การใช้ประโยชน์จากปัญญาประดิษฐ์เพื่อเพิ่มประสิทธิภาพการทำงานของรัฐบาลอิเล็กทรอนิกส์: การวิเคราะห์ที่เน้นนโยบายโดยมุ่งเน้นที่ประสิทธิภาพการใช้จ่ายภาครัฐ

Leveraging Artificial Intelligence to Enhance E-Government Productivity: A Policy-Centric Analysis with a Focus on Public Spending Efficiency

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การศึกษานี้เจาะลึกศักยภาพของปัญญาประดิษฐ์ (AI) ในการปรับปรุงผลิตภาพภายใต้โครงการรัฐบาลอิเล็กทรอนิกส์ของประเทศไทย โดยเน้นการเพิ่มประสิทธิภาพการใช้จ่ายภาครัฐ งานวิจัยนี้ใช้ระเบียบวิธีศึกษาเชิงคุณภาพและมุ่งเน้นนโยบาย เพื่อศึกษากลยุทธ์ด้านปัญญาประดิษฐ์และรัฐบาลดิจิทัลของประเทศไทย เพื่อคาดการณ์ผลผลิตที่เพิ่มขึ้นและระบุความท้าทายที่สำคัญในการดำเนินงาน โดยวางแนวทางของประเทศไทยในบริบทระหว่างประเทศ เปรียบเทียบกับสิงคโปร์และเอสโตเนีย ซึ่งเป็นสองประเทศที่บูรณาการปัญญาประดิษฐ์เข้ากับการบริหารราชการแผ่นดินได้อย่างมีประสิทธิภาพ โดยมุ่งเน้นไปที่ปัจจัยต่าง ๆ เช่น โครงสร้างพื้นฐานทางเทคโนโลยี ขีดความสามารถขององค์กร และปัจจัยที่เอื้อต่อกฎระเบียบและสภาพแวดล้อม ผลการศึกษาชี้ให้เห็นว่าปัญญาประดิษฐ์สามารถเปลี่ยนแปลงประสิทธิภาพการดำเนินงาน ความรับผิดชอบ และความโปร่งใสในการใช้จ่ายภาครัฐของประเทศไทยได้ อย่างไรก็ตาม การตระหนักถึงประโยชน์เหล่านี้จำเป็นต้องอาศัยการแก้ไขปัญหาสำคัญ ๆ ซึ่งรวมถึงโครงสร้างพื้นฐานทางเทคนิค การขาดแคลนทักษะแรงงาน และกรอบการกำกับดูแลข้อมูลที่ครอบคลุม

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Abstract

This study delves into the potential of Artificial Intelligence (AI) to improve productivity within Thailand's e-government initiatives, emphasizing the optimization of public spending. Through a qualitative, policy-oriented case study methodology, this research examines Thailand's AI and digital government strategies to anticipate productivity gains and identify critical implementation challenges. Situating Thailand's approach within an international context, comparisons are drawn with Singapore and Estonia, two countries that have effectively integrated AI into public administration focusing on factors such as technological infrastructure, organizational capacity, and regulatory and environmental enablers. Findings suggest that AI could be transformative for enhancing operational efficiency, accountability, and transparency in public spending within Thailand's public sector. However, realizing these benefits will require addressing notable challenges, including technical infrastructure, workforce skill shortages, and comprehensive data governance frameworks.

Keywords: Artificial Intelligence, E-Government Productivity, Public Spending Efficiency

1. Introduction

E-government has become an essential mechanism for modernizing public administration, offering the potential to enhance service delivery, improve operational efficiency, and increase government transparency. Digital tools are now central to effective public sector management, enabling more dynamic interactions between governments and citizens (Chen, 2020). Among these innovations, Artificial Intelligence (AI) has emerged as one of the most influential technologies in public administration, enabling governments to automate processes, enhance decision-making capacities, and leverage data for resource allocation (Bovens & Zouridis, 2021). AI's capabilities position it as a critical factor in advancing e-government productivity, particularly in domains like budgeting, auditing, and citizen services.

