The Integration of Artificial Intelligence Systems in Governments to Support Strategic Decision-Making

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This literature review explores the integration of artificial intelligence (AI) into government systems to support strategic decision-making. It examines how AI can improve decision-making through real-time data analysis, predictive modelling, and suggestions for optimised resource allocation. Using an exploratory approach, this review draws on case studies such as Singapore's Smart Nation initiative and considers application in urban planning, disaster response, and policy development. Key challenges include data privacy, algorithmic bias, ethical considerations, and the need for robust data governance frameworks. The review is primarily theoretical, assessing existing uses of AI in government and its potential to enhance strategic decision-making. It highlights the importance of interdisciplinary collaboration, transparency, and ethical implementation, while also underscoring the need for appropriate regulation and data protection legislation. Overall, the review aims to provide policymakers with guidance for using AI to support smarter, more efficient, and ethically responsible governance in increasingly complex and data-rich environments.

Keywords: artificial intelligence, government, strategic decision-making, AI governance

1. Introduction

The introduction of large language models (LLM) and the rise in popularity of artificial intelligence (AI) have introduced new possibilities for data analysis and digital assistance to different fields, including governments and governing processes. By utilising artificial intelligence, governments can increase their efficiency and transform process management steps and mechanisms to respond to the current economic, political, environmental, or social challenges. AI models offer large-scale data analysis of different data sets, identification of patterns for better decision-making, as well as agile assistance in the prevention of hidden threats and challenges that may occur in the future.

This review aims to contribute to the growing discourse on AI governance, offering actionable insights for creating resilient, intelligent, and equitable government systems of the future.

The research questions in this paper are:

1. How can AI be effectively integrated into government decision-making systems to enhance strategic decision-making?
2. What are the primary ethical, legal, and social challenges associated with using AI, and how can these challenges be mitigated?
3. What measurable impacts have existing AI implementations in government systems had, and what lessons can be drawn from these case studies to guide future integration?

This paper explores the integration of AI into government systems, focusing on its application in strategic decision-making frameworks. It examines how AI can enhance governance by enabling real-time analysis, improving predictive modelling, and optimising resource allocation. By automating routine tasks and augmenting human judgment with data-driven insights, AI holds the potential to significantly improve the quality, speed, and accuracy of government decisions. However, the adoption of AI in this domain is not without challenges. Issues related to data privacy, algorithmic transparency, bias, and the ethical implications of AI-driven decisions pose significant barriers that require careful consideration.

The investigation begins with an overview of current AI applications in government, highlighting successes and identifying gaps where further integration could yield substantial benefits. The paper then delves into specific case studies, analysing instances where AI systems have been employed to address strategic challenges, such as disaster response, policy analysis, and national security. These examples illustrate both the potential and the limitations of AI in a governmental context.

Furthermore, this paper discusses the critical factors necessary for the successful integration of AI, including robust data governance frameworks, interdisciplinary collaboration, and a commitment to ethical AI practices. It underscores the importance of building trust among stakeholders by ensuring transparency, accountability, and inclusiveness in the design and deployment of AI systems. Finally, the paper outlines a roadmap for policymakers to leverage AI effectively while mitigating risks, fostering innovation, and ensuring alignment with public values and democratic principles.

The contribution of this paper is theoretical because it investigates the possible use cases for AI in a strategic government environment. Therefore, the research explores how government officials can benefit from AI for better strategic decision-making and whether AI can be beneficial to governments for strategic decision-making or not.

2. Literature Review

Payne (2023) investigated the use of AI systems in government environments. The paper found that AI has already become a military reality by 2018, when the U.S. military began exploring the potential use cases for AI in military settings. The author showed that AI can categorise information more rapidly and use it flexibly to support better decision-making, making AI models suitable for application at the strategic level. The paper also examined broader use cases, noting that AI is already implemented in weapons-guidance systems and suggesting that the integration of AI into weapons systems could be comparable to the introduction of nuclear weapons and nuclear-powered rockets. Additionally, the author argues that the growing use of AI in military strategies may represent the first time in history that non-biological intelligence has been used to inform decision-making (Payne, 2018). The paper also highlights ethical considerations that should be implemented to restrict and control the use of AI in military settings.

Reis, Santo, and Melao (2019) investigated and reviewed the existing literature on the application of AI in government services. Their paper aimed to present a brief review of the influence of AI in the current digital era and its role in governments for strategies and decision-making. The researchers investigated the application and use of AI in different forms of government, as well as the currently developed AI models that are implemented by certain governments. The paper concludes that Western countries like the United States of America (USA), and Eastern Countries like Singapore and the United Arab Emirates (UAE), focus heavily on the implementation of artificial intelligence, while European countries follow different strategies and aim to cooperate with leading technology companies in their progress towards AI adoption (Reis, Santo, & Melao, 2019). The paper concludes that AI has a strong influence on government and leads to increased technological investment. Furthermore, future research should not only focus on business and economics but also on government strategies and protection of critical infrastructure.

