

REVIEW PAPERS

Applying Government Innovations for Public Management and Public Services

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Received: 27 April 2023 / Revised: -/ Accepted: 29 April 2023

Abstract. Innovative government becomes an important principle for governmental agencies to cope with severe challenges and to be adaptable and viable in a changing and disruptive world. This article aims to explore the models and applications of technology and innovations in the public management and public service delivery of the public sector, providing guidance for those interested in building upon these products or services, as well as management processes, in order to enhance the competitive capabilities of businesses or other sectors within the country. Various types of innovations and digital government technology have been applied in Thailand and abroad including artificial intelligence (AI), blockchain, big data analytics, government innovation labs. In Thailand, research and development of government innovations have employed digital technologies as the primary tool for the development of public management and services. Besides, the government may focus on the application of policy-based innovations for strategic planning and policy. The development of government innovation helps create opportunities for collaboration between the private sector and the public to achieve common goals among

government agencies, the private sector, and the public sector to create shared value in utilizing digital technologies, leading to effective and innovative public management and public services.

Keywords: Innovation, Management, Artificial intelligence, Information technology, Public service

1. Introduction

This article aims to examine the models and applications of technology and innovations in the public management and public service delivery of the public sector. The purpose is to provide guidance for those interested in building upon these products or services, as well as management processes, in order to enhance the competitive capabilities of businesses or other sectors within the country.

The content's coherence with the title as specified in the objectives in the introduction:

Title	Content in the Article	Content from the Introduction
Applying Government Innovations for Improved Public Management and Public Services	1. Government Innovations	1. The models and applications of technology and innovations in the public management and public service delivery of the public sector.
	2. Innovations for Improved Management of the Public Sector	2. Providing guidance for those interested in building upon these products or services.
	3. Success of Applying Government Innovations for Improved Public Service	3. Enhancing competitive capabilities of businesses or other sectors within the country.

Currently, Thailand is transitioning toward a digital economy, with technology and innovation being crucial drivers propelling the country toward economic growth. These positive changes lead to improvements in various aspects, such as technology enhancements, technology transfers, and new product designs. When combined with management, these developments result in new investments contributing to the country's increased competitive capabilities.

Innovation, therefore, serves as a vital mechanism for pushing the economic system forward, having a statistically significant positive impact on economic growth. In other words, increased research and development efforts lead to greater economic growth (Intrathavorn and Punyasavatsut, 2016). This aligns with studies on the Idea-driven Endogenous Growth Theory, proposed by Romer (1990), which highlights the importance of human capital with skills and knowledge in research and development as a factor affecting economic growth. Factors contributing to innovation include a common innovation infrastructure, which supports the innovation of the entire economic system. This includes investments, policies that support innovation, human resources, and budgets dedicated to advancements in science and technology (Yodudom et al. 2020).

In the past, Thailand's innovation development has shown an increasing trend, as evidenced by the global innovation index rankings by the World Intellectual Property Organization (WIPO). This index serves as an indicator of innovation capabilities, reflecting the knowledge output, technology, creativity, research, and development of over 132 countries worldwide. Thailand's overall innovation capability rank has gradually improved, with the country ranked 43rd in 2021, up one position from the previous year (National Innovation Agency 2022). Furthermore, the Bloomberg Innovation Index 2021, which

measures countries' competitiveness in innovation, reveals that Thailand's innovation competitiveness rose by four positions in 2021, placing it 36th Globally (6th in Asia) (Office of National Higher Education Science Research and Innovation Policy Council 2021).

In addition to the continuous improvement in Thailand's innovation capability rankings, there has been a concurrent increase in research investment trends in innovation. This is evident in the overall growth of research and development investment, amounting to over THB 208,009 billion. Notably, the public sector's investment proportion has significantly increased by nearly 10% from the previous year, reaching THB 66.304 billion, and the private sector's investment is at THB 141,705 million. The public and private sectors' respective proportions stand at 32% and 68% (Promwong 2022).

Consequently, the public sector plays a crucial role in driving the development of Thailand's innovation capabilities, including policy formulation, promotion of research and development, and particularly taking the lead in adopting innovations and technologies for public management and public services. This pioneering approach serves as an example for the private sector and civil society to adopt innovative strategies to enhance the value of goods and services, eventually leading to an increased economic value within the country.

Factors that stimulate the public sector to adopt innovations and technologies include changes in the global context, such as the spread of the coronavirus disease (COVID-19), the transition to a new normal lifestyle, digital disruptions, and the limitations in the public sector's own capacity to manage issues and adapt to the emerging changes, particularly in cross-ministerial, departmental, and sectoral collaborations (Sirisamphan 2017a).

