered data analytics can facilitate innovation for government organizations through meaningful correlations, trends, and patterns derivation to contribute to evidence-based program evaluation and policymaking. AI techniques, including data mining and machine learning, may unearth hidden insights informing policy decisions (Wang and Aviles 2023). Predictive analytics have been used to identify emerging issues and anticipate future needs (Engin and Treleaven 2019). Although governments have proactively tackled societal challenges with these techniques, discussions associated with data sharing frameworks, interoperability, and data quality have been cited as primary enablers to efficient and effective AI-driven data analytics. Dandale et al. (2023) reinforced the benefits by focusing on robotic process automation and AI-enabled process optimization methods and showed that they can minimize human error, decrease administrative burden, and improve efficiency. AI-powered automation may be utilized in different bureaucratic and administrative procedures, including compliance monitoring, document processing, and approvals, to realize resource optimization and cost savings.

The objective of this comprehensive literature review was to examine the exploitation of artificial intelligence (AI) for handling innovation within e-government entities. It observed several domains where earlier investigations have fallen short in addressing research inquiries or where existing knowledge lacks sufficient depth. One such area involves a lack of a universal blueprint guiding the application of AI in the public sector, as previous studies have ineffectively grappled with this query. Even as governments shift towards automating tasks using AI and predictive analytics, the demand for a uniform structure that can steer the deployment and supervision of AI mechanisms within government institutions remains unmet. Additionally, current knowledge further lacks clarity specifically concerning governmental organizations' AI concerns. It would be erroneous to directly transpose private sector transformation strategies and AI protocols to the public sector due to the essential emphasis on maximizing public gain. Therefore, there is a need for more research that focuses on AI challenges and opportunities unique to the public sector. Moreover, there is a lack of consensus concerning how to tackle the issues about regulation and governance in public administration that Artificial Intelligence (AI) presents. Notwithstanding the augmented attention towards AI governance, regulations, and policies, a thorough systematic assessment of AI usage in the supervision of innovation within e-government institutions appears noticeably limited. This deficiency underlines the drive for additional research probing into the legislative and governance dimensions of AI within the public industry.

METHODOLOGY

To update, summarize, and qualitatively assess the literature on the use of AI in managing Innovation in e-government organizations worldwide, a systematic literature review (SLR), an appropriate approach to systematically evaluate the existing body of knowledge, was conducted. An SLR was preferred over other literature reviews because of various reasons (Mengist et al. 2020). In addition to providing a more objective analysis than narrative literature reviews, an SLR facilitates reproducibility by generating comprehensive conclusions via a well-structured, transparent, and detailed process. It also encompasses a quantitative technique that establishes the existing studies and offers research gaps, thus developing robust research ideas for further research. To this end, SLRs have mainly been

used in social sciences, especially in management studies, to present results in a more accessible and relevant way for policymakers and academics.

Data Collection Process

Data gathering encompassed utilizing two databases, including Web of Science (WOS) and Scopus, to screen and collect documents. These databases have compiled crucial academic research articles in social sciences, underscoring the reason for selecting them. On the one hand, Scopus is considered a leading and comprehensive scientific database that indexes studies from different academic disciplines (Pranckutė 2021). This database has nearly 23,000 scientific publications from an estimated 6,000 international publishers (Zhu and Liu 2020). On the contrary, WOS has a collection that enables access to different databases, including the Arts & Humanities Citation Index, Social Sciences Citation Index, Science Citation Index, and other databases. It is interdisciplinary that contains more than 29,000 journals from 3,400 publishers with robust and rigorous protocols and strict criteria standards (Pranckutė 2021). Both Scopus and WOS have systems that organize and integrate data from diverse sources, such as conference papers, book chapters, and articles, into different bibliographic formats for cited references. Furthermore, this feature establishes scientific rigor, thus making them valuable for bibliometric analysis and ensuring the retrieved documents' relevance, validity, and reliability.