Straub and colleagues (2023) researched the application of AI in government environments. The researchers investigated the transformative potential of AI in governmental settings. The paper emphasises the need for standard procedures, clear criteria, and alignment with societal norms to be incorporated into AI models if they are to be used in governmental settings (Straub et al., 2023). The paper proposes a unified framework for AI research because the current state of research on AI and its application

in governmental environments is fragmented and divided between the social and technological sciences. Furthermore, the researchers call for the development of global standards for the implementation and adaptation of AI in governments and its application to decision-making.

Radu (2021) investigated the national AI strategies in governments, focusing on defining the roles of private and public sectors in AI policy. The study highlights the predominance of hybrid governance in national AI strategies, where public and private sectors collaborate extensively. Such an approach emphasises ethics over strict regulation and allows for functional indetermination, enabling flexible and adaptive governance structures (Radu, 2021). Most national AI strategies prioritise ethical guidelines and principles rather than rule-based systems. This focus on ethics aims to guide AI development in a normative direction, although it often lacks concrete regulatory measures. Considering the interaction between the public and private sectors in the field of artificial intelligence, significant involvement of private-sector representatives can be observed in the drafting and implementation of AI strategies. The paper identifies China and the United States as the leading countries in the development of AI strategies, while Germany and France are the leaders in Europe, the UAE is the leader in the Middle East, and Singapore continues to make progress in the field of AI (Radu, 2021).

Hamadaqa and colleagues (2024) explored the use of AI for strategic decision-making in different environments. The research presents different use cases in which AI has been used to support strategic decision-making in various companies and fields, showing how companies across different sectors apply artificial intelligence. Amazon applies AI models in retail, DHL uses AI models to improve supply chain solutions, and Unilever applies AI to recruitment and the evaluation of existing and prospective candidates, assisting the HR department in the process (Hamadaqa et al., 2024). This research presents use cases of AI for decision-making only in the business and business strategy sector. Thus, it does not address the governmental sector, however, it does offer insights into certain fields and how different applications could be adapted to support governments in their strategic decision-making processes.

In 2019, the European Commission published a report on artificial intelligence, which aimed to establish ethical guidelines for AI. The report recognised the potential commercial and societal impact of AI, and the authors expressed concern about the different effects that AI could have on society and the economy in the future. Therefore, the Commission recognised that future AI models would need to follow certain guidelines

to prevent adverse impacts that could not have been foreseen in 2019. The European Commission argues that AI systems need to be trustworthy and benefit humans in their decision-making, placing trust as the main criterion for the development of AI models. Such AI models should be developed within legal frameworks and comply with regulations prescribed by national and international law, such as those concerning data protection and a human-centric approach. Additionally, they should be ethically responsible, robust, and resilient to potential data breaches or abuse through malicious use (European Commission, 2019). A precedent for such ethical considerations is the General Data Protection Regulation, established by the European Union in 2018. This regulation introduced strong rules for organisations regarding the handling of personal data to protect the fundamental rights to human privacy and security. Furthermore, the regulation prescribes rules for the handling of the personal data of all residents of the European Union, allowing individuals to access the data stored by data collectors and request its deletion or changes to how certain websites and companies store and handle personal and private data (European Commission, 2019). Through this regulation on personal data, individuals were given greater control over their personal data, while businesses and organisations received a unique and unified framework for the compliance with requirements concerning the handling of personal data. The European Union report on AI also states that a unified framework must be applicable to AI as well, stating that businesses and organisations must provide transparent information about the data collected by the AI models and provide visitors or consumers with greater control and choice over which data can be stored and used for the training of certain AI models (European Commission, 2019).

With the increase of research in artificial intelligence, international organisations such as the Organisation for Economic Co-operation and Development (OECD) have developed frameworks for the definition and application of artificial intelligence. One such document is the OECD Framework for the Classification of AI Systems (2023). According to the report issued by the OECD (2023), the framework should help promote understanding of artificial intelligence, support the description of the basic capabilities of AI in registries and automated systems, support system frameworks, provide a common basis for inventories and automated decision system, aid healthcare and finance systems and processes, assist governments in risk assessment and risk mitigation systems, and support risk response systems (OECD, 2023). Furthermore, the OECD (2023) encourages a human-centric focus for AI systems, with primary consider-

ations given to the impacts of certain decisions on humans and the human environment. Additionally, the OECD (2023) places future emphasis on the development of metrics for assessing the impact on human rights and human well-being. Furthermore, the OECD's next steps should focus on developing a common framework for negative, harmful, or controversial incidents connected to artificial intelligence, which would form part of a global tracking system providing evidence about the risks of unethical or inappropriate use of artificial intelligence (OECD, 2023).

The use of AI in governments is improving and gradually advancing, drawing on ideas and inspiration taken from the business sector (Medaglia, Gil-Garcia, & Pardo, 2023). However, there are certain risks involved in relying solely on artificial intelligence, which is why governments must exercise caution and frame the application of AI in government decision-making through ethical restrictions and clear ethical guidelines for its use (Guenduez & Mettler, 2023). There are key questions concerning the application of AI in the government sector, one of which is the trustworthiness of AI application models. Full protection of private data must be ensured for citizens, with restrictions placed on which data AI can access and what data can be used for evaluation (Armugam & Manida, 2024).