Currently, the Thai public sector emphasizes the formulation of policies, plans, or projects to support the development of various innovations within the public sector. This is evident from the establishment of the 20-year National Strategy (2018-2037), which aims to achieve sustainable country development based on good governance principles. One strategic focus is on public services and the efficiency of the public sector, with the goal of achieving effective public sector operations through the application of innovative technologies. This includes the development of public services to provide convenience for citizens quickly and transparently through the application of digital technology and innovation in the public sector's management and service provision. Additionally, it involves the development of the public sector's database system and the application of digital technology for the benefit of decision-making and excellent services. This opens up opportunities for the private sector and civil society to access public sector information, increasing competitiveness and benefiting the people's daily life, thereby ensuring the efficiency of government agencies' operations (Office of the National Economic and Social Development 2022).

In addition, issue 23 of the National Strategy Master Plan, focusing on research and development of innovation (2018-2037), aims to balance and develop the public sector's management system to increase the efficiency of public sector operations in line with economic and social activities in the digital age. The plan promotes research, development, and the application of innovations in public sector management to ensure modernity, responsiveness, and the provision of convenient, fast, and transparent public services. Key research topics

include digital government, large-scale public sector information systems, and area-based development mechanisms (Office of the National Economic and Social Development 2022).

Therefore, this article aims to examine the forms and applications of technology and innovation in public management and public services. This is intended to provide guidance for those interested in building upon these findings to develop products or services, as well as to improve management, processes, and the competitive potential of businesses or other sectors within the country.

The Definition of Government Innovation

In the past, with the world undergoing changes that utilize technology and innovation as the main driving forces for national development, the public sector has had to adapt significantly to become the Government 4.0 that operates based on good governance principles for the benefit of the people (Better Governance, Happier Citizens). This ensures that the public sector can truly be trusted and relied upon by the people (Office of the Public Sector Development Commission 2017). Factors contributing to the success of the transition to the Government 4.0 (Sirisamphan 2017b) include the creation of innovation based on the foundation of collaborative efforts between the public sector and other sectors of society, as well as leveraging digital systems to design public services and policies that can address the country's challenges or respond to the needs of the people.

In academic literature, the definition of Government Innovation varies but remains closely related. The meanings are arranged chronologically as follows:

Academics (Year)	The Definition of Government Innovation
Mohammed bin Rashid Center for Government Innovation 2015	Innovation is what leads the public sector to success through driving the development of the best policies, processes, and services.
OECD 2017	A new method, process, concept, or product applied to create impact in various areas; in the private sector, it refers to creating a competitive advantage through new business strategies, while in the public sector, it means creating value within the system, consisting of three components: novelty or invention of new things, adaptation, and impact or increased efficiency, effectiveness, and satisfaction.
Apolitical 2019	The process of implementing new solutions to address existing problems, with the goal of improving the public sector's service to citizens.
Larkins 2021	New solutions, processes, or concepts that have been implemented successfully and produced results in the public sector are complex and valuable, focusing on creating new things, changing outcomes for the better, and increasing efficiency, effectiveness, and satisfaction.
Innovation-Driving Committee of the Secretariat of The House of Representatives, 2022	Public sector work arising from the use of knowledge, skills, experiences, and creativity, which is created to bring about change and create public value or economic and social benefits, possibly in the form of new policies, services, processes, or products.
Office of the Public Sector Development Commission, 2020	New concepts, methods, and processes in organizational development, work process, and service delivery, resulting from the creation, development, enhancement, extension, or application of knowledge and various practices, leading to the development of efficiency, effectiveness, and quality of public sector performance.
Deloitte, 2022	Aspects that the public sector acknowledges and embraces and operations based on a new way of thinking, operational processes, and delivering services.

Based on the definitions of Government Innovation from the above table, a synthesis of research on the subject reveals that most studies define it as the transformation of solutions, processes, and concepts to create new policies, processes, or services that are efficient and effective. The OECD's research elaborates on the components of public sector innovation, stating that it consists of three parts: novelty, adaptation, and impact. Meanwhile, Apolitical emphasizes the focus on change to address existing problems.

Types of Government Innovation and Their Application

Government Innovation can be applied in various forms, depending on the context or challenges a country or organization faces. These adaptations are intended to achieve the

most optimal results. Based on the study, the types of Government Innovation (Office of the Public Sector Development Commission, 2022) can be categorized as follows:

1. Policy Innovation: This involves the creation, design, or establishment of new policies, strategies, missions, and objectives to demonstrate a vision or set a new direction for organizational development by the countries that develop such innovations.

2. Service and Product Innovation: This refers to the design and development of new products and services, such as the development of smart national identification cards and mobile service units.