Search Strategy

To generate an accurate, robust, and effective analysis, identical keywords or terms were used for advanced search in the selected databases, as Fig. 1 presents. The initial set of search terms was obtained from recent bibliometric research and SLRs focusing on AI and innovation management in e-government organizations. They included "AI" and other terms associated with its subfields, namely "data mining," "deep learning," "neural network," and "machine learning." In the Scopus database, the search combined these AI-linked terms with "Government," "innovate*," and "e-government services," yielding 57 documents. In line with other SLRs, the search was based on successive filters: only review papers and articles written in English, published from August 2019, indexed, and situated in social sciences, decision sciences, multidisciplinary sciences, management, engineering multidisciplinary, and telecommunications were deemed relevant. This refinement narrowed the sample to 30 references.

Inclusion and Exclusion Criteria

The WOS database search was akin to the technique employed in Scopus, combining different keywords. An operator "AND" was incorporated to limit the results to the above-specified fields, generating 23 documents. Duplicate articles were then excluded from the dataset, implying that in the final compilation, those that existed in both databases were not included. Finally, 44 articles were included. It is important to note that 21 articles remained after excluding records without full texts, i.e., with only abstracts. An additional 10 articles were removed because of relevance and quality-related issues, leaving 11 articles for inclusion in this SLR. Recent articles from 2019 were included in the systematic review. The resulting articles were examined to extract common themes that could inform this review.

Data Analysis

Conducting a systematic literature review and analyzing data using themes is a structured approach to synthesizing research findings across multiple studies. This method

was used to identify common patterns, trends, and insights within the use of artificial intelligence in managing innovation in e-government organizations worldwide. Analysis was done by organizing the initial codes into broader themes that reflect common patterns or concepts across the data. Themes were synthesized across the selected studies. Finally, overarching patterns, variations, and trends that emerge from the data were identified.

RESULTS

This section details the core results that were extracted from the included studies, paying attention to different AI applications in managing innovation within E-government organizations globally. It highlights each application in detail to encompass the technical mechanisms and algorithms underlying their operation or functionality. Included in these findings are the discussions for interpretation in the context of how they contribute to efficiency and innovation in these agencies. Table 1 shows the included articles in this systematic review while figure 1 shows the process of the selection process.