Concrete data on the application of AI in governments are provided by Pautz (2023). The case study presents examples of AI use in the Scottish government. In Scotland, the government uses AI in limited ways. However, it relies on a simple AI solution for data sorting and traffic solutions (Pautz, 2023), similar to the examples discussed by Keding (2021). Fully autonomous AI models are absent because policies in Scotland do not aim to rely solely on AI to make decisions that could affect individuals (Keding, 2021). Therefore, the Scottish Government focuses more on using AI to evaluate and sort large amounts of collected data rather than using it as a model that makes decisions (Guenduez & Mettler, 2023).

A much greater user of AI models than European countries is the USA, with most use cases concentrated in security and criminal prosecution. The USA uses AI models in areas such as border protection, healthcare, drug and food administration, and several other government agencies (Engtsrom et al., 2020). The most frequent applications of AI are in law enforcement, where it is used to regulate, research, analyse, and monitor security developments and process data for law enforcement purposes. The second most frequent use of AI in the USA is in healthcare, where AI models are used to analyse large datasets and predict adaptable insurance plans for certain clients based on their demographics. Detailed insights and extracted information are presented in the case study analysis of AI in the USA.

Grinayev and colleagues (2021) discuss the role of AI technologies in long-term socioeconomic development and integrated security. The paper highlights the resurgence of AI in the second decade of the 21st century and the ethical considerations surrounding the delegation of decision-making to AI systems. It examines strategic documents from major economies to outline global AI development trends and identify mechanisms for implementing strategic priorities. China's AI strategy, outlined in the Next Generation AI Development Plan of 2017, aims to make China a world leader in AI by 2030, with significant investments and the integration of AI into various sectors. The strategy emphasises national security and technological superiority, reflecting a neorealist approach to international competition. The U.S. AI strategy, initiated by the American AI Initiative in 2019, focuses on prioritising AI research, providing data and resources for AI development, establishing standards, developing competencies, and maintaining international leadership (Grinayev et al., 2024). The strategy involves significant private-sector engagement and aims to counter the technological advancements of rivals such as China and Russia. The European Union's AI strategy, while more modest in investment, positions the EU as an ethical regulator, setting norms and rules for AI development. The EU emphasises international cooperation and the attraction of foreign specialists, with individual Member States also developing their own AI strategies. Russia's AI strategy, formalised by a 2019 presidential decree, aims to draw on the country's historical capabilities in AI, although it faces challenges due to the loss of Soviet-era scientific achievements and a lack of systemic support. The strategy assigns significant roles to Sberbank in the civilian sector and Rostec in the military sector, with a focus on control and security applications (Grinayev et al., 2024).

Overall, the article underscores the intensifying global competition in AI development, with major powers adopting distinct strategies to secure technological and economic advantages while addressing ethical and security concerns.

Doshi and colleagues (2024) investigate the use of generative AI in evaluating strategic business decisions. Two studies were conducted: one with AI-generated business models and another using real start-up models from a competition. The findings show that individual AI evaluations are often inconsistent and biased, but aggregating multiple evaluations across different AI models, roles, and prompts yields results that closely align with human expert assessments. The study highlights the potential of generative AI to support strategic decision-making by providing valu-

able predictions, emphasising the benefits of diversity and scaling in AI evaluations (Doshi et al., 2024). This approach can help managers make informed decisions with minimal investment of time and resources.

Asiabar, Asiabar, and Asiabar (2024) explore the integration of AI in strategic management and its impact on organisational decision-making. Using a descriptive survey method, the research examines AI's role in enhancing strategic decisions across various industries. The findings show a significant positive correlation between AI adoption and decision quality. AI's capabilities in predictive analytics and data processing improve decision-making speed, accuracy, and risk assessment. The study highlights the importance of ethical considerations and human oversight in AI implementation (Asiabar, Asiabar, & Asiabar, 2024). The research suggests that AI can provide a sustainable competitive advantage by enhancing strategic planning and resource allocation. Future research should focus on long-term impacts, ethical frameworks, and cross-cultural differences in AI adoption. Overall, AI is poised to revolutionise strategic management, offering significant improvements in decision-making processes.

The existing literature suggests that AI can bring large improvements to government decision-making processes. However, the literature is primarily concerned with the ethical challenges and ethical implementation of artificial intelligence. Other points of concern regarding the application of AI in strategic decision-making processes include how AI and its application should be regulated and whether the relevant framework should be national, regional, or international.

Based on the literature review, three cases of AI applications in strategic decision-making can be presented, based on which the authors draw their conclusions and answer the research questions.

3. Methodology

The implementation of AI in government systems for strategic decision-making was studied using a multi-method approach that combined exploratory research, case study analysis, and secondary source evaluation.

Exploratory Research. The review began with an exploratory phase to identify the key areas where AI has been integrated into government systems. This included reviewing the segments in which governments use artificial intelligence. Interviews with domain experts and policymakers, as docu-

mented in the secondary literature, were analysed to frame the research questions and establish the scope of the study. This paper evaluated only qualitative information and adopted a qualitative approach to the research problem, as the use of AI in governance and the adaptation of AI models for effective governance have gained popularity since the introduction of the large language model ChatGPT in 2022. Given the recent nature of the topic, there have not yet been sufficient cases to determine whether the use of AI in governmental environments has led to success or failure. Therefore, only a limited number of cases can currently be collected and evaluated, and the actual outcomes are likely to become apparent only over time.

