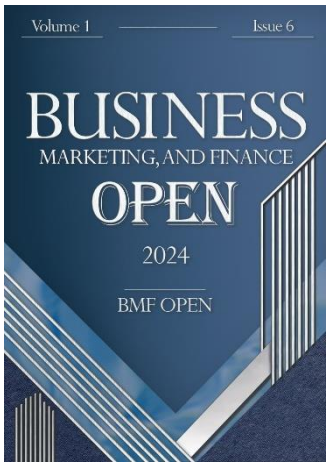
Futures Studies on AI Governance in Smart Governments: Toward Achieving a Sustainable and Efficient Structure for Utilizing Advanced Technologies



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Abstract: Future advancements are expected to occur rapidly, with scientists anticipating the realization of superhuman capabilities in strategic fields within the coming decades. The opportunities created by technological advancements, especially in artificial intelligence (AI), across various domains such as healthcare, transportation, energy, education, economic growth, and environmental sustainability, are immense. Conversely, the potential risks are significant, and technological advancements pose numerous governance challenges. These risks include workforce displacement, inequality, shifts in national power, strategic instability, and certain forms of AI that may jeopardize health and other societal values. Leaders of governments and large corporations frequently seek advice for better policymaking in this new landscape; however, academic attention to the revolution brought about by AI remains limited. Therefore, there is an urgent need for extensive research on AI governance, a topic that necessitates rethinking global institutions, policies, and norms to ensure the beneficial and ethical development and application of AI. This report is written in light of the urgent need for research on this issue. The first section focuses on AI policy, emphasizing the dynamics among governments, major corporations, the public, researchers, and other stakeholders. The final section analyzes possible structures for transitioning toward AI management. This study examines the future of AI governance in smart governments to achieve a sustainable and efficient structure for leveraging advanced technologies. The findings highlight the importance of revising policies and regulations to develop AI governance. The proposed future scenario suggests that governments should continuously update AI-related laws and regulations to prevent negative societal impacts. These revisions must simultaneously support innovation and ensure that citizens' rights are protected against automated decision-making. Moreover, enhancing the security and sustainability of AI systems should be prioritized. This includes developing security infrastructures, risk management practices, and employing advanced techniques to prevent misuse and cybersecurity threats. Given the rapid evolution of AI technologies, ensuring their security and sustainability is a primary responsibility of governments. This effort can lead to improved quality of life and increased public trust.

Keywords: Futures Studies, AI Governance, Smart Government, Sustainable Structure, Advanced Technologies.

1. Introduction

Artificial intelligence (AI) is expected to become a superhuman force in most of the tasks it is designed for within this century. Such progress can bring significant opportunities and risks for humanity. According to various

experts, AI's diverse capabilities will manifest in the coming decades, radically transforming power, wealth, and prosperity on a scale comparable to the Industrial Revolution [1, 2]. AI governance is the study of how to manage the transition to advanced AI systems, focusing on political, economic, military, governmental, and ethical dimensions. This report serves as an introduction to this subject. AI governance is often discussed alongside AI safety, as both aim to help humanity maximize the beneficial use of AI. However, AI governance emphasizes the institutions and contexts in which AI is developed and utilized. Advanced AI could play a crucial role in addressing global challenges such as climate change and international tensions [3].

Remarkably, advanced AI can enhance health, happiness, prosperity, science, and self-awareness. These benefits, however, must be weighed against potential catastrophic risks, such as reinforcing authoritarianism, escalating nuclear conflicts among major powers (where AI could complicate and render crisis cycles less predictable), and misalignments with human values. AI fundamentally alters the nature of wealth and power [4, 5]. The interests and capabilities of powerful actors will change, and new powerful entities may emerge. These actors may compete or collaborate to advance their interests [6]. AI development also raises serious concerns, including public opinion dynamics, researchers' ethics and values, national wealth, and security.

AI policy examines how the evolving technological landscape could reshape domestic politics, international political economy, and global security, as well as how powerful actors' strategies may shape AI development [7]. If the current trend continues—where AI-related benefits are primarily concentrated in large companies like Google—there could be a global monopoly over AI usage. Nations lacking AI industries may worry about being excluded from the global AI-driven economy. For instance, concerns in the U.S. and Europe about China's growing economic power and technological advancement have motivated policies like the U.S.-China trade war under former President Trump. These concerns may lead to AI nationalism and protectionism, where nations heavily invest in AI development and strongly support domestic AI champions [1, 8].

