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The Role of Artificial Intelligence (AI) in E-Government: Literature Review from Sustainable Development Aspects

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Abstract

Modernizing public services in the digital age requires strengthening e-government, especially in order to enable efficient and long-lasting governance. The purpose of this study is to examine how artificial intelligence (AI) functions in e-government systems, with a focus on sustainable development. A rigorous literature review of several government papers, international policy reports, and scholarly journals is the approach taken. The study's findings show that AI can enhance government governance, reduce budget abuse, increase access to public services, and improve bureaucratic efficiency. But issues like cybersecurity and the digital divide continue to be barriers. The efficiency of AI use in e-government is also influenced by the availability of infrastructure, laws, and human resources.

Keywords: *artificial intelligence (AI), e-government, sustainable development, public sector digital transformation*

Introduction

In the framework of today's digital governance, sustainable development is becoming a more significant concern. Governments throughout the world are vying to modernize bureaucracy through digital transformation, which prioritizes both decision-making efficacy and service speed. AI is a crucial technology in this regard that can improve public governance. AI is a key tool to enhance the quality of public services while bolstering sustainable growth because of its capacity to do quick data analysis, offer algorithm-based recommendations, and automate services. Additionally, the application of AI in e-government is perceived as an attempt to catch up with bureaucratic modernization in emerging nations like Indonesia.

AI can enhance government services and their quality, according to numerous studies. Wirtz et al. (2019) claim that AI enables governments to apply predictive models for decision-making and increase the operational efficiency of administrative operations. Bannister & Connolly (2020) claim that digital innovation encourages transparency by tracking spending and identifying abnormalities through data analytics. In the meantime, digital technology is a crucial instrument for accomplishing the Sustainable Development Goals (SDGs), according to UNDESA (2022). However, a number of studies have also brought attention to ethical and societal concerns related to the use of AI, such as unequal access and the vulnerability of personal data (Zhang & Dafoe, 2019).

ISSN 2621-5764
Vol.8 No.2 Jul-Dec 2025

This study's goal is to use a literature review methodology to investigate how AI may improve the e-government system. This approach is utilized to provide a thorough understanding of the role of AI in the context of sustainability by summarizing numerous scientific studies. This study generated conclusions about the advantages, difficulties, and suggestions for the application of AI in e-government through a synthesis of the literature. Therefore, it is anticipated that this study will contribute scientifically to the creation of government policies related to digital transformation.

AI plays a part in the environmental, social, and economic facets of sustainable development. In terms of the environment, AI uses sophisticated sensor systems to provide intelligent waste management, air quality monitoring, and disaster mitigation. In terms of society, AI makes public services more inclusive, particularly for disadvantaged populations. In the meantime, AI-powered governmental efficiency can promote a more favorable investment environment. As a result, AI helps governments accomplish the Sustainable Development Goals in a variety of ways.

Theoretical Framework

The theoretical underpinnings of artificial intelligence's (AI) function in e-government and its contribution to sustainable development are expounded upon in this section. The theoretical review offers a conceptual framework that supports the examination of sustainability-oriented governance, digital governance reform, and AI adoption in the public sector.

Artificial Intelligence in the Public Sector

The ability of robots to carry out tasks that normally require human intelligence, such as learning, reasoning, pattern recognition, and decision-making, is known as artificial intelligence (Russell & Norvig, 2021). AI is being used more and more in the public sector to improve public service delivery, policy analysis, and administrative efficiency. According to Wirtz, Weyerer, and Geyer (2019), AI helps governments reduce human error in administrative chores, enhance data-driven decision-making, and automate mundane bureaucratic activities.

AI is seen from the standpoint of public administration theory as a transition from traditional bureaucratic governance to algorithmic and data-driven governance. AI technologies enable governments to process massive amounts of data in real time, supporting proactive public services and predictive governance, according to Janssen and Kuk (2016). As a result, AI is a structural component that transforms institutional capacity and governance procedures rather than just a technology tool.