The author selected peer-reviewed journals to gain a better understanding of whether there are already cases of AI being used by governments and which countries use it in different scenarios. Further confirmation and explanations were provided by official governmental reports, online presentations, and project documentation. The author explored the existence of AI models used by governments and their agencies. Given the recent emergence of this topic and the increasing integration of AI by various governments, only comprehensive and reliable information was selected to ensure that relevant cases could be accurately compiled and assessed.

Case Study Analysis. The review analysed secondary sources to present cases that provide a better understanding of how AI is used in government settings. The Singapore Smart Nation initiative and its Virtual Singapore project were chosen as primary case studies. These examples illustrate how AI is used to enhance strategic decision-making in urban planning, resource allocation, and crisis management. Data were collected from government reports, white papers, and academic studies. The outcomes of these projects were evaluated to assess the effectiveness, scalability, and limitations of AI integration in governance. The paper selected the USA and Singapore because sufficient data and information are available on the use of AI in governance to support case study analysis and evaluation. Furthermore, the two countries represent different approaches to technology and its integration into government structures, as well as different perspectives on the topic. Singapore is an advanced and wealthy state in the Eastern world, while the USA is an advanced and wealthy state in the Western world. The two countries therefore provide a direct contrasts and implement AI in different areas and in diverse ways. Both are technologically advanced but occupy somewhat different positions in the technological landscape. The USA is known for its technological progress and innovation, while Singapore is better known for its approach to implementing

technology to provide more efficient governance and public services. For further contrast, the European approach was also included, with the EU representing an ethics-first approach that continues to focus primarily on the ethical considerations of AI implementation rather than the "use first, adapt later" approach, for example, by the Singaporean government or the more segmental introduction of AI by the US government.

4. Case Study Analysis

4.1. Singapore

Singapore has been a global leader in leveraging AI to improve government services and strategic decision-making processes. Under its Smart Nation initiative, the government employs AI technologies to address challenges related to urbanisation, transportation, healthcare, and security (Hoe, 2016). A notable example is the Virtual Singapore project, a 3D digital twin of the entire city that uses AI to simulate urban scenarios, such as improving public transportation routes, assessing the impact of new infrastructure, and planning disaster response strategies. The city-state's strategic approach to AI is encapsulated in its national AI strategy, "AI Singapore", which was launched in May 2017. This strategy is a comprehensive plan aimed at leveraging AI to drive economic growth, improve public services, and enhance the quality of life of its citizens. This case study explores the key elements of Singapore's AI strategy, its implementation, and the impact of AI on various sectors within the country (Radu, 2021).

AI Singapore is a national programme led by the National Research Foundation (NRF) and involves multiple stakeholders, including the Smart Nation and Digital Government Office, the Economic Development Board, the Infocomm Media Development Authority, the state-owned company SGInnovate, and the Integrated Health Information Systems (Guenduez & Mettler, 2023). The programme aims to build a vibrant AI ecosystem in Singapore by focusing on three main pillars: AI research, AI technology, and AI talent.

Healthcare. AI has been widely adopted in Singapore's healthcare sector to improve patient care and operational efficiency. For example, AI-powered diagnostic tools are used to analyse medical images and detect diseases such as cancer and diabetic retinopathy. These tools help doctors

make more exact and timely diagnoses, leading to better patient outcomes (Straub et al., 2023). Additionally, AI is used to improve hospital operations, such as predicting patient admissions and managing bed occupancy (Hoe, 2016). Furthermore, predictive analytics are used to forecast demand for hospital beds, staffing, and medical supplies, helping to streamline healthcare delivery.

Transportation and Public Services. AI has played a crucial role in transforming Singapore's transportation system. The city-state has implemented AI-powered traffic management systems to monitor and control traffic flow, reducing congestion and improving road safety (Grinayev et al., 2024). AI is also used in public transportation to optimise bus and train schedules, ensuring efficient and reliable services for commuters. Additionally, Singapore is exploring the use of autonomous vehicles to enhance mobility and reduce reliance on human drivers. AI systems predict traffic flow and congestion patterns, enabling real-time adjustments to traffic signals and public transport schedules, thereby reducing travel time and enhancing the commuter experience (Radu, 2021). Singapore's government has leveraged AI to improve public services and enhance citizen engagement. AI-powered chatbots and virtual assistants are used to provide information and support to citizens, making it easier for them to access government services. AI is also used in urban planning to analyse data and make informed decisions about infrastructure development and resource allocation. Furthermore, AI is employed in public safety to monitor and analyse surveillance footage, helping law enforcement agencies detect and respond to incidents more effectively (Hoe, 2016).