For Thailand, AI offers substantial potential for transforming its public sector, particularly through improving public spending efficiency, resource allocation, and fiscal transparency. Recognizing the importance of AI, Thailand has articulated its goals within the Digital Government Development Plan and National Artificial Intelligence Strategy, both of which position AI as a catalyst for increased productivity

within public administration (Thailand Digital Government Development Agency, 2023). Despite these aspirations, AI's application within Thailand's public sector remains in its early stages, hindered by structural challenges such as a lack of technical infrastructure, limited AI expertise, and regulatory hurdles concerning data privacy.

This study aims to assess the potential productivity gains AI could bring to Thailand's e-government, particularly in optimizing public spending. By employing a policy-based case study approach enriched with the Technology-Organization-Environment (TOE) framework, this research evaluates Thailand's readiness for AI adoption, projects potential productivity outcomes, and identifies the obstacles that may impede AI implementation. Comparative insights are drawn from Singapore and Estonia, countries recognized for successfully integrating AI within their public sectors. By positioning Thailand's AI ambitions within a broader international framework, this study aims to provide a roadmap for maximizing AI-driven productivity improvements in Thailand's e-government.

2. Literature Review

2.1 The Role of AI in Enhancing E-Government Productivity

AI integration in e-government has become a global trend, given AI's potential to significantly improve operational efficiency, resource management, and decision-making in public administration. Research shows that AI applications have the capacity to reduce administrative costs, automate routine tasks, and increase the speed of government service delivery, leading to overall improvements in productivity (Xu & Zheng, 2022). For example, AI-powered chatbots and automated data processing systems have been implemented in various countries to handle citizen inquiries, manage documentation, and process large datasets—functions that would otherwise consume considerable time and labor resources (Susskind, 2020).

AI also enhances e-government productivity by facilitating real-time data processing and predictive analytics, enabling public administrators to make evidence-based decisions. Predictive analytics, in particular, has proven valuable in forecasting budget needs, assessing risk, and preventing fraud, contributing to more accurate and efficient public spending (OECD, 2021). With these capabilities, AI has the potential to be a cornerstone of efficient e-government systems, providing governments with the tools to meet evolving public expectations for responsive, accessible, and data-driven services.

2.2 AI's Impact on Financial Efficiency and Public Spending Optimization

AI's role in financial management, particularly in optimizing public spending, has garnered substantial interest. AI applications in budgeting, fraud detection, and expenditure tracking allow governments to allocate resources more strategically and reduce financial inefficiencies. Advanced machine learning models can analyze large financial datasets to detect anomalies, assess spending patterns, and forecast future budget needs with high accuracy (Schaefer, 2021). Singapore and Estonia, two countries at the forefront of AI adoption in the public sector, provide instructive examples of how AI can enhance financial efficiency. In these countries, AI has led to cost savings and increased fiscal transparency by enabling real-time expenditure monitoring and proactive fraud detection (UNDP, 2022).

AI's predictive capabilities support budgeting processes by leveraging historical data to create budget forecasts that reduce overspending risks and improve the strategic distribution of funds (Gawer, 2020). Predictive budgeting allows governments to optimize resource allocation based on data-driven insights, ensuring that limited public funds are allocated to high-impact initiatives. This approach not only improves the efficiency of government spending but also enhances accountability by providing clear, measurable benchmarks for financial performance.

2.3 Theoretical Framework: Technology-Organization-Environment (TOE) Framework

The Technology-Organization-Environment (TOE) framework provides a robust structure for understanding the factors that facilitate or hinder the adoption of new technologies, especially in complex environments like the public sector. Originally proposed by Tornatzky and Fleischer (1990), the TOE framework suggests that the adoption of technology is influenced by three key dimensions: Technological (the technological infrastructure and the features of the technology itself), Organizational (the internal structure, resources, and processes within the organization), and Environmental (external factors including regulatory, socio-political, and competitive forces). Applying the TOE framework to Thailand's AI adoption allows for a holistic evaluation of the country's readiness for AI implementation, identifying specific areas that need support or restructuring to fully realize AI's productivity benefits in e-government.