Countries and corporations are exploring ways to maximize economic benefits from AI. Some aim to replicate successful AI-based companies domestically or provide more support to local firms. Key questions arise here [5]: What benefits could a country like China gain in managing its large economy and eliminating competitors compared to other nations? What are the potential dynamics of a global AI-based economy? Is it acceptable for nations to prioritize domestic AI companies to compete with leading global industries? It is evident that technological transitions impact countries differently, prompting diverse policy responses. In terms of international security, the potential for intense competition among nations over AI development is significant. Thus, more thorough and comprehensive research on the scenarios, consequences, and management of such competition in the future is crucial [1, 4, 9].

AI and related technologies likely have profound implications for national and international security. In the short and medium term, AI appears poised to become a transformative and strategic asset. In the long term, AI may evolve into a fundamental capital for nations, potentially prompting governments to regulate and secure AI-related research and development (R&D). Additionally, AI's strategic and military advantages could intensify global arms races [8]. Therefore, understanding the logic of such competition, ways to avoid it, and strategies for its resolution are essential.

In the coming years, AI will present new security challenges. These include domestic and international use of autonomous weapons, AI-driven cyber operations, and AI-facilitated political campaigns (Asa et al., 2022). Many of these challenges are potentially transformative. Thus, awareness of these challenges and knowledge of how to address them are imperative. Currently, most AI-related research is conducted openly, as researchers seek recognition through public dissemination of their findings. However, some AI research is conducted privately for proprietary purposes, although such practices are relatively uncommon. If AI becomes perceived as a dangerous or strategically sensitive knowledge, these trends may shift. The more likely catastrophic outcomes of AI dissemination become, the greater the probability that leading AI researchers and institutions will restrict the sharing of AI capabilities. Advanced AI can create substantial wealth and power for its owners [10]. If this perception holds—especially regarding the economic and military strategic benefits of possessing AI—

international competition over AI will likely intensify. The immense benefits of advanced AI may cause actors to neglect balancing its possession with values such as safety, transparency, accountability, and democracy.

A comprehensive examination of AI governance and its implications has been explored extensively in recent studies. Sastry et al. (2024) analyzed computational power and AI governance, highlighting how policymakers can leverage computational tools to enhance regulatory oversight, allocate resources effectively, and impose restrictions to prevent irresponsible AI development. However, they also noted the challenges of implementation readiness and the risks posed by simplistic approaches to computational governance, including threats to privacy and economic inequality [3]. Babaeian et al. (2024) focused on AI's role in public policy cycles, identifying applications such as issue prioritization and evidence-based policymaking using big data, alongside challenges like ethical concerns, resource gaps, and algorithmic biases [7]. In the context of AI governance in international policy, Babbari Gonbad (2024) analyzed China's rapid advancements in AI governance and its global implications, stressing the need for coherent global responses to AI's transnational challenges, including privacy and militarization risks [1]. Together, these studies collectively underscore the transformative potential of AI in governance and its multifaceted challenges, providing a robust foundation for future research and policymaking in this evolving domain.

A primary concern is the lack of caution in deploying advanced AI systems, posing numerous questions for policymakers. As the likelihood of intense AI competition increases, it becomes necessary to devise strategies to prevent such competition or plan for its resolution. The common political solution to global risks involves enhancing transparency, establishing norms, and signing agreements, which may be bilateral, multilateral, or global. Norms involve mutual understanding between parties about unacceptable behaviors and responses to them. Hidden norms have the advantage of being enforced without explicit consent but may be criticized for being unjust or insufficient. Traditional international norms, such as customary laws, often lack relevance without a higher legal authority for major powers. Diplomatic agreements and treaties are effective if well-defined in detail but rely on full cooperation from all parties. Institutions like the World Trade Organization create bureaucratic mechanisms that clarify ambiguities and facilitate future negotiations. International collaborations often start with norms, evolve into regional and multilateral agreements, and eventually establish institutions. One approach to avoiding hostile AI competition is adopting standards, verification, enforcement, and control by a third party.

The first feasible model is establishing an international agency to define and enforce AI safety standards [11]. This step is foundational for achieving shared knowledge on what could be termed AI agreements. A second model involves creating an organization capable of fostering cooperation and establishing new agreements.

The final model suggests designing a global framework for AI that operates independently of major powers and holds a monopoly over strategic technology. However, this model requires careful organizational design to ensure cooperative incentives among all stakeholders.