Singapore's strategic approach to AI has positioned it as a global leader in AI adoption and governance (Johnson, 2022). The AI Singapore programme, with its focus on research, technology, and talent, has driven significant advancements across various sectors, improving the quality of life of its citizens. While challenges remain, Singapore's commitment to ethical AI practices, data privacy, and talent development is intended to support the sustainable and responsible use of AI in the future. As AI continues to evolve, Singapore's proactive and collaborative approach may serve as a model for other countries seeking to harness the potential of AI for societal benefit. Building a robust AI talent pool remains a challenge, as demand for AI skills continues to outpace supply. Singapore's AI strategy includes various initiatives to develop AI talent, but continued efforts are needed to attract and retain highly skilled professionals. Collaboration with international institutions and industry partners can help bridge the talent gap and ensure a steady pipeline of qualified AI specialists.

4.2. USA

As previously stated, the U.S. Government implements AI in certain cases. The literature review showed that the government uses AI to support strategic decision-making.

Securities and Exchange Commission (SEC). The SEC is a federal agency tasked with protecting investors, maintaining fair and efficient markets, and facilitating capital formation. To achieve these objectives, the SEC issues rules governing securities exchanges, brokers, dealers, investment advisors, and mutual funds (Engtsrom et al., 2020). The SEC also has the authority to bring enforcement actions against those who violate these rules. The SEC's enforcement activities are crucial for converting "law on the books" into "law in action" and delivering policy benefits such as market efficiency and investor protection (Pautz, 2023).

The SEC has developed multiple algorithmic enforcement tools across its divisions and offices. These tools help the agency enforce securities laws and manage its resources more efficiently. One of these tools is the Corporate Issuer Risk Assessment (CIRA), a dashboard containing around two hundred metrics designed to detect unusual patterns in companies' financial reports. CIRA is trained on historical data and uses a random forest model to predict possible misconduct, allowing the SEC to focus its investigations on corporate filers that may require closer scrutiny (Guenduez & Mettler, 2023). Another tool, the Advanced Relational Trading Enforcement Metrics Investigation System (ARTEMIS), analyses patterns and relationships among traders by examining a vast database of trading records. Its main purpose is to catch repeat insider traders by finding suspicious trading behaviour. ARTEMIS also uses natural language processing to review corporate filings and identify events that might require further investigation (Asiabar, Asiabar, & Asiabar, 2024).

The Abnormal Trading and Link Analysis System (ATLAS) is focused on identifying first-time insider trading. It processes trading data to extract relevant features and applies a machine learning model to determine whether a trade appears suspicious, helping the SEC identify outliers and potential cases of insider trading (Reis, Santo, & Melao, 2019). Finally, the ADV Fraud Predictor assists the SEC in predicting which financial professionals may be violating federal securities laws (Doshi et al., 2024). It analyses Form ADV filings, which contain information about investment advisers, using natural language processing and supervised learning algorithms to flag high-priority documents for further review by SEC staff, identify potential violators of securities laws, and allocate resources more efficiently.

The SEC's use of AI-based enforcement tools demonstrates the potential for algorithmic governance to transform regulatory enforcement. While these tools offer significant benefits in terms of efficiency and accuracy, they also present challenges related to data quality, evolving forms of wrongdoing, and technical capacity. As the SEC and other agencies continue to develop and deploy AI tools, they must carefully navigate the trade-offs between transparency, accountability, and effectiveness to ensure fair and effective regulatory governance.

Customs and Border Protection (CBP). CBP is a federal agency within the Department of Homeland Security (DHS) tasked with safeguarding the United States' borders. CBP's mission includes preventing the illegal entry of people and goods, facilitating lawful trade and travel, and enforcing immigration and customs laws. To enhance its capabilities, CBP has increasingly turned to AI technologies, particularly facial recognition and risk prediction tools. These AI applications aim to improve the efficiency and accuracy of CBP's operations while addressing security concerns.

CBP applies AI in two ways. One major aspect of its use of AI is facial recognition, while another is risk predictions and assessment (Engtsrom et al., 2020).

Facial recognition technology has become a cornerstone of CBP's efforts to enhance border security. The agency's facial recognition programme, known as the Traveler Verification Service (TVS), aims to streamline the identification process for travellers entering and exiting the United States. TVS uses facial recognition software to match live images of travellers with pre-existing photos from passports, visas, and other government databases (Keding, 2021).

An important application of facial recognition is at U.S. airports, as well as at U.S. preclearance locations abroad, such as those in Ireland (Khan & Efthymiou, 2021). Orlando International Airport became the first airport to use facial recognition for all travellers in June 2018. The system captures passengers' photos as they board the aircraft and matches them against their registered photos in the TVS database (Engtsrom et al., 2020). This process aims to expedite boarding and enhance security by identifying travellers attempting to enter the country illegally. In August 2018, the agency began testing facial recognition on drivers at the Anzalduas International Bridge in Texas. This deployment aims to improve the efficiency of vehicle inspections and enhance security at land borders (Khan & Efthymiou, 2021).

CBP's risk prediction programme leverages AI to assess the potential security risks posed by travellers and cargo entering the United States. The

programme, part of the Automated Targeting System (ATS), uses machine learning techniques to analyse data from various sources, including government databases and airline passenger information (Engtsrom et al., 2020).