Within the technological dimension, Thailand's readiness for AI deployment in e-government hinges on the existing digital infrastructure, data availability, and the compatibility of AI solutions with current systems. A strong technological foundation is essential to support the computational demands of AI algorithms and enable interoperability across government departments. Furthermore, data quality and availability play a critical role in AI's effectiveness, as AI systems rely heavily on large datasets for training and predictive analytics. Without a cohesive data infrastructure and well-established protocols for data

management, AI applications in Thailand's public sector may face limitations in both accuracy and scalability, reducing their potential to enhance productivity (Gawer, 2020).

The organizational dimension of the TOE framework emphasizes internal factors that impact AI adoption, such as workforce skill levels, leadership support, and organizational culture. For AI integration to be successful in Thailand's e-government, public sector employees must possess the skills necessary to operate and manage AI-driven tools. This requires a comprehensive approach to workforce development, including AI-specific training programs and the recruitment of professionals with expertise in data science and machine learning. Moreover, leadership support and a culture that embraces technological innovation are crucial for fostering an environment where AI initiatives can flourish. Government leaders in Thailand need to advocate for AI adoption and promote a culture of continuous learning and adaptation to build organizational resilience and readiness for AI-driven transformation (Chen, 2020).

Lastly, the environmental dimension considers the broader regulatory, social, and competitive factors that shape technology adoption in the public sector. In Thailand, regulatory frameworks and data governance policies will significantly influence AI deployment, especially in areas like data privacy, cybersecurity, and ethical AI use. Effective governance is essential to balance the benefits of AI with the need to protect citizen data and prevent potential misuse of AI technologies. Additionally, societal acceptance and trust in AI play a pivotal role in its success in public administration. Public concerns regarding data privacy, transparency, and accountability must be addressed through clear, accessible communication and engagement efforts. Furthermore, Thailand's position within the ASEAN region offers opportunities for collaboration and knowledge sharing with neighboring countries, which could foster regional alignment on best practices for AI in government. By addressing these environmental factors, Thailand can strengthen its readiness for AI in e-government, creating a supportive ecosystem that aligns with both local and international standards (Tornatzky & Fleischer, 1990; UNDP, 2022).

2.4 Overview of Thailand's AI and Digital Government Policies

Thailand's national AI and digital government policies emphasize AI's potential to improve public sector productivity, focusing on areas such as fiscal management, service delivery, and transparency. The Digital Government Development Plan and National AI Strategy outline clear objectives, including automating government processes, strengthening fiscal oversight, and fostering a data-driven culture in public administration (Thailand Digital Government Development Agency, 2023). However, the policies also face significant challenges, including the need for substantial infrastructure investment, workforce

training, and data privacy regulations. Addressing these issues is essential for realizing the productivity gains that AI promises in the public sector.

Thailand's AI and digital government policies underscore a national commitment to transforming public sector efficiency and improving governance through advanced technologies. The Digital Government Development Plan and National AI Strategy, developed by the Digital Government Development Agency (DGA), articulate specific goals for automating processes, enhancing decision-making capabilities, and fostering transparency in fiscal management. A notable aspect of these policies is their focus on creating a data-centric infrastructure that enables seamless interoperability across government departments, ensuring that AI systems are supported by robust, accessible data sources. Moreover, the policies prioritize citizen-centric services by aiming to enhance public engagement and responsiveness, aligning government operations with the needs and expectations of Thailand's increasingly digital-savvy population. However, the realization of these objectives depends heavily on overcoming key challenges, such as establishing comprehensive data governance frameworks and expanding digital infrastructure to rural areas. Addressing these issues is essential to ensure that AI not only improves operational efficiency but also bolsters public trust and inclusivity in Thailand's e-government transformation (Thailand Digital Government Development Agency, 2023).

3. Methodology

3.1 Case Study

This study employs a qualitative, policy-based case study methodology to examine AI's productivity potential within Thailand's e-government, focusing specifically on public spending optimization. The methodology combines policy document analysis, a comparative assessment with Singapore and Estonia, and the TOE framework to evaluate Thailand's AI readiness and project anticipated outcomes.

3.1.1 Research Design

This study is structured around policy document analysis and comparative policy analysis, with the TOE framework guiding an in-depth assessment of Thailand's AI preparedness.