2. Methodology

Each criterion identified during the MICMAC analysis as part of mapping is included in the scenario analysis. At this stage, based on four criteria and 25 sub-criteria, the appropriate scenario is identified using the Scenario Wizard software.

First, the cross-impact matrix is constructed. The CIB matrix (Cross-Impact Balance) is used to extract expert opinions on the impact and likelihood of one state of a descriptor on another state of the descriptor, utilizing verbal expressions.

Table 1. Named Components in Scenario Wizard

Term	Symbol in Scenario Wizard
Long-term Goal Setting	A1
Increasing Public Trust	A2
Innovation and Process Improvement	A3
Data Protection and Privacy	A4

Ethics in Artificial Intelligence	A5
Innovation and Competitiveness	A6
Establishing Technological Infrastructure	A7
Education and Empowerment of Human Resources	A8
Performance and Efficiency Evaluation	B1
Risk Management and Problem Forecasting	B2
Assessing Sustainability and Long-term Impacts	B3
Supporting Innovation and Development	C1
System and Information Integration	C2
Encouraging Public Participation	C3
Monitoring Social and Ethical Impacts	C4
Reviewing Policies and Regulations	C5
Stakeholder Feedback Analysis	C6
Continuous Updating of Algorithms and Models	C7
Benchmarking Against Global Standards	C8
Social Justice and Reducing Inequalities	D1
Transparency and Accountability	D2
Technical Standards and Regulations	D3
International Collaboration	D4
Launching Pilot Projects	D5
Enhancing Security and Sustainability	D6

3. Findings

Based on the four aforementioned criteria and 25 related sub-criteria, the structure of the cross-impact matrix was identified.

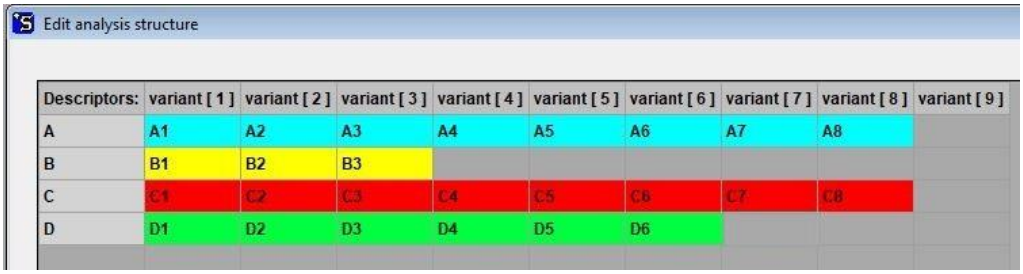

Figure 1. Structuring the Cross-Impact Matrix

Subsequently, the cross-impact matrix was weighted with scores ranging from 3 to -3.

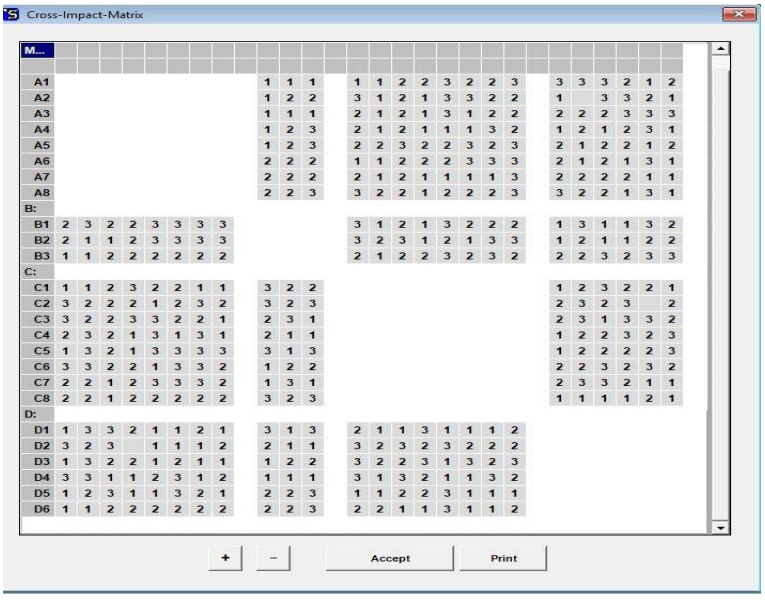

Figure 2. Completion of the Cross-Impact Matrix

To derive the scenario with the highest consistency, the cross-impact matrix was homogenized.