The risk prediction programme evaluates passenger data to identify individuals who may pose a security threat. The system analyses factors such as travel history, payment information, and baggage data to generate risk scores for each traveller. These scores help CBP officers prioritise which passengers should undergo additional screening and inspection (Reis, Santo, & Melao, 2019). The risk prediction programme also assesses the risks associated with cargo shipments. The system analyses data from shipping manifests, customs declarations, and other sources to identify high-risk shipments that may require further inspection (Guenduez & Mettler, 2023). This approach aims to enhance the efficiency of cargo screening and prevent the entry of contraband and illegal goods.

The deployment of AI technologies at CBP demonstrates the potential of AI to transform law enforcement and border security. While these technologies offer significant benefits in terms of efficiency and accuracy, they also present challenges related to data quality, privacy, bias, and adversarial attacks. As CBP and other law enforcement agencies continue to develop and deploy AI systems, they must navigate these challenges carefully to ensure that AI is used in a fair, transparent, and accountable manner. By doing so, they can harness the power of AI to enhance security and protect the public while upholding the principles of justice and human rights.

5. Discussion: Ethical Considerations in AI Application

The implementation of AI for strategic decision-making presents transformative opportunities for governments and organisations. However, it also raises profound ethical concerns that require careful consideration to ensure AI systems are used responsibly and equitably. These ethical challenges span several domains, including bias and discrimination, transparency, accountability, privacy, and the broader societal implications of deploying AI in high-stakes contexts.

The ethical implications of AI, such as bias and fairness, are critical issues that need to be addressed. Singapore's AI strategy emphasises the impor-

tance of developing ethical AI principles and guidelines (Radu, 2021). The government has established an Advisory Council on the Ethical Use of AI and Data to provide recommendations on ethical AI practices. Additionally, AI Singapore collaborates with international organisations to promote ethical AI standards and best practices.

The use of AI in law enforcement must be guided by ethical principles to ensure that it respects individual rights and promotes justice (Engtsrom et al., 2020). This includes addressing issues related to privacy, bias, and fairness, and ensuring that AI systems are used in a manner consistent with democratic values. Agencies must ensure that AI systems are transparent, explainable, and subject to oversight to maintain public trust and prevent abuses of power (Doshi et al., 2024).

One of the most critical ethical issues in AI implementation is algorithmic bias. AI systems often reflect and amplify biases present in their training data. For instance, historical data used to train AI systems can perpetuate existing inequalities in areas such as criminal justice, hiring, and resource allocation. Studies show that biased AI systems disproportionately harm marginalised communities, as seen in cases where predictive policing algorithms target minority neighbourhoods (Straub et al., 2023). Addressing this issue requires robust frameworks for auditing AI systems, diversifying datasets, and involving interdisciplinary teams to design unbiased algorithms.

AI's "black box" nature poses a significant challenge to ethical decision making. Strategic decisions often require a clear understanding of how conclusions are reached. However, AI systems can lack explainability, making it difficult for stakeholders to trust their recommendations. This lack of transparency can undermine public trust, particularly in government systems where accountability is paramount. Solutions include adopting explainable AI (XAI) frameworks, which ensure algorithms are interpretable and their outputs are understandable to non-technical stakeholders (Payne, 2018).

The use of AI for strategic decision-making often involves analysing large volumes of sensitive data. This raises significant privacy concerns, particularly in contexts such as healthcare, surveillance, and governance. For example, contact-tracing apps deployed during the COVID-19 pandemic demonstrated the potential for AI to intrude on individual privacy, even when used for public health purposes (Morley et al., 2020). The ethical implementation of AI requires adherence to data protection laws, such as the General Data Protection Regulation (GDPR), and the development of systems that prioritise data minimisation and anonymisation.

The delegation of critical strategic decisions to AI systems also raises ethical questions about human autonomy. Over-reliance on AI can lead to decision-making processes that bypass human judgment, reduce accountability, and limit the ability to challenge outcomes. To address this, a hybrid model that combines AI recommendations with human oversight is essential. This ensures that humans remain in control of strategic decisions and can intervene when necessary. The deployment of AI in strategic decision-making can have far-reaching societal implications, particularly in terms of equity. For example, using AI to allocate resources in public sectors such as healthcare or education can exacerbate existing disparities if not carefully managed. Ethical AI implementation must consider the societal context and prioritise equitable outcomes. This requires inclusive policymaking processes that engage diverse stakeholders, including underrepresented groups (Chernov, Chernova, & Komarova, 2019). Addressing these ethical challenges necessitates the development of comprehensive regulatory and ethical frameworks. Governments and organisations must establish guidelines governing the design, deployment, and monitoring of AI systems. Initiatives such as the European Union's AI Act and the OECD Principles on AI provide valuable frameworks for ensuring that AI is used responsibly and ethically. These frameworks emphasise principles such as fairness, transparency, accountability, and human-centric AI (Morley et al., 2020).

The ethical considerations surrounding the implementation of AI for strategic decision-making are complex and multifaceted. Addressing these challenges requires a proactive approach that combines technical solutions with regulatory measures and public engagement. By prioritising fairness, transparency, accountability, and inclusiveness, governments and organisations can ensure that AI systems are used ethically to support strategic decisions that benefit society.