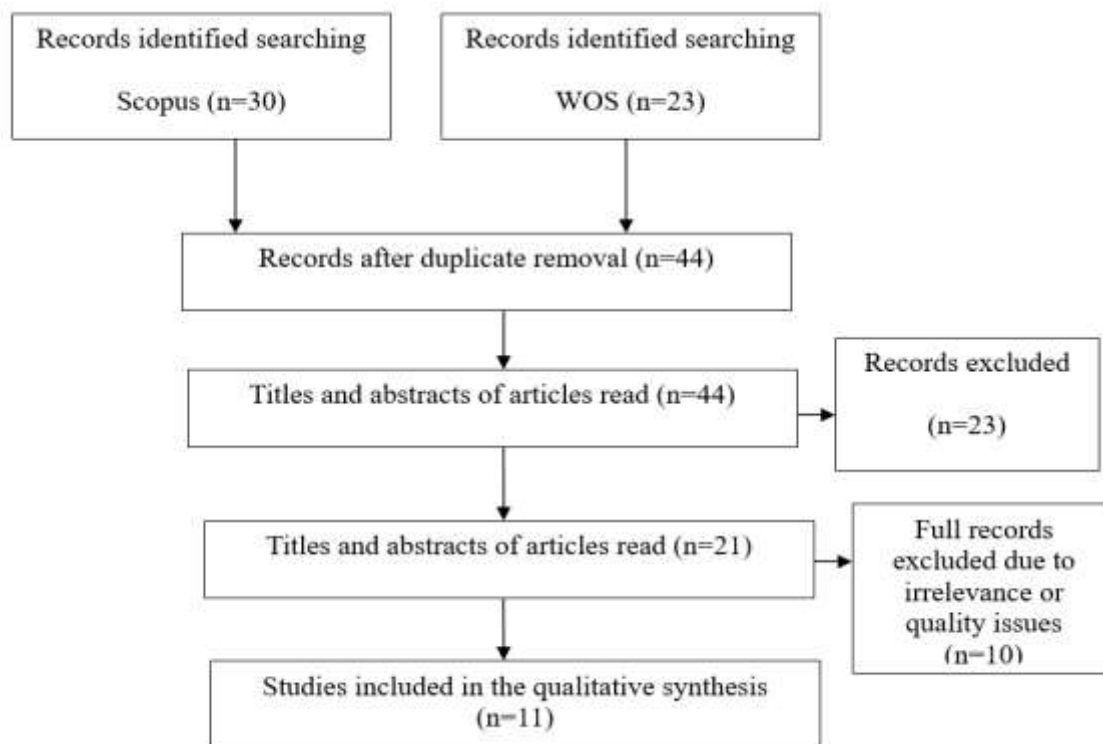


Figure 1: Study Selection, Evaluation and Inclusion

Table 1: Summary of the Included Studies

Author	Aim/Purpose	Search Databases	Type of Article	Methods	Results	Level of Analysis
Kuziemski and Misuraca (2020)	To investigate legal, policy, and technical instruments related to AI use in the public sector focusing on Poland, Finland, and Canada.	Scopus WOS	Literature review	Content analysis of secondary research	Findings show that governments are increasingly automating their activities, including decision-making, using AI and predictive analytics. However, a common framework is lacking.	Three countries
Wang and Aviles (2023)	To integrate ML predictive capabilities in business intelligence for better decision-making and enhanced operational	Scopus	Empirical	Mathematical modeling, i.e., regression and NN algorithms	Managers may get real-time and accurate sales forecasts	Organizational
Kosmas et al. (2023)	To get insights into the progress of the ANN adoption in the public sector	Scopus WOS	Review	Systematic literature review	Most governments, especially in the EU, have rarely adopted the technologies.	Countries
Kowalski et al. (2020)	To investigate the effect of mining citizen feedback on satisfaction using NLP	WOS	Review	Literature review	Interaction quality with staff and bureaucratic exigencies are integral to driving user satisfaction	Country, England
Aziza and Kristiyanto (2021)	To elucidate the analysis of public trust using sentiment analysis and employ the Naïve Bayes classification method for sentiment analysis	WOS	Empirical	Modeling	The public trust level in the studied governments varied during COVID-19 and could be used as a reference for policymaking	Countries
Zuiderwijk et al. (2021)	To examine the use of AI in public governance	Scopus WOS	Review	Systematic literature review	AI use in government has many benefits related to efficiency, decision-making, cost-savings, etc.	Countries

Adnan et al. (2021)	To address AI use in government service centers by assessing the benefits of chatbots	Scopus	Empirical	Quantitative	Chatbots offer beneficial effects to customer service improvement. However, they may not entirely replace humans in the foreseeable future.	USA
Aoki (2020)	To explore public's initial trust in AI chatbots in the public sector	Scopus WOS	Empirical	Experimental online survey	Public initial trust would be lower if government were to begin using AI chatbots in answering public queries in parental support than in waste separation. Challenges have also been highlighted	Countries
Damij and Bhattacharya (2022)	To explore AI chatbot advances as part of the public services when used in public health	WOS	Review	Science design approach	Results stress ethical considerations and governance and AI-based approach as key enablers to design new mental health chatbots.	Organizational
Reis et al. (2019)	To provide an overview of how AI is influencing governmental terms and policymaking	Scopus WOS	Review	Systematic literature review	Findings suggest the need to deepen research in various fields, including public administration, where digital transformation still lags behind in AI	Countries
Dreyling et al. (2022)	To perform an interdisciplinary systematic review of the current state of the art associated with AI utilization in e-government services.	Scopus WOS	Review	Systematic literature review	Technical articles discussed the influence of AI employment in e-government organizations	Countries