E-Government and Digital Governance Theory

The use of information and communication technologies (ICTs) to improve public service delivery, change government operations, and increase citizen-state relations is known

ISSN 2621-5764
Vol.8 No.2 Jul-Dec 2025

as "e-government" (Heeks, 2006). Efficiency is not the only goal of e-government; transparency, accountability, and citizen participation are also important. According to this framework, artificial intelligence (AI) is regarded as an advanced level of e-government development and is frequently linked to the ideas of smart governance and digital government (OECD, 2020).

According to Layne and Lee's (2001) e-government maturity model, the world of government is evolving toward an integrated system. Facilitating automated decision-making, real-time policy monitoring, and AI can enhance this model. Thus, a digital governance ecosystem can facilitate more responsive and adaptive public institutions, theoretically enabled by AI (Mergel et al., 2019).

Sustainable Development and AI-Driven Governance

Development that satisfies current demands without jeopardizing the capacity of future generations to satisfy their own needs is known as sustainable development (WCED, 1987). Sustainability in governance studies places a strong emphasis on combining social inclusion, economic efficiency, and environmental preservation. AI-supported digital governance is widely acknowledged as a key factor in accomplishing the Sustainable Development Goals (SDGs) (UNDP, 2022).

According to Vinuesa et al. (2020), AI can help environmental monitoring systems, increase resource efficiency, and improve public service accessibility—particularly when it comes to fulfilling the SDGs. AI-based data analysis can enhance catastrophe risk management, optimize energy use, and improve urban mobility. Experts emphasize that unrestrained AI use can exacerbate issues, particularly moral ones. The importance of governance in incorporating AI with sustainable practices is shown by this dilemma.

Ethical and Governance Perspectives of AI

Ethical issues like accountability, transparency, justice, and human-centered design are highlighted in theoretical discussions on AI governance (Floridi & Cowls, 2019). These values are especially important in the public sector since AI systems have the potential to impact citizens' rights and governmental policies. Significant obstacles to democratic government include algorithmic bias, explainability issues, and data privacy concerns (O'Neil, 2016).

A concept of AI that emphasizes moral principles, legal requirements, and public values can be created in response to these issues (European Commission, 2020). This perspective is relevant to e-government, as institutional legitimacy is crucial. According to AI governance theory, to ensure sustainable digital governance, technological innovation must be combined with a robust regulatory framework and inclusive policy design.

Methods

ISSN 2621-5764
Vol.8 No.2 Jul-Dec 2025

This study uses the Systematic Literature Review (SLR) method which aims to identify, evaluate, and interpret scientific research in a structured manner. The SLR process is carried out in five main stages:

The first stage is carried out by collecting literature from international databases such as Scopus, Web of Science, Science Direct, and Google Scholar. The keywords used include: "Artificial Intelligence", "E-Government", "Digital Governance", "Sustainable Development", and "Public Sector Innovation". Literature selection follows defined criteria. It was based on publications between 2014 and 2024, relate to e-government and sustainability, show clear methodological structure, and be available in full-text PDF format. Out of the initial 180 articles, 58 articles were obtained that were eligible for analysis.

The object consists of scientific publications and official reports that discuss the use of artificial intelligence in government, models of e-government, digital policy, and the implementation of technology in the context of sustainable development.

Data collection focuses on several dimensions. These include the benefits of AI in public services, challenges in AI implementation, documented cases of use, and impacts on the Sustainable Development Goals. The data collected are organized into a thematic matrix. Data analysis applies thematic content analysis. The process groups findings into main themes, synthesizes conclusions, and links results across studies. The findings are then presented in clear language while maintaining scientific content.

Results

The results show that AI contributes to bureaucratic efficiency by supporting public administration processes. Governments use *24/7* chatbots for public service access, automate document handling, and manage data through machine learning systems. One example is Singapore's virtual assistant, Ask Jamie, which is able to answer thousands of public service questions every day.

AI also supports transparency and accountability in government. It can identify irregular patterns in budget transactions, support fraud prevention, track money flows, and forecast budget deviations. Bannister and Connolly (2020) argue that AI can strengthen public trust by providing data-based information.

In terms of access to public services, several countries apply AI to reach populations in remote areas. In the health sector, AI-based telemedicine expands service access in underserved regions. In education, AI learning systems support equal access to learning quality. In public administration, service chatbots provide direct interaction between citizens and government agencies.