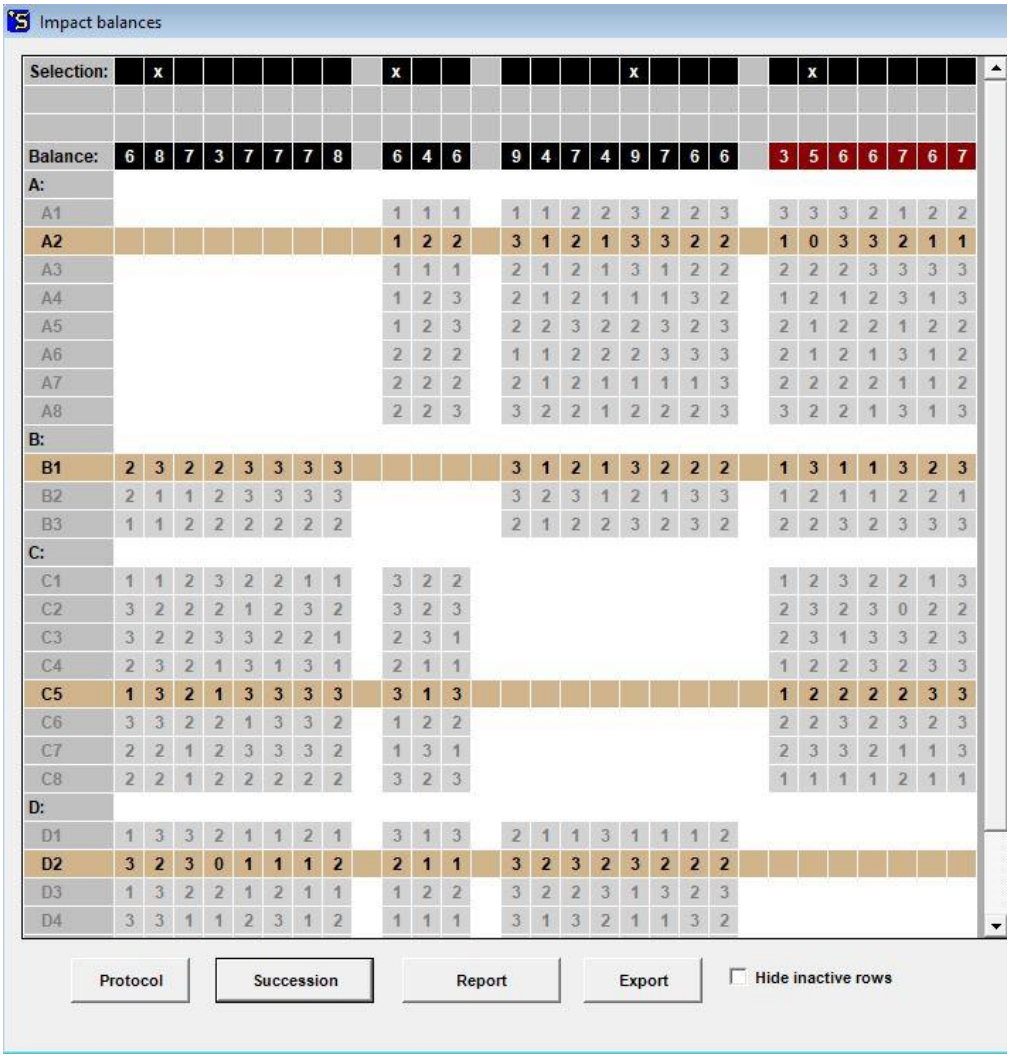

Figure 3. Homogenization of the Cross-Impact Matrix

Finally, considering the importance of all four components, 25 scenarios were identified using Scenario Wizard software.

Figure 4. Identified Scenarios

None of the other scenario elements conflict with this assumption. Based on the scenario analysis, nine scenarios were identified. Each scenario is detailed according to the sub-criteria:

Scenario 1: Includes Components A1, B2, C3, D2

- **Long-term Goal Setting** (A1)
- **Risk Management and Problem Forecasting** (B2)
- **Encouraging Public Participation** (C3)
- **Transparency and Accountability** (D2)

In developing AI governance in smart governments, long-term goal setting must aim to achieve a sustainable and efficient structure for utilizing advanced technologies. This goal-setting includes developing robust digital infrastructure and supporting AI innovation, which can help address complex issues and improve the quality of public services. Long-term plans should be formulated with consideration of the future transformations AI will bring to social, economic, and political structures.