Policy Document Analysis: A systematic thematic analysis of Thailand's Digital Government Development Plan, National AI Strategy, and related documents identifies the strategic goals, intended outcomes, and implementation challenges associated with AI adoption in public administration (Bowen,

2009). Policy document analysis provides a foundation for understanding the Thai government's vision for e-government and the pathways it envisages for achieving productivity gains.

Comparative Policy Analysis: By comparing Thailand's AI initiatives with those in Singapore and Estonia, this study identifies best practices and draws lessons from countries that have successfully integrated AI within public administration. Singapore and Estonia offer valuable insights into the strategies and regulatory frameworks needed for effective AI deployment, enabling this study to contextualize Thailand's e-government ambitions within a broader international perspective.

TOE Framework Application: The TOE framework structures the analysis, focusing on Thailand's technological, organizational, and environmental readiness for AI adoption. This includes evaluating technical infrastructure, assessing workforce capacity, and examining the influence of external regulatory and socio-political factors.

3.1.2 Data Collection

Data were collected from primary and secondary sources:

Primary Sources: Core documents include Thailand's AI and digital government strategies, including publications from the Digital Government Development Agency (DGA).

Secondary Sources: International reports and academic literature on AI applications in public administration, especially in Singapore and Estonia, serve as a comparative foundation.

3.1.3 Data Analysis Techniques

Thematic Content Analysis (TCA) was employed, integrating deductive and inductive coding to identify both predefined themes (e.g., efficiency, transparency, accountability) and emergent themes, such as privacy challenges and skills gaps.

3.1.4 Methodological Rationale

The policy-based and comparative methodology provides a structured, forward-looking assessment of Thailand's AI strategy. Integrating the TOE framework and cross-national comparisons enhances the study's relevance, offering Thailand an informed approach to maximizing AI-driven productivity improvements in e-government.

3.2 In-depth Interview

This study also adopted a qualitative research approach to explore the integration of artificial intelligence (AI) in the Thai public sector through the perspectives of key informants. The qualitative method was chosen to capture in-depth insights, contextual nuances, and diverse interpretations that could inform policy and implementation strategies.

3.2.1 Key Informant Selection

Three key informants were purposefully selected based on their prominent roles and firsthand experiences in AI-related initiatives within the Thai public sector. The selection criteria emphasized diversity in institutional background and strategic perspective. The informants included:

1. A senior official from a national security agency;

2. A government executive with prior experience in the private sector; and

3. A senior bureaucrat with oversight in digital governance.

These individuals were chosen for their ability to provide expert-level, reflective insights into the opportunities, challenges, and policy implications of AI adoption in public administration.

3.2.2 Data Collection

Data were collected through semi-structured interviews, allowing for both guided discussion and emergent themes. Each interview was conducted individually and followed an interview guide that covered three core areas:

- Perceived benefits of AI in the public sector;
- Conditions and strategies for effective implementation; and
- Challenges encountered and proposed solutions.

Interviews were conducted in a confidential setting and lasted approximately 45–60 minutes each. Notes and audio recordings were used for accuracy, with participant consent.

3.2.3 Data Analysis

Thematic analysis was employed to identify, categorize, and synthesize patterns across the interview data. The analysis emphasized interpretive depth, ensuring that each informant's perspective was accurately represented while also allowing for analytical synthesis across cases.

3.2.4 Research Rigor

To ensure credibility and trustworthiness, triangulation was employed by cross-validating insights among the three informants and aligning findings with existing policy documents and academic literature where applicable. Member checking was conducted by sharing preliminary summaries with the participants for validation.

4. Results

4.1 Case Study Results

The results presented in Table 4.1 illustrate the anticipated productivity gains Thailand might realize through the integration of AI into its e-government operations, particularly in comparison with the experiences of Singapore and Estonia. These results are categorized into three key areas of focus: operational efficiency, fiscal transparency, and resource optimization via predictive budgeting. The findings suggest that Thailand stands to benefit significantly from AI-driven solutions, mirroring positive outcomes achieved in both Singapore and Estonia. However, the extent to which these productivity gains can be actualized will depend on Thailand's capacity to address several foundational challenges, including infrastructure and data governance.