3. Delivery Innovation: This encompasses the design and development of new ways to provide services or interact with

the public, such as offering services through the internet.

4. Process and Organization Innovation:

This entails designing new organizational structures and internal processes, such as establishing specialized service units to enhance service efficiency and developing budget management and human resource management guidelines.

5. Process Interaction Innovation:

This approach involves improving or developing new systems of relationships or power interactions with other sectors, such as developing comprehensive service processes for all interrelated tasks.

Exemplar Countries in Developing Government Innovation:

This article presents examples of countries that have substantially developed government innovation, namely Sweden, United Kingdom, United States and South Korea, as follows:

- **Sweden:** Currently, Sweden is a leader in transitioning to a cashless society, with 80% of transactions being cashless. Out of 1,600 banks, 900 no longer accept cash. Stores have the legal right to refuse cash payments; even public transportation tickets can no longer be purchased with cash. This rapid development is due to the public's familiarity with digital systems and the widespread internet coverage, which reaches approximately 94% of the country's area. Additionally, Swedish banks have expanded the use of Swish, a mobile application for online transactions, beyond its initial use for peer-to-peer (P2P) and in-store transactions (European Payments Council 2019).

- **United Kingdom:** The UK has developed 1) STARMIND, a computer software that its creators refer to as "human brain technology" that can listen and answer job-related questions; 2) Quantum technology for navigation without using GPS, which is

employed in creating 3D maps and exploring underground resources; the use of this also extends to medical imaging without radiation; and 3) Material development, nearing the point where supercomputers can design materials at the atomic level. Approximately 70% of technical innovations are estimated to be related to materials science, whether directly or indirectly (UK National Quantum Technologies Programme 2020; techUK 2021).

- United States:

The US has established New York City's "I-Zone," a transformative approach to the education system that focuses on enabling students to adapt their learning plans based on their skills or interests. Additionally, the "Government on Wheels" initiative provides mobile services to deliver public services in remote locations, addressing the issue of traveling to government agencies (Mohammed bin Rashid Center for Government Innovation 2015).

- South Korea:

South Korea has implemented the "Shareable City" policy to promote various sharing initiatives, following the trend of the Sharing Economy. Examples include sharing vacant rooms in senior citizens' homes with students (Kim 2022).

In conclusion, exemplar countries developing government innovation primarily focus on innovating products and services, utilizing digital technology as a crucial tool for innovation. The emphasis is on creating convenience in daily life for the general public, from cashless payments to support for students.

Government Innovation and Its Applications

Various countries are developing government innovation and adopting it as a new approach to work/services. These aim to improve the quality of public services, respond to societal needs, as well as help elevate public participation, and foster confidence in every stage of the government policy cycle up to the

implementation. It has been found that the majority of innovations are in the form of services that benefit the public and other sectors of society.

Therefore, this article focuses on the application of government innovation in Thailand that has tangible effects on the public in the form of service and product innovation. This leads to the provision of new public services by transforming traditional service models with innovation and technology to enhance the quality of life for citizens and facilitate their access to services, saving both time and costs. Furthermore, the results of improved services to the public allow the government to obtain vast amounts of data that can be analyzed to understand citizens' behavior or needs, enabling the design of efficient, effective, and targeted policies or public services.

Drawing from the study of significant innovations in Thailand and abroad, along with the findings from the Hype Cycle for Digital Government Technology (Digital Government Development Agency 2021), we can summarize the examples of government innovations applied for public benefit as follows:

1. Artificial Intelligence, or AI, refers to the technology used to create intelligent machines and computers using algorithms and statistical tools to develop intelligent software capable of replicating complex human abilities, such as recognition, differentiation, reasoning, decision-making, prediction, and communication with humans, among others. In some cases, these machines may even be capable of self-learning (Digital Government Development Agency 2019). For the public sector, AI is used for internal management tasks that support the services or the mission of agencies by analyzing repetitive and uncomplicated tasks.

In the public sector, AI has been utilized for the development of Government Innovation, such as permit request processing. The Department of Industrial Works (DIW), in collaboration with the Federation of Thai Industries (FTI), through the use of Robotic Process Automation (RPA) techniques combined with the processing of large-scale data and learning from the evaluation of previously submitted documents, have developed the AUTO e-License system, a permit application system for processing permits to dispose industrial waste within just three minutes using AI technology. Businesses simply have to submit their permit requests electronically, which helps reduce the burden on their end and speeds up the process of industrial waste disposal. Another example is the crime surveillance system developed by the Royal Thai Police, which relies on the combination of closed-circuit cameras and image recognition technology to recognize and distinguish individuals with criminal tendencies. This system helps reduce the burden on police officers in monitoring criminals entering gold shops and assists in coordinating with local police to apprehend criminals within 8 minutes.