An additional difficulty in the current period of technological change and the delegation of human duties to AI is the need to train future professionals to be aware of and sensitive to the technologies they employ. Therefore, states that currently use AI for their decision-making processes should invest in the training of future talent and emphasise the importance of human interaction with artificial intelligence: Human oversight and control should remain central to critical decisions rather than leaving such decisions entirely to algorithms. Education should therefore highlight the importance and continuing role of humans in future technological development.

6. Conclusion

The integration of AI into government systems for strategic decision-making offers transformative potential to enhance governance and address complex challenges. Case studies from Singapore and the United States demonstrate AI's ability to optimise urban planning, healthcare, regulatory enforcement, and border security. However, significant ethical challenges, including bias, transparency, accountability, and privacy, must be addressed to ensure responsible and equitable AI use.

Ensuring transparency and explainability in AI systems is crucial for maintaining public trust and accountability. Privacy concerns necessitate adherence to data protection laws and prioritisation of data minimisation. Inclusive policymaking processes are essential to ensure equitable outcomes, particularly in resource allocation. To address the privacy concerns and to incorporate the ethical aspect of artificial intelligence, the author reviewed the European framework for the application of artificial intelligence, as the European Union has developed a regulatory framework that focuses on the protection of privacy and personal data and requires organisations and businesses implementing AI models to be transparent about the amount of data and the frequency of data collection. Furthermore, European residents should be able to decide which data can be collected and stored by accessing an overview of their data. Additionally, the author reviewed the OECD framework for the application of artificial intelligence, which incorporates key European regulatory criteria for data protection and further emphasises the need for a human-centred approach to the application of AI models. Comprehensive regulatory and ethical frameworks, such as the European Union's AI Act, are needed to guide responsible AI implementation. Additionally, investing in education and training is vital for developing a workforce capable of managing AI systems ethically. By addressing these challenges, governments can harness AI to drive strategic decisions that benefit society.

After presenting the research, the authors can answer the research questions as follows:

1. Effective integration of AI into government systems requires a multi-pronged approach that includes robust infrastructure, clear policies, and stakeholder engagement. Governments need to invest in data infrastructure and ensure access to high-quality, standardised datasets for training AI models. Collaboration between technology providers, policymakers, and domain experts is essential for devel-

oping AI systems that align with public policy objectives. To maintain transparency, governments should adopt explainable AI (XAI) systems, allowing decision-makers and citizens to understand the reasoning behind AI-driven recommendations. Accountability can be enhanced through regulatory frameworks that mandate audits, impact assessments, and the establishment of oversight bodies to monitor AI applications. Training programmes for civil servants can ensure they have the skills to interpret and apply AI outputs effectively.

2. Key challenges include bias in AI algorithms, risks to data privacy, and the potential for AI to perpetuate inequality. Bias can arise from unrepresentative or skewed training data, leading to discriminatory outcomes. Governments can address this by implementing rigorous data governance practices and bias detection mechanisms. Data privacy concerns can be mitigated by adopting secure data management practices and adhering to privacy regulations such as GDPR. Social concerns, such as the loss of public trust, can be addressed by involving citizens in AI governance processes, promoting transparency, and ensuring that decisions remain accountable to elected officials. Additionally, ethical guidelines should be codified to prevent misuse and establish clear boundaries for AI applications in government.
3. Existing AI implementations in government, such as predictive policing, pandemic response modelling, and disaster management, have shown measurable benefits. For instance, AI systems have improved resource allocation during natural disasters by providing real-time data on affected areas, leading to faster and more effective responses. Similarly, AI-driven analytics during the COVID-19 pandemic helped governments model the spread of the virus and optimise vaccine distribution strategies. However, these cases also highlight challenges, such as over-reliance on AI predictions and issues of public trust. Lessons from these implementations suggest the need for a balanced approach in which AI supports but does not replace human judgment, while continuous evaluation ensures that systems remain effective and aligned with public values.

To ensure the responsible and effective use of AI in government, it is important to develop comprehensive ethical guidelines that provide clear frameworks for the design, deployment, and monitoring of AI systems. Transparency and explainability should be prioritised by implementing explainable AI frameworks and making decision-making processes un-

derstandable to non-technical stakeholders. Regular audits are necessary to address algorithmic bias, while diversifying training datasets can help ensure fair and equitable outcomes. Data privacy must be protected by adhering to data protection laws and focusing on data minimisation and anonymisation to safeguard citizens' privacy.

Interdisciplinary collaboration is essential, encouraging technologists, policymakers, ethicists, and other stakeholders to work together in creating well-rounded AI solutions. Investing in AI education and training will help develop future talent in AI ethics, governance, and technical skills. Inclusive policymaking should be promoted by engaging diverse stakeholders, including underrepresented groups, to ensure equitable AI deployment. Robust regulatory frameworks, such as the European Union's AI Act, need to be established and enforced to govern AI use in government.

Building public trust is crucial, which can be achieved by ensuring transparency, accountability, and inclusiveness in the design and deployment of AI systems. Finally, it is important to continuously monitor AI systems for performance and ethical compliance and adapt them as necessary to address emerging challenges and opportunities.