Table 1: Projected AI-Driven Productivity Gains in Thailand's E-Government Compared to Singapore and Estonia

Theme	AI Applications	Projected Outcomes for Thailand	Comparative Insights (Singapore and Estonia)
Operational Efficiency Gains	- Document automation - AI chatbots	- Reduction in manual workload by 30-50% - Faster response to citizen inquiries	- Singapore's chatbots reduce response times by up to 40% - Estonia automated document processing, reducing costs by 35%
Fiscal Transparency and Accountability	- Real-time budget monitoring - Fraud detection systems	- Enhanced budget oversight - Reduction in fiscal anomalies	- Estonia's AI fraud detection saves millions annually - Singapore's real-time monitoring improves citizen trust
Resource Optimization through Predictive Budgeting	- Predictive analytics for budgeting	- Improved budget allocation accuracy - Cost savings by	- Singapore's predictive tools have improved budget precision by 20% - Estonia uses AI for resource

Theme	AI Applications	Projected Outcomes for Thailand	Comparative Insights (Singapore and Estonia)
	- Historical trend analysis	reducing budget overflows	reallocation with a focus on high-impact areas

In terms of operational efficiency, AI applications such as document automation and AI chatbots could substantially reduce Thailand's reliance on manual processes, thereby decreasing administrative workload and accelerating response times to citizen inquiries. Singapore's use of AI chatbots, which has led to response times reducing by up to 40%, exemplifies the potential impact for Thailand. Similarly, Estonia has achieved cost savings of around 35% through automated document processing, providing a useful benchmark. These comparative insights underscore AI's capacity to enable Thailand to streamline its e-government services, allowing public sector employees to redirect their focus towards higher-value tasks that cannot be easily automated.

Regarding fiscal transparency and accountability, the integration of AI-based real-time monitoring and fraud detection systems can offer Thailand enhanced oversight of public spending. As seen in Estonia, which has implemented AI-powered fraud detection systems that yield substantial cost savings, AI can be a critical tool in ensuring fiscal responsibility and fostering citizen trust. Additionally, Singapore's real-time budget monitoring initiatives have not only increased transparency but also bolstered public confidence in government spending practices. Should Thailand adopt similar practices, it is likely to observe improvements in public trust through more visible, accountable, and efficient financial governance, enhancing both domestic and international perceptions of Thailand's commitment to fiscal integrity.

Finally, resource optimization through predictive budgeting provides a promising avenue for Thailand to improve budget allocation accuracy and minimize resource wastage. AI-driven predictive analytics has allowed Singapore to improve budget precision by approximately 20%, enabling resources to be allocated more effectively towards high-impact projects. Estonia's adoption of AI for resource reallocation, prioritizing key public sectors, further demonstrates how predictive budgeting can ensure that resources are directed where they are most needed. For Thailand, leveraging predictive analytics in budget planning could significantly improve the efficiency and strategic alignment of public spending, ultimately leading to optimized utilization of government resources. By emulating these examples, Thailand can set a

foundation for a more data-driven approach to budgeting, contributing to a long-term, sustainable increase in public sector productivity.

4.2 Key Informant Insights on AI Integration in the Thai Public Sector

This section presents a synthesized summary of insights from three key informants involved in AI-related public sector development in Thailand: a senior official in national security, a government executive with a private sector background, and a senior bureaucrat. Their perspectives offer diverse yet converging views on the potential, application, and challenges of adopting artificial intelligence in the Thai public sector.

Key Informant	**Perceived Benefits of AI**	**Implementation Strategies**	**Challenges and Solutions**
1. National Security Official	Filters large volumes of data for strategic use; enhances human decision-making; saves analysis time.	Comprehensive readiness: skilled personnel, software/hardware, cybersecurity, high-level processing systems.	Over-reliance on AI; budget limitations; dependence on foreign tech; early-stage local development.
2. Executive with Private Sector Background	Reduces labor-intensive tasks; optimizes resource allocation; improves organizational efficiency.	Build AI literacy, ensure data quality, establish sustainable infrastructure, align national strategy.	Lack of AI knowledge; poor data quality; weak inter-agency cooperation; energy/funding limitations.
3. Senior Government Official	Improves efficiency, speed, and accuracy in government operations; clearer and more precise outputs.	Focus on national infrastructure; support local tech and platforms tailored for public sector.	Limited understanding among leaders; budget constraints; recommend training and policy support.