One potential scenario for the future is drafting macro-level policies for integrating AI at all government levels and creating smart and sustainable work environments. These policies must also be flexible to adapt to rapid technological changes.

AI, due to its decision-making power and process automation capabilities, can create unique opportunities but also poses significant challenges such as security risks, privacy concerns, and algorithmic biases. Smart governments must enhance their capacity to manage these risks to minimize harm and anticipate potential problems.

Future scenarios in this domain include designing more robust monitoring systems and utilizing AI-based tools to identify and manage emerging risks. Establishing AI structures capable of predicting economic, social, and environmental challenges can help governments proactively prepare for future crises and make more strategic and optimal decisions using these technologies.

In the future of smart governments, one of the most critical factors for successful AI governance will be transparency and encouraging public participation. Governments must demonstrate accountability by providing open access to AI-based data and reports to build public trust and encourage citizen participation.

A relevant scenario in this domain is creating open government platforms where citizens can access AI decision-making processes and share their opinions. These platforms can increase public awareness about AI's impacts and provide continuous feedback for improving intelligent systems. Ultimately, this transparency and accountability will help maintain public trust and strengthen collaboration between governments and citizens.

Scenario 2: Includes Components A6, B2, C7, D2

- **Innovation and Competitiveness** (A6)
- **Risk Management and Problem Forecasting** (B2)
- **Continuous Updating of Algorithms and Models** (C7)
- **Transparency and Accountability** (D2)

In the development of AI governance in smart governments, innovation and competitiveness are foundational for long-term success. Employing AI across various government sectors, from improving public services to enhancing efficiency in strategic decision-making, will drive significant transformations.

A scenario in this area envisions governments not only leveraging AI to improve their efficiency but also strengthening their global competitiveness by facilitating access to AI technologies and infrastructures. Future smart governments can achieve global technological leadership by investing in research and development (R&D), supporting innovation, cultivating skilled human resources, and encouraging international collaborations.

As AI expands in smart governments, risk management and problem forecasting, along with the continuous updating of intelligent algorithms and models, are critically important. Risks associated with AI, such as privacy concerns, data security, and algorithmic biases, require proactive and ongoing measures.

In this scenario, governments must regularly update AI algorithms and models to mitigate risks and enhance their performance. Establishing robust AI-based monitoring systems capable of identifying and analyzing emerging threats is another necessary step to prevent potential crises. Smart governments must anticipate economic, social, and political challenges and dynamically adapt AI algorithms to maintain efficiency and respond to environmental changes.

One of the key challenges in developing AI governance in smart governments is ensuring transparency and accountability. Given the automated decision-making processes and AI's extensive societal impacts, governments must be answerable and make AI processes transparent to citizens.

A future scenario envisions creating transparent and accessible platforms where citizens can obtain accurate and up-to-date information about AI's use in public services. This transparency can increase public trust and improve oversight of system performance. Additionally, governments must commit to accountability for errors or deficiencies arising from AI decisions and establish reliable mechanisms for correcting and revising those decisions.

Scenario 3: Includes Components A2, B3, C6, D3

- **Increasing Public Trust** (A2)
- **Assessing Sustainability and Long-term Impacts** (B3)
- **Stakeholder Feedback Analysis** (C6)
- **Enhancing Security and Sustainability** (D3)

In developing AI governance within smart governments, increasing public trust is one of the most critical factors for achieving long-term acceptance and success. A future scenario in this area could focus on establishing transparent and accessible processes, enabling citizens to easily understand how AI-based systems function and how data is utilized in government decision-making. Regular reporting on AI performance, creating open communication channels for public feedback, and ensuring user privacy are some measures that can strengthen public trust.

Future smart governments must assure citizens that AI technologies are deployed responsibly and under strict oversight, prioritizing public interests.

The widespread use of AI in governments requires continuous evaluation of its sustainability and long-term societal and environmental impacts. In a future scenario, governments should periodically conduct studies to assess the social, economic, and environmental effects of AI technologies. These assessments might include evaluating how AI reduces social inequalities, improves access to public services, and minimizes natural resource consumption.

Such measures help policymakers craft strategies that leverage AI's benefits while managing its long-term challenges. Moreover, addressing employment shifts caused by process automation and providing necessary workforce training must also be a priority.