Discussion

Predictive Analytics for Service Optimization

Most studies revealed the potential of AI application in e-government innovation management by focusing on predictive analytics, an approach that harnesses the machine learning (ML) algorithms' power in empowering government organizations to optimize their services by proactively anticipating citizen preferences and needs (Kuziemski and Misuraca 2020; Wang and Aviles 2023). AI algorithms can be used to analyze historical

data to carefully decode emergent trends and intricate patterns, thus providing organizations with a way to effectively allocate their resources, streamline response times, and improve service quality.

Predictive analytics have various algorithms that distinctively contribute to their functioning and achieving the benefits listed in the previous paragraph. It can be classified into Decision Trees (DTs), Random Forests (RNs), and Neural Networks (NN), and most countries, particularly in the EU, are already employing them. DTs serve an essential role in categorizing and prioritizing citizen requests based on the rich historical data at governments' disposal to hone service delivery mechanisms. On the other hand, RFs utilize the collective wisdom element to amalgamate predictions from several DTs for improved forecast accuracy and reliability and more robust decision-making frameworks. The application of NNs manifests the most intricate facet (Kosmas et al. 2023), as they uncover the underlying connections that exist in datasets to enrich predictions with meticulous insights in different sectors, including the environment, governmental financial services, health ethics, public order, and government policy. The interlinked layers of artificial neurons untangle the complex variable interplay, divulging the associations that conventional analysis may not reveal. The ability to capture and interpret sophisticated correlations improves prediction precision, allowing organizations to tailor their services with heightened astuteness.

Public institutions and agencies have employed predictive analytics to multidimensionally orchestrate their technological prowess. ML algorithms extract relevant aspects and design predictive models that go beyond the conventional foresight boundaries, as they seamlessly screen through colossal datasets (Kuziemski and Misuraca 2020). With this paradigm shift in service optimization, government agencies have been able to streamline their operational fabric, prevent issues before they crystallize or occur, and address the dynamic citizen needs with astounding efficiency and efficacy. Eventually, e-government agencies have used predictive analytics as the precursor of innovation, providing them with capabilities to navigate the evolving landscape of citizen-centric service delivery.

Sentiment Analysis for Citizen Feedback

Studies also indicate the pivotal role of AI-driven innovation in sentiment analysis. Evidence has revealed that sentiment analysis is a technique used for harnessing the power of Natural Language Processing (NLP) algorithms for autonomous ascertainment and dissection of sentiments for public conveyed feedback from different sources, such as online surveys or social media posts (Kowalski et al. 2020; Verma, 2022). The technique to gauge citizen sentiment allows public agencies to deeply understand residents' views, address their concerns, provide tailored services, and enhance overall operational efficiency. Aziza and Kristiyanto (2022) point out that sentiment analysis depends on NLP capabilities, where Long Short-Term Memory (LSTM) networks and Recurrent Neural Networks (RNNs) are integral mechanisms and can be used to analyze public trust in various situations such as health crisis. These neural architectures are designed to parse and process textual data, interpret emotional nuances, and eventually provide the inherent sentiment. For instance, RNNs can fulfill tasks associated with sentiment analysis requirements due to their proficiency and ability to encapsulate sequence and context dependencies in textual information (Zuiderwijk et al. 2021). The recursive feature in these algorithms permits them

to retain historical data memory and unravel the sentiment evolution's subtleties over a specific period.

Studies have further shown that the impact of sentiment analysis transcends beyond text interpretation since this wealth of insight can be harvested to facilitate government entities' decision-making (Zuiderwijk et al. 2021). These entities can strategize and implement actions in line with public sentiment through accurate gauging of citizens' emotional undercurrents based on their feedback. Ultimately, these endeavors lead to significant and enhanced citizen engagement and satisfaction and pave the way for more responsive and inclusive governance.