4.3 Detailed Summary of Key Informant Interviews

4.3.1 Key Informant 1: Senior Official from a National Security Agency

1. Perceived Benefits of AI

The informant emphasized that AI plays a critical role in filtering vast volumes of information, narrowing it down to only the most essential data required for strategic decision-making. AI is seen as a tool that enhances human judgment by providing precisely extracted information. Specific benefits cited include:

- Time savings in data analysis
- Improved ability to differentiate relevant data from various sources
- Enhanced decision-making effectiveness

Importantly, the informant stressed that AI should be treated as a "supporting tool" rather than a decision-maker, serving as a strategic enabler in national security missions.

2. Conditions for Effective AI Integration

Successful AI implementation requires comprehensive preparedness beyond technological readiness. This includes:

- Developing personnel with foundational knowledge of AI
- Acquiring high-performance software and hardware
- Building robust cybersecurity systems
- Enhancing operational systems capable of high-level processing

The informant concluded that only an integrated, multi-dimensional approach would allow AI to become an effective component within the bureaucratic system.

3. Challenges and Proposed Solutions

The informant identified several obstacles:

- Some personnel overly trust AI outputs, neglecting critical human judgment
- Budget limitations and a perception that AI is not an urgent priority
- Lack of a national AI system, leading to dependence on foreign technologies
- Domestic AI development is still in its early stages

Suggested remedies include encouraging national technological development and fostering understanding among decision-makers about the long-term returns on AI investment.

4.3.2 Key Informant 2: Government Executive with a Private Sector Background

1. Perceived Benefits of AI

This informant noted that public understanding of AI remains limited, often equating AI with simple chatbot systems. In reality, AI can significantly reduce labor-intensive tasks, freeing human cognitive resources for creative problem-solving. AI was also seen as instrumental in optimizing resource allocation and elevating the quality of organizational outputs.

2. Strategic Implementation Approach

The informant recommended a parallel and integrated approach across sectors. Key elements include:

- Building AI literacy among public employees
- Ensuring availability of high-quality, usable data
- Establishing sustainable infrastructure, such as data centers with adequate energy resources
- Aligning all ministries and agencies under a unified national AI strategy

3. Challenges and Recommendations

Noted barriers include:

- Widespread lack of basic AI knowledge
- Insufficient availability and quality of usable national data
- Limited inter-agency cooperation
- Energy and funding constraints that hinder long-term AI sustainability

The informant advocated for reframing AI as an opportunity and warned that Thailand may fall behind other nations if it delays investment in AI technologies.

4.3.3 Key Informant 3: Senior Government Official

1. Perceived Benefits of AI

This informant highlighted AI's value in improving public sector workforce efficiency, especially in terms of speed, accuracy, and data reliability. AI reduces time spent on routine tasks while delivering clearer and more precise outcomes.

2. Recommended Pathways for AI Implementation

AI adoption in the public sector should begin with strengthening national digital infrastructure. The informant emphasized:

- Prioritizing domestic technological development over foreign dependency
- Supporting Thai private sector involvement in building platforms tailored to public sector needs

3. Key Challenges and Proposed Actions

Challenges include:

- Many senior executives lack a deep understanding of AI, although interest is growing
- Budget constraints, especially in early-stage implementation

Recommended strategies include developing comprehensive AI training programs for government personnel and establishing clear policy frameworks that promote technological advancement at the national level.

5. Discussion

The results of this study underscore the significant potential of AI to enhance Thailand's e-government productivity, especially in terms of operational efficiency, fiscal transparency, and resource optimization. These findings suggest that, if effectively implemented, AI can play a transformative role in modernizing Thailand's public administration. However, the achievement of these productivity gains is contingent on Thailand's ability to address the technological, organizational, and environmental factors highlighted in the TOE framework.