Table 1. AI's Contribution to Public Service Access

Sectors	AI Examples	Impact
Health	AI telemedicine	Service access for 3T areas
Education	AI learning system	Equitable distribution of education quality

ISSN 2621-5764
Vol.8 No.2 Jul-Dec 2025

Administration	Service chatbot	Fast and personalized service

Source: Processed researcher

AI also plays a role in supporting sustainable development. In the environmental dimension, AI sensors monitor air pollution, detect floods, landslides, and forest fires, and support smart grid management. In the social dimension, AI supports public services for persons with disabilities and enables targeted distribution of social assistance. In the economic dimension, AI-based licensing systems support investment flows, and automated business analysis platforms assist micro, small, and medium enterprises.

Despite these benefits, several challenges remain in the implementation of AI in e-government. The digital divide limits access in regions with weak internet infrastructure. Algorithm bias can lead to discrimination when data sources are not inclusive. Cybersecurity risks pose threats to government systems and public data. In addition, regulatory frameworks remain incomplete, particularly in areas related to data protection, AI ethics, and digital rights of citizens.

Discussion

The study's conclusions demonstrate that the application of artificial intelligence (AI) in e-government greatly improves the efficiency of government administration management and the efficacy of public services (Janssen & Kuk, 2016). This is consistent with other studies that show AI may reduce human mistakes, enhance data accuracy, and expedite decision-making processes (Wirtz et al., 2019). Additionally, AI integration gives governments the chance to create service systems that are more proactive, flexible, and sensitive to the requirements of citizens (Sun & Medaglia, 2019).

However, there are unavoidable difficulties in implementing AI in the public sector, particularly with regard to ethical considerations, data security, and the possibility of algorithmic bias (Zhang et al., 2021). According to earlier studies, algorithms that are not built with accountability and transparency in mind may make unfair decisions, particularly for vulnerable populations (O'Neil, 2016). In this regard, the government must make sure that the application of AI stays under the regulatory framework that protects citizens' rights and promotes public confidence in digital services (European Commission, 2020).

AI integration has the potential to help a number of important SDG pillars from a sustainable development standpoint, particularly in the areas of inclusive governance, technological innovation, and effective resource management (UNDP, 2022). AI can be used, for instance, to forecast energy requirements based on real-time data, monitor environmental quality, or evaluate people's movement patterns to lower transportation emissions (Vinuesa et al., 2020). Accordingly, AI is a strategic tool for attaining fair and sustainable development in addition to being a technological tool (Kumar et al., 2021).

The study's findings further support the notion that human resource capability, digital infrastructure preparedness, and national policy alignment with technology innovation are

ISSN 2621-5764
Vol.8 No.2 Jul-Dec 2025

critical to the success of using AI in e-government (Misuraca & van Noordt, 2020). AI has been shown to be most effective in expediting bureaucratic change and raising the standard of public services in nations with a strong commitment to digital transformation (Mergel et al., 2019). On the other hand, nations with inadequate institutional capacity and digital gaps typically encounter substantial obstacles to the adoption of AI technology (World Bank, 2021).

Overall, this conversation highlighted the need for a mature governance framework, cross-sector collaboration, and a sustainability-oriented strategy in addition to the technological aspects of implementing AI in e-government (Kankanhalli et al., 2019). For the advantages of AI to be widely felt without compromising ethics and social justice, governments must find a balance between innovation and the defense of public values (Floridi & Cowls, 2019). AI has the potential to be a crucial component of digital transformation that eventually advances the Sustainable Development Goals with the correct approach (OECD, 2023).

Conclusions

AI has a strategic role in strengthening e-government through increasing bureaucratic efficiency, transparency, access to public services, and direct contributions to environmental, social, and economic sustainability. The main impact of this study is to affirm that AI is not just a technology but an instrument of systemic change in public governance. The success of AI implementation is highly determined by regulatory readiness, human resource competence, and infrastructure. Thus, government investment in strengthening the digital capacity of humans and institutions is key to ensuring that AI brings maximum and sustainable benefits to society.

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Vol.8 No.2 Jul-Dec 2025

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