Chatbots for Customer Service

Evidence demonstrates that as governments actively seek to integrate AI technology into their services, chatbots have emerged as an AI-driven solution that is revolutionizing customer engagement and the service landscape. Adnan et al. (2021) contend that chatbots are innovative conversational agents with the potential to leverage the power of NLP and ML algorithms to offer efficient, seamless, and automated assistance and responses to public questions in real time. Aoki (2020) adds that as a technology-driven development in customer interaction, it provides many benefits to influence public interaction with government organizations. The author indicates that chatbot functionality integrates ML and NLP to allow comprehension and response to various citizen queries. This technology can understand the intent behind all queries through intricate language analysis, thus ensuring that responses are not only relevant but also accurate. Besides, it can adapt and learn through continuous interactions, thus equipping them with the mastery and expertise to resolve growingly complex questions and improve overall user experience.

Indeed, chatbots have certain features that make them more beneficial. Their round-the-clock availability ensures that they offer 24/7 support to the public (Adnan et al. 2021; Aoki 2020). This feature is transformative, as the departure from conventional office hours enables citizens to conveniently seek information and assistance thus overcoming temporal constraints. Accordingly, challenges related to waiting times can substantially decrease and contribute to a more positive perception and increased user satisfaction with services offered by government bodies.

From the perspective of technical underpinnings, evidence shows that these technologies use different techniques, including rule-based systems and Sequence-to-Sequence models accompanied by Attention Mechanisms, to achieve their goal. For instance, rule-based systems utilize predefined rules and templates for response generation; although flexibility and more advanced approaches are lacking in these systems, they offer a foundational automation level that can be used to address various public issues including mental health (Damij and Bhattacharya 2022). Nevertheless, more advanced methods have been found to truly demonstrate chatbots' potential. Sequence-to-Sequence models with Attention Mechanisms have cutting-edge chatbots for leveraging deep learning and diverse dialogue datasets in creating contextually human-like and coherent responses (Adnan et al. 2021). In addition to bettering the interaction precision, using these models instills the technology's capacity to simulate authentic conversations and bridge the gaps in human touch-technology gaps.

Data-Driven Decision-Making

Studies also reveal AI's potential to revolutionize e-government agencies, as it equips them with comprehensive and robust data-driven decision-making capabilities. ML and advanced analytics are especially pivotal, as they enable the entities to harness large and complex datasets to obtain meaningful insights, facilitate more informed policies, and optimize valuable resource allocation (Wang and Aviles 2023). Shifting toward data-driven decision-making is transformative, as improves the effectiveness and efficacy of governmental activities and strengthens evidence-based governance through enhanced accountability and transparency.

By integrating AI-powered tools, government entities can unlock the latent data potential. Leveraging ML algorithms, including Regression and Clustering, ensures navigation of the immense dataset intricacies with agility and precision (Reis et al. 2019). For example, clustering algorithms ensure that similar data points are organized into coherent segmentations or groups, thus allowing organizations to establish the citizen data trends and patterns that may have not been revealed. These insights offer a means to identify behavioral or demographic segments recognized previously, thus enabling agencies to tailor their services and policies and meet the needs of citizens. The other ML cornerstone is Regression capable of empowering organizations to use historical data for outcome prediction. They can make evidence-based and well-informed forecasts regarding the potential impacts of different policy choices by exploring the connections between variables and their possible consequences. The predictive capability boosts the formulation of better policies and approaches by allowing policymakers to test potential impacts and design their strategies accordingly.

In addition, implementing AI-driven data-driven decision-making offer other benefits to e-government organizations through improved transparency and accountability of their activities and operations. Data-driven insights provide the empirical basis and credence to decision-making, allowing entities and decision-makers to support their views and actions with concrete evidence (Dreyling et al. 2022). The ultimate impact is the increased level of public confidence and trust in governance since individuals have a better and clearer comprehension of the rationale and justification for certain policy choices and decisions.