In terms of operational efficiency, the integration of AI applications such as document automation and chatbots could lead to substantial reductions in manual workload, allowing government employees to focus on tasks that require human insight and strategic oversight. Singapore and Estonia's successes with similar technologies suggest that Thailand could achieve significant gains in service speed and administrative cost reductions. Nonetheless, for Thailand to realize comparable benefits, it will need to invest in a reliable and interoperable digital infrastructure capable of supporting these advanced AI applications. Without adequate technical foundations, including high-quality data systems and secure IT networks, the potential efficiencies offered by AI may remain largely unrealized.

Fiscal transparency and accountability are equally crucial for Thailand as it seeks to improve the public's trust in government spending. AI-powered tools such as real-time budget monitoring and fraud detection could enable a more accountable and transparent approach to fiscal management. In both Singapore and Estonia, the adoption of such technologies has strengthened public confidence by allowing for closer oversight of government expenditure. By implementing similar systems, Thailand can improve budget monitoring and create more accessible pathways for citizens to track government spending. However, enhancing transparency will also require comprehensive data governance policies to ensure that sensitive financial data is protected, as well as public engagement initiatives to communicate the benefits of

these transparency tools to citizens. Balancing the potential gains in transparency with robust privacy protections will be essential in maintaining public trust as Thailand advances its digital government initiatives.

Finally, resource optimization through predictive budgeting emerges as a particularly promising area for Thailand to increase the accuracy and impact of its public spending. AI-driven predictive analytics can provide Thailand with valuable insights based on historical expenditure data, allowing for more strategic allocation of resources and avoiding budgetary redundancies. The successes observed in Singapore and Estonia underscore how data-driven budgeting can help direct funds towards high-impact projects, maximizing the value derived from public investments. However, for Thailand to implement predictive budgeting effectively, it will need to ensure that its workforce possesses the necessary skills to interpret AI-generated insights and make data-informed budget decisions. Developing a culture of data literacy within the public sector, combined with targeted training programs, will be instrumental in helping Thailand to fully leverage the benefits of AI in budget optimization.

Despite the promising outcomes AI could deliver, several implementation challenges remain. A robust technical infrastructure is required to support the computational demands of AI systems, and considerable investment will be necessary to upgrade data systems across government departments. In addition, workforce development is essential, as public sector employees must be equipped with the skills to operate, manage, and interpret AI tools. Furthermore, implementing effective data governance practices to safeguard citizen data and address public concerns over privacy will be essential for fostering trust in AI-driven government services. Addressing these challenges will be critical to realizing the productivity gains AI offers and ensuring that Thailand's e-government transformation is both effective and sustainable.

5.1 Expanded Discussion and Analysis: AI Policy in Thailand

5.1.1 Strategic Reflections on Thailand's AI Policy Architecture

While Thailand's National AI Strategy and Digital Government Development Plan articulate a forward-looking vision, the policy framework remains fragmented across ministries and lacks the operational coherence observed in countries like Singapore and Estonia. The absence of a central coordinating agency with budgetary and regulatory authority over cross-sector AI implementation creates bottlenecks in execution. Moreover, AI policy is often perceived through a technological lens without embedding it into broader socio-economic and governance reforms.

Thailand should establish a National AI Commission under the Office of the Prime Minister or Ministry of Digital Economy and Society to serve as the single-point coordination body. This commission

must be equipped with regulatory oversight, investment planning authority, and cross-agency collaboration mandates, with a focus on public service delivery.

5.1.2 Digital Divide and Infrastructure Inequality

Despite the push for AI-enabled government, digital infrastructure inequality persists between urban and rural provinces. The reliance on cloud computing, high-performance computing, and high-speed networks excludes many regional agencies from leveraging AI tools effectively.

The government must roll out a “Digital Equity Fund” to finance infrastructure upgrades for underserved provinces. This includes AI-compatible cloud data centers, last-mile broadband connectivity, and open-access government data platforms localized for provincial needs.

5.1.3 AI Capacity Building: Beyond Technical Literacy

The key informant interviews consistently point to deficient AI knowledge among government officials, especially at senior levels. However, the current approach to training remains too narrow—focusing on basic AI concepts without addressing the strategic, ethical, fiscal, and organizational implications of AI in governance.