Stakeholder feedback analysis is a vital tool for the continuous improvement of AI systems. In a future scenario, governments can establish mechanisms to collect and analyze feedback from citizens, government employees, and other stakeholders to enhance system efficiency and security. This feedback could play a critical role in identifying weaknesses and improving systems.

Additionally, enhancing the security and sustainability of AI-based systems is essential for countering cybersecurity threats and maintaining system stability. Governments must significantly invest in cybersecurity infrastructure and implement secure protocols for sensitive data to prevent cyberattacks and security breaches. Empowering systems for long-term sustainability and protecting data and algorithms will be key to successful AI governance in future smart governments.

Scenario 4: Includes Components A5, B2, C3, D4

- **Ethics in Artificial Intelligence** (A5)
- **Risk Management and Problem Forecasting** (B2)
- **Encouraging Public Participation** (C3)

- **International Collaboration** (D4)

In AI governance within smart governments, adhering to ethical principles in using AI technologies holds significant importance. A future scenario in this domain emphasizes creating ethical frameworks to ensure the responsible use of AI in government decision-making. Governments must establish specific laws and regulations to ensure that AI is designed and applied in ways that do not exacerbate social inequalities or algorithmic biases.

Protecting citizens' rights, including privacy and human dignity, should be a priority. In a future scenario, smart governments could regularly review AI ethics and update algorithms to align with principles of transparency, fairness, and accountability, ensuring that AI operates in the public's best interest without bias.

Managing risks and forecasting challenges arising from AI is a fundamental issue in developing AI within smart governments. AI may involve risks such as security threats, privacy violations, and algorithmic biases. A future scenario involves building robust systems to predict and manage these risks, enabling governments to respond proactively.

These systems must analyze data, identify potential problems, and take measures to mitigate the adverse impacts of AI using advanced algorithms. Future scenarios indicate that smart governments will leverage advanced AI techniques to evaluate emerging risks and create rapid-response protocols. This approach strengthens public trust and ensures safe and responsible use of AI.

Encouraging public participation and fostering international collaboration in AI governance is essential for the long-term success of this technology within smart governments. In a future scenario, governments can engage citizens in AI decision-making and development processes by creating digital platforms and collaborative tools.

This public participation can enhance transparency, improve system performance, and boost public trust in AI. International collaboration is equally critical for managing risks and capitalizing on global opportunities.

Future scenarios suggest that smart governments will share knowledge, experiences, and ethical standards internationally, develop multilateral agreements, and strengthen cooperation in research and security. This approach enables governments to benefit from AI capabilities in a global context while managing common challenges in a coordinated manner.

Scenario 5: Includes Components A6, B2, C3, D5

- **Innovation and Competitiveness** (A6)
- **Risk Management and Problem Forecasting** (B2)
- **Encouraging Public Participation** (C3)
- **Launching Pilot Projects** (D5)

Innovation and competitiveness are key factors in improving public services and increasing the efficiency of governments in AI governance within smart governments. A future scenario in this context highlights the need to create an innovative ecosystem where AI technologies are continuously evolving and updating.

Smart governments must support research and development (R&D), establish technology accelerators, and create innovation hubs to foster a conducive environment for AI startups and practical innovations. This competitiveness can also be strengthened through synergies with the private sector and academia, where knowledge and experience exchange can enhance the quality of public services and improve government decision-making.

In this scenario, governments should emphasize learning from international experiences and adopting best practices in innovation and competitiveness.

Risk management and forecasting challenges arising from AI implementation in smart governance are fundamental to preventing unintended consequences and maximizing social benefits. In a future scenario, governments must develop comprehensive and accurate systems to identify and assess risks associated with AI use.

These systems should be designed to respond quickly to security threats, privacy breaches, and ethical issues caused by algorithmic biases. Moreover, governments must strengthen their capacity to anticipate problems through data analysis and advanced AI models.

This proactive approach allows governments to react to challenges and prevent potential crises, thereby increasing AI governance efficiency and fostering public trust in new technologies.

Encouraging public participation and launching pilot projects are other critical pillars in developing AI governance within smart governments. Future scenarios suggest that governments must actively involve citizens, non-governmental organizations, and stakeholders in AI decision-making and implementation processes.

By creating platforms to collect citizens' feedback and experiences, governments can enhance the design and implementation of AI services. Pilot projects enable governments to test ideas and innovations on a small scale and identify their strengths and weaknesses before full-scale implementation.