AI-Related Challenges Facing E-Government Organizations

Studies suggest that while AI deployment in government entities has the potential to effectively manage innovations, they face some challenges that should be addressed. These issues are mostly associated with data availability and quality, interoperability and transparency, ethical considerations, and sustainability and scalability. These critical aspects have been elaborated by Dreyling et al. (2022). Data quality and availability are one of the main challenges that these agencies encounter. For reliable outcomes and results, AI systems considerably depend on large, diverse, and accurate datasets. For public entities, many sources of data with disparities in quality, semantics, and formats are often used. To achieve optimal AI algorithm performance, organizations are compelled to use substantial efforts to integrate and preprocess these data through cleansing, normalization, and semantic alignment.

The AI models' transparency and interoperability present another significant problem to the technology implementation and use. Since governmental decisions and policies have a significant influence on citizens, AI-based outcomes require comprehensive

explanations. Interestingly, technologies, such as Explainable AI, are increasingly being adopted by organizations to offer insights into the decision-making processes that involve sophisticated models, thus boosting accountability and transparency and promoting public trust (Aoki 2020). In addition to the discussed challenges, ethical concerns about AI adoption have been growing unprecedentedly in recent years, with critics citing issues around privacy, fairness, and biases. For instance, historical data may contain biases, which AI models potentially propagate and perpetuate inherent inequalities and disparities.

Research by Dreyling et al. (2022) emphasize the need to incorporate advanced approaches, such as fairness-aware learning and algorithmic auditing, to ensure fair algorithmic decision-making. Besides, organizations must comply with strict privacy regulations when handling sensitive data, compelling the development of privacy-preserving AI techniques.

The authors add that AI solution scalability and sustainability present significant concerns to governments. AI systems must seamlessly integrate with legacy systems and incorporate dynamic governance structures, as they evolve and adapt to evolving need. To ensure long-term viability, effectiveness, and relevance, organizations must continuously monitor, maintain, and retrain AI models, which require substantial resources and expertise in the face of a shrinking public budget.

CONCLUSION AND RECOMMENDATION

This systematic review aimed to investigate the use of AI in e-government innovation management and revealed the technology's revolutionary role in improving the effectiveness, efficiency, and creativity of services. It was found that AI-driven solutions are indispensable techniques to modernize the public sector, as they hold immense potential to change service delivery and improve public satisfaction and engagement. To realize the full benefits of AI, it would be essential for e-government entities to prioritize strategic investments in capacity building and technological infrastructure. A comprehensive and holistic technological foundation will effectively integrate AI into different services and processes, ascertaining efficient operations and maximizing these innovations' effects. Besides, concerted efforts in capacity-building initiatives will equip public staff with the required knowledge and skills to effectively utilize these technologies, cultivating a culture of efficiency and innovation. Additionally, government organizations should also emphasize ethical considerations when implementing AI-enabled solutions.

Stakeholders and policymakers must also actively seek ways to resolve challenges associated with accountability, transparency, data privacy, and bias. They should responsibly deploy strong ethical frameworks for the equitable distribution of benefits among users. Notably, additional investigations with longitudinal designs will be essential to assess the long-term effect of AI on innovation management in e-government entities. An in-depth understanding of AI's long-term impacts over extended timeframes will be invaluable in providing true potential and informing strategic decision-making within the public sector.

Based on the evidence presented in this review, integrating AI in e-government innovation management has many benefits related to public service delivery enhancement and citizen satisfaction and experience improvement. This systematic review analyzes patterns and trends, thus ensuring extensive comprehension of the synergies between AI-driven solutions and innovations in government organizations worldwide. A critical point to emphasize is that the evolving AI technology necessitates its strategic and responsible deployment. It can lead to a more citizen-centric and innovative landscape with careful planning and effective

implementation. Overall, the public sector can foster innovation, better address citizens' dynamic and evolving needs, and build more resilient and stronger societies by leveraging the technology's capabilities.

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