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THE INTEGRATION OF ARTIFICIAL INTELLIGENCE SYSTEMS IN GOVERNMENTS TO SUPPORT STRATEGIC DECISION-MAKING

Summary

This study critically examines the integration of artificial intelligence (AI) into the strategic decision-making processes of modern governments, with a focus on comparative case studies from Singapore and the United States. Framed by the accelerating pace of technological advancement and the imperative for data-driven governance, the research seeks to elucidate how AI is reshaping public administration, policy formulation, and institutional responsiveness. The paper begins by defining key conceptual frameworks surrounding AI, emphasising its distinction from traditional algorithmic systems and its potential to enhance anticipatory governance. It then explores the rationale for adopting AI in strategic governmental contexts, particularly its capacity to process complex datasets, forecast policy outcomes, and enhance institutional efficiency. The core of the analysis centres on empirical case studies: Singapore's integrated, centralised approach to AI policy, including its Smart Nation initiative, and the United States' sector-specific deployments, notably within the Securities and Exchange Commission (SEC) and U.S. Customs and Border Protection (CBP). Through a comparative lens, the study identifies critical differences in governance models, regulatory strategies, and ethical safeguards. Singapore exemplifies a top-down, coordinated national strategy characterised by centralised oversight and a strong emphasis on public trust. Conversely, the U.S. model is decentralised and sector-led, reflecting a liberal-democratic tradition that prioritises innovation but often lacks cohesion in ethical oversight and inter-agency collaboration. The research concludes by offering a critical synthesis of global trends and assessing the inherent opportunities and challenges of AI-enabled governance. It argues for a balanced policy framework that ensures transparency, accountability, and inclusiveness while harnessing AI's transformative potential. The study contributes to the broader discourse on technological governance, urging policymakers to adopt adaptive, ethically grounded strategies that align with democratic values

and institutional resilience in the age of intelligent systems. Recommendations include developing ethical guidelines, implementing explainable AI (XAI), ensuring privacy, promoting inclusivity, fostering collaboration, and continuously monitoring AI systems.

Keywords: *artificial intelligence, government, strategic decision-making, AI governance*

INTEGRACIJA SUSTAVA UMJETNE INTELIGENCIJE U RAD VLADA KAO POTPORA STRATEŠKOM ODLUČIVANJU

Sažetak

U radu se kritički analizira integracija umjetne inteligencije (AI) u procese strateškog odlučivanja suvremenih vlada, s naglaskom na komparativne studije slučaja Singapura i Sjedinjenih Američkih Država. Polazeći od sve bržeg tehnološkog napretka i potrebe za upravljanjem utemeljenim na podacima, istraživanjem se nastoji objasniti kako AI preoblikuje javnu upravu, utječe na formuliranje javnih politika i institucionalnu sposobnost odgovora. U radu se najprije definiraju ključni konceptualni okviri povezani s AI-om, pri čemu se naglašava njegova razlika u odnosu na tradicionalne algoritamske sustave te njegov potencijal za unaprjeđenje anticipatornog upravljanja. Potom se razmatraju razlozi za primjenu AI-ja u strateškom djelovanju vlada, osobito njegova sposobnost obrade složenih skupova podataka, predviđanja učinaka javnih politika i povećanja institucionalne učinkovitosti. Središnji dio analize čine empirijske studije slučaja: integrirani i centralizirani singapurski pristup politici AI-ja, uključujući inicijativu Smart Nation, te sektorska primjena AI-ja u Sjedinjenim Američkim Državama, osobito u Komisiji za vrijednosne papire i burze (SEC) te Carinskoj i graničnoj službi SAD-a (CBP). Komparativnom analizom utvrđuju se značajne razlike u modelima upravljanja, regulatornim strategijama i mehanizmima zaštite etičkih standarda. Singapur predstavlja primjer koordinirane nacionalne strategije odozgo prema dolje, obilježene centraliziranim nadzorom i snažnim naglaskom na povjerenju javnosti. Nasuprot tomu, američki je model decentraliziran i sektorski vođen te odražava liberalno-demokratsku tradiciju koja daje prednost inovacijama, ali često pokazuje nedostatak koherentnosti u etičkom nadzoru i međuinstitucionalnoj suradnji. U zaključku rada iznosi se kritička sinteza globalnih trendova te procjenjuju mogućnosti i izazovi upravljanja uz potporu AI-ja. Zastupa se potreba za uravnoteženim okvirom javnih politika kojim se osiguravaju transparentnost,

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odgovornost i uključivost uz istodobno korištenje transformacijskog potencijala AI-ja. Rad pridonosi široj raspravi o tehnološkom upravljanju te poziva donositelje javnih politika na usvajanje prilagodljivih i etički utemeljenih strategija usklađenih s demokratskim vrijednostima i institucionalnom otpornošću u doba inteligentnih sustava. Preporuke uključuju razvoj etičkih smjernica, primjenu objašnjive umjetne inteligencije (XAI), zaštitu privatnosti, promicanje uključivosti i suradnje te kontinuirano praćenje sustava umjetne inteligencije.

Ključne riječi: *umjetna inteligencija, vlada, strateško odlučivanje, upravljanje umjetnom inteligencijom*