These projects can serve as successful models for other government sectors, promoting a culture of innovation and participation within society. As a result, these approaches improve public service efficiency while strengthening social cohesion and increasing public trust in smart governments.

Scenario 6: Includes Components A6, B3, C5, D5

- **Innovation and Competitiveness** (A6)
- **Assessing Sustainability and Long-term Impacts** (B3)
- **Policy and Regulation Review** (C5)
- **Launching Pilot Projects** (D5)

In today's world, innovation and competitiveness are fundamental pillars of AI governance in smart governments. The future scenario highlights that governments must continuously identify and implement new technologies to respond more effectively to social and economic challenges. This requires establishing suitable environments for research and development (R&D) and encouraging startups and tech companies.

Governments can foster innovation by building strong connections with universities and research centers to exchange knowledge and ideas. Additionally, creating accelerators and innovation hubs can support the emergence of new talents and capabilities. In this scenario, competitiveness is a key factor in attracting investment and improving public services, ultimately enhancing citizens' quality of life.

Assessing sustainability and long-term impacts is equally critical in AI governance development. The future scenario suggests that governments should carefully evaluate the social, economic, and environmental impacts of AI applications. These evaluations might include analyzing the effects on the labor market, public service quality, and shifts in social behaviors.

Given the rapid pace of technological change, governments must regularly review their strategies to ensure that policies align with societal needs and expectations. Advanced analytical tools and collaboration with researchers and specialists can provide governments with deeper insights into these issues and enable better decision-making.

Policy and regulation review in relation to AI is an essential step toward effective governance of this technology. The future scenario emphasizes that governments must continually update laws and regulations to keep pace with rapid technological changes.

These reviews should simultaneously safeguard public interests and support innovation and development. Moreover, launching pilot projects enables governments to test AI capabilities and challenges in controlled, small-scale environments. These projects can serve as successful models for wider implementation across other sectors.

By analyzing the results of these projects, governments can optimize their policies and regulations based on real-world data and practical experience. Consequently, smart governments can ensure the sustainability and effectiveness of AI governance, thereby improving citizens' quality of life and promoting social welfare.

Scenario 7: Includes Components A1, B2, C7, D5

- **Long-term Goal Setting** (A1)
- **Risk Management and Problem Forecasting** (B2)

- **Continuous Updating of Algorithms and Models** (C7)
- **Launching Pilot Projects** (D5)

In the development of AI governance in smart governments, long-term goal setting emerges as a cornerstone of this process. The future scenario emphasizes the importance of defining clear and measurable objectives for the effective use of AI technologies.

These objectives should encompass improving the quality of public services, enhancing managerial efficiency, and increasing citizen satisfaction. To achieve these goals, governments need to establish a strategic framework that integrates AI initiatives and projects with broader national development plans.

Moreover, implementing regular evaluation systems to measure progress toward these objectives and adjusting strategies based on feedback can significantly enhance the sustainability and success of these programs.

Risk management and problem forecasting are also vital dimensions of AI governance that require careful attention. The future scenario highlights that governments must take measures to identify and assess the potential risks associated with AI to mitigate its negative consequences.

Employing advanced data analysis and simulation techniques can help governments anticipate upcoming challenges and enable proactive planning to address them. Additionally, it is essential to recognize that AI algorithms and models may be influenced by social and ethical biases; thus, steps must be taken to ensure transparency in processes and fairness in decision-making.

Continuous updating of algorithms and models is crucial for maintaining the efficiency and effectiveness of AI governance systems. The future scenario suggests that governments should regularly update and optimize their algorithms to keep up with rapid technological advancements and evolving societal needs.

These updates should be informed by new data and ongoing analyses. Furthermore, launching pilot projects allows governments to test innovative ideas and solutions in controlled environments and collect valuable feedback.

These projects can act as real-world laboratories to evaluate the performance of algorithms and assess their social and economic impacts. By adopting this approach, governments can continuously improve their services and ensure that AI technologies are deployed effectively and responsibly for the public good.

Scenario 8: Includes Components A5, B3, C5, D6

- **Ethics in Artificial Intelligence** (A5)
- **Assessing Sustainability and Long-term Impacts** (B3)
- **Policy and Regulation Review** (C5)
- **Enhancing Security and Sustainability** (D6)

In the development process of AI governance in smart governments, adhering to ethical principles is considered a fundamental pillar. The future scenario indicates that governments must seriously address ethical issues to build public trust and ensure the responsible use of AI technologies.