2. Blockchain refers to a shared database storage system that ensures data security by guaranteeing that previously recorded data cannot be altered or modified. All users can access the same set of data, utilizing cryptographic principles and the capabilities of distributed computing to establish trust mechanisms (Yermack 2017)

Consequently, the government has employed blockchain to create Government Innovation for tracing transactions throughout the supply chain (Supply Chain Transaction Traceability). This involves using blockchain technology in the issuance of Letters of Guarantee (LG), a collaboration between banks, state enterprises, and business

organizations under the Thailand Blockchain Community Initiative, supervised by the Bank of Thailand. The Electronic Letter of Guarantee on Blockchain (e-LG on Blockchain) has been in operation since June 2019, helping to reduce the time required for issuing guarantees. As this process is completed electronically, it helps in reducing paper usage and document storage costs (Digital Government Development Agency 2021).

In other countries, AI and blockchain have been used to develop innovations, such as in Mongolia, where counterfeit medicines detection has been improved by using AI and blockchain to track their identification codes at every stage before reaching the public (OECD 2019).

3. Big Data Analytics refers to the processing, analyzing, and presenting vast amounts of data using appropriate methods. This includes financial data, operational data, customer data, personnel data, and data stored in various databases, which continually increase in volume, making it challenging to manage effectively using conventional methods.

Applying Big Data for the development of Government Innovation can be employed across various agencies, such as the Tourism Authority of Thailand under the Ministry of Tourism and Sports, and the Government Big Data Institute. These organizations use data analysis to suggest suitable tourist destinations for different groups of travelers, utilizing data from registered hotels provided by the Ministry of Interior, hotel data from the National Statistical Office of Thailand, and tourist entry and exit data from the Immigration Bureau. The Office of Agricultural Economics under the Ministry of Agriculture and Cooperatives uses agricultural data collected to forecast the production volume of Thailand's five main economic crops: rice, rubber, palm, cassava, and

sugarcane. This is done using artificial intelligence technology to improve the accuracy of production forecasts (Kuchaisit 2013; Government Big Data Institute, 2019).

4. Government Innovation Labs are a widely successful approach adopted by several countries, such as the United Kingdom with Nesta's collaboration Y Lab, South Korea with the Seoul Innovation Bureau, and the United States with the Mayor's Office of New Urban Mechanics (Sellick, 2019). These labs serve as experimental platforms for the development of Government Innovations and their appropriate application (Deeyiam and Boontongkham, 2020). In Thailand, the Government Innovation Lab was established by the Office of the Public Sector Development Commission in 2017. The lab comprises experts or innovators from various professions, both public and private sectors, who collaborate using design thinking processes. The lab's organizational structure fosters knowledge exchange to develop novel ideas and problem-solving approaches (Office of the Public Sector Development Commission 2022).

In addition, Government Innovations rely on future technologies for their service development, such as the Digital Twins of Government, quantum technology, and cryptocurrencies.

Government Innovation is a crucial mechanism for the public sector to incorporate innovations in management and public service. Studies on the application of innovations in various countries reveal that they have significantly benefited the public. In Thailand, research and development of Government Innovations have employed digital technologies as the primary tool for the development of new public services for citizens, such as Artificial Intelligence or AI, for example, the development of the AUTO e-License system for managing industrial waste disposal permissions, crime surveillance using closed-circuit cameras and image recognition,

blockchain technology for issuing Letters of Guarantee (LGs) through the e-LG on the Blockchain system, and Big Data Analytics for analyzing and suggesting suitable tourist attractions for different tourist groups. The Government Innovation Lab has also been established to develop new concepts and problem-solving methods (Thienwisitsakul 2017; Vorathumdusdee 2021).

In summary, Thailand has extensively utilized innovations for public service development, although limited to services provided by government agencies. Government Innovation could take the form of policy and strategic innovations, which directly reflect the roles and responsibilities of the public sector in shaping national policies and strategies to demonstrate the country's development direction in various areas that can be transformed into innovations, such as adopting significant trends affecting Thailand and turning them into policy-based innovations, like digital assets or electronic government services. Furthermore, the development of Government Innovation should create opportunities for collaboration between the private sector and the public to achieve common goals within and between government agencies, between government agencies and the private sector, and between government agencies and the public sector to create shared value in utilizing digital technologies. The public should actively participate in co-creating innovative public management by providing opinions, creative suggestions, and practical solutions for various issues through appropriate channels, leading to efficient and comprehensive Government Innovation that effectively addresses public needs.

Acknowledgements

We would like to thank staffs of the College of Innovation and Management, Suan Sunandha Rajabhat University and School of Business,

Sripatum University for their generous supports.

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