This framework should partner with Thai universities and international institutions to deliver blended learning models (in-person + online).

5.1.4 Governance, Ethics, and Public Trust in AI

While AI can enhance transparency, paradoxically, it can also introduce “algorithmic opacity”—where public decisions become harder to audit due to the complexity of AI models. This erodes citizen trust, especially in cases involving predictive policing, benefits eligibility, or automated regulatory decisions.

5.1.5 Inter-Agency Integration and Data Interoperability

Thailand’s siloed data systems present one of the biggest bottlenecks to AI deployment. The lack of interoperability among ministries means that predictive tools cannot draw from integrated data across health, education, social welfare, and finance sectors.

6. Conclusion and Recommendations

This study demonstrates the considerable potential of AI to enhance productivity within Thailand’s e-government initiatives, particularly in improving operational efficiency, fostering fiscal transparency, and optimizing resource allocation. By drawing on the experiences of Singapore and Estonia, two countries that have successfully integrated AI into public administration, this study illustrates how

Thailand could benefit from similar applications in areas such as document automation, budget monitoring, and predictive budgeting. However, realizing these benefits will require a strategic approach that addresses the technological, organizational, and environmental factors identified in the TOE framework.

To achieve these AI-driven productivity gains, several critical steps are recommended. First, Thailand should prioritize investment in its digital infrastructure. The effectiveness of AI applications, especially in data-intensive processes, depends on a secure, reliable, and interoperable infrastructure that supports large-scale data sharing across government agencies. Developing this foundation will enable Thailand to implement more sophisticated AI tools and realize the potential efficiencies and cost savings associated with automation.

Second, Thailand's government workforce must be equipped with the necessary skills to manage and interpret AI systems. This requires targeted training initiatives focused on data literacy and AI competency, allowing employees to make data-informed decisions and fully utilize AI's capabilities. Additionally, fostering a culture of innovation and continuous learning within the public sector will be essential to adapt to ongoing technological advancements.

In tandem with technical and organizational improvements, robust data governance frameworks are essential. Implementing policies to safeguard data privacy and security will not only protect citizen information but also build public trust in AI-driven government services. Clear communication and transparency about how AI is used in public administration can further alleviate citizen concerns, promoting a positive public perception of AI's role in government.

Finally, Thailand should seek collaboration with international partners, particularly those with established AI frameworks in e-government, such as Singapore and Estonia. These partnerships can facilitate knowledge sharing, enable Thailand to adopt proven best practices, and provide guidance in adapting AI tools to meet local needs. By building on both domestic strengths and international expertise, Thailand can effectively harness AI's transformative potential, ensuring that its e-government initiatives drive meaningful improvements in productivity, accountability, and public trust.

7. New Knowledge from Research

This study makes a significant contribution to the evolving field of public administration by offering a comprehensive, policy-oriented analysis of how artificial intelligence (AI) can be leveraged to enhance e-government productivity in Thailand, with a specific emphasis on optimizing public spending. By utilizing a qualitative case study methodology framework, the research bridges theoretical constructs

with applied policy insights. It contributes to the literature by not only identifying the operational, fiscal, and organizational opportunities of AI adoption in the public sector, but also contextualizing these findings within Thailand's current digital government strategy. Furthermore, the study enriches cross-national comparative research by drawing practical lessons from Singapore and Estonia—two nations recognized for successful AI integration—offering Thailand a realistic and strategic roadmap for implementation.

The research generates new knowledge by presenting a nuanced understanding of how AI technologies, if properly implemented, can enhance public sector productivity in Thailand across three critical domains: operational efficiency, fiscal transparency, and resource optimization. While existing literature discusses AI's generic benefits in public administration, this study uniquely frames AI as a fiscal tool—highlighting its potential to automate processes, improve budget accuracy through predictive analytics, and strengthen public trust via real-time expenditure monitoring. The comparative dimension further validates these findings by showing measurable gains in Singapore and Estonia, such as a 20–40% improvement in budget precision and response times. This comparative lens allows the study to transform abstract policy goals into tangible benchmarks for Thailand.

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