This includes ensuring transparency regarding how data is collected and used, preventing discrimination, and ensuring fairness in algorithm-based decision-making. Establishing ethics committees and consulting with various stakeholders, including experts, academics, and community representatives, can help governments develop effective ethical policies. These policies should be regularly reviewed to keep pace with technological advancements and societal needs.

Sustainability and long-term impacts of AI usage are also critical topics in AI governance. The future scenario suggests that governments must continuously evaluate the social, economic, and environmental effects of AI technologies.

These assessments should not only focus on the direct impacts on citizens' quality of life but also address indirect effects, such as changes in labor markets and social behaviors. Predictive modeling and simulations can help governments anticipate the outcomes of their decisions more accurately, enabling them to design appropriate strategies for managing long-term changes.

Reviewing policies and regulations related to AI is another crucial aspect of effective AI governance. The future scenario proposes that governments should continuously update their AI-related laws and regulations to prevent its negative impacts on society.

These reviews must balance public interest protection with support for innovation and development. Additionally, enhancing the security and sustainability of AI systems must be prioritized. This includes developing security infrastructure, risk management, and employing advanced techniques to prevent misuse and cyber threats.

Given the rapid evolution of AI technologies, ensuring their security and sustainability is a primary responsibility for governments, ultimately leading to improved quality of life and increased public trust.

Scenario 9: Includes Components A4, B3, C7, D3

- **Data Protection and Privacy** (A4)
- **Assessing Sustainability and Long-term Impacts** (B3)
- **Continuous Updating of Algorithms and Models** (C7)
- **Technical Standards and Regulations** (D3)

In the development of AI governance in smart governments, data protection and privacy emerge as top priorities. The future scenario suggests that with the increasing use of AI in public services, privacy risks and data security threats will also rise.

Governments must develop stronger laws and protocols for the collection, storage, and processing of personal data to prevent potential misuse. These protocols should be transparent and inform citizens of their rights regarding personal data. Establishing independent oversight institutions and using encryption technologies can enhance public trust and ensure data is managed securely and ethically.

Assessing the sustainability and long-term impacts of AI usage must also be a key focus. The future scenario highlights that governments should continuously evaluate the economic, social, and environmental implications of AI technologies.

These evaluations might include assessing impacts on employment, changes in social behaviors, and environmental consequences of using complex algorithms. Predictive modeling and data analysis can help identify potential challenges and develop appropriate strategies to address them. Public participation and feedback must also be incorporated into the decision-making process.

Continuous updating of algorithms and models is an essential component of AI governance. The future scenario emphasizes that governments should regularly review and update their algorithms to align with technological advancements and social changes.

These updates should be based on new data and continuous analyses to maintain the quality and accuracy of AI decision-making. Furthermore, establishing technical standards and regulations for AI technologies is of critical importance.

These standards should include guidelines for the development, implementation, and evaluation of AI systems to ensure they are deployed ethically and effectively. Through this approach, governments can support the creation of a sustainable and secure AI ecosystem that ultimately benefits society.

4. Discussion and Conclusion

To date, there has not been a comprehensive scientific investigation into the impact of AI on governance processes worldwide. While most political scientists, especially those in the field of comparative politics, agree on AI's influence on governance, the scope, dimensions, and consequences of this impact have not been thoroughly examined.

This report has been prepared in light of the need for research in this area. It provides only an introductory overview of the issue of AI governance and highlights the necessity for further studies. In the section on optimal AI governance, possible frameworks for transitioning to AI management have been analyzed.

The report emphasizes expanding effective communication tools and leveraging potential benefits through joint collaborations. It also underscores the need for a global coalition in the AI domain, one that is committed to fundamental public-interest objectives and incorporates institutional mechanisms to ensure principles such as non-aggression and global security.

It is recommended to leverage cutting-edge technologies to perform activities more effectively by enhancing accessibility and reducing associated costs. Efforts should also focus on increasing transparency through the adoption of appropriate policies, monitoring their implementation, and creating the necessary infrastructure to ensure the proper execution of previous policies in this area at the national level. Furthermore, enhancing knowledge and information sharing among government entities, as well as between the government, citizens, and businesses, is crucial. This can be achieved by establishing platforms for seamless information exchange and utilizing diverse communication channels, such as mobile applications, to promote openness and collaboration.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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