# The Feasibility of E-Governance in Taiwan: A Comparative Analysis between Taiwan and Estonia

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Ting Hsi Chen, B.A.

Wenzao Ursuline University of Languages, 2023

## Abstract

This research endeavors to explore methods for enhancing comprehensive e-governance in Taiwan, drawing on the experiences of e-governance implementations in Estonia and Taiwan. Both countries possess conducive conditions and motivations for developing digital societies, owing to their advanced technological capabilities and constraints related to territory, resources, and markets. Estonia serves as an exemplary case of a well-developed digital society with high e-participation. In contrast, Taiwan has made strides in e-governance, but its citizens still lack understanding and participation in the digital society. A comparative approach is employed in this research, utilizing content analysis to gather data from official development organizations, press media, and reviews, among other sources. By comparing these two countries, Estonia is presented as a comprehensive model, while Taiwan serves as a comparable example to elucidate the disparities between them. The study delves into the lessons Taiwan can derive from Estonia's e-governance experience and discusses the potential benefits in terms of sustainability and the economy that can be realized through improved e-governance. Furthermore, this research explores the possibilities for future research in this field. Simultaneously, this research contributes to a better understanding of the digital society among the public, furthering the development of digital society as a whole.

**Key words**: e-governance (e-government), e-participation, digitalization

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# INTRODUCTION

## Background

Nowadays, we are in an era that prioritizes efficiency, thanks to advanced technology. E-governance has emerged as a significant trend in this transition. This shift not only enhances societal efficiency but also contributes to sustainability, affecting aspects such as social participation, government administration, and the economy. For example, e-governance has the potential to reduce the need for staff, thereby lowering costs for government sectors. Moreover, it can mitigate environmental damage by transitioning from traditional frameworks to digitalization. Furthermore, e-governance offers scalability and accessibility to the public, further enhancing societal efficiency and fostering economic growth through increased interaction between individuals and society.

Taiwan, a country with a strong foundation in high technology, is well-positioned to develop e-government systems. In November 2005, Taiwan introduced the 'Digital Nation. Innovative Economic Development Program (2017-2025)' (DIGI$^{+}$ Program), as reported by the Executive Yuan. Over the past four years, Taiwan has consistently ranked among the world's top four most innovative countries, alongside Germany, the United States, and Switzerland. In 2020, it was ranked 11th in the World Digital Competitiveness Ranking. Despite favorable conditions for its development and longstanding efforts to promote e-governance, citizens in Taiwan still lack trust and understanding of e-governance.

Estonia is renowned for its expertise in e-governance and boasts a high e-government development index and global e-participation ranking. Estonia serves as a

comprehensive case study for e-governance, offering a wide array of services and a well-organized digital society supported by numerous related laws and regulations. Estonia continually evolves and improves its digital society and is dedicated not only to building a comprehensive system but also to innovating and exploring new possibilities within the digital society.

Given the similarities between Taiwan and Estonia, this research focuses on e-governance in Estonia as a comprehensive case study. The aim of this research is to compare these two countries, examining the differences between them and proposing models for enhancing e-governance in Taiwan.

## Motivation

Regarding Taiwan's inherent resources in science and technology, and the growing aspect of e-government. Taiwan has the strength to promote e-governance and still needs more improvement. In order to understand the current situation of e-governance in Taiwan and learn about how to improve better e-governance, this research will compare the case of Estonia and Taiwan.

## Research Purpose

The purpose of the study is to identify the success (comprehensive and well-organized case) and failure of e-governance, based on learning and analyzing two cases to understand the working of e-governance. Also, more understand how the system in each country works. Then comparing these two model to discuss how to improve a better e-governance. This research not only aims to discover how to improve the e-

governance but also hope could let the reader more understand the digital society.

## Research Questions

How to improve the e-governance in Taiwan?

## Contribution

The findings of this research may be beneficial for the officials, scholars, and professionals to understand how to improve the e-governance. Besides, this research could become data or sources for related research in the future. Also, it may improve the public's understanding toward the e-governance and digital society.

## Limit

The data collection mainly focuses on information provided by the developing institutions because this research also would like to examine how each model promotes its e-governance.

## LITERATURE REVIEW

Now is a generation where it is difficult to say, 'I could live without the internet.' With the advancement of technology, digital applications and the internet are deeply connected to our daily lives. Dating back to 2002, some scholars had discussed the transformation of using lowercase rather than capitalization for the letter 'i' in 'Internet'. According to the press article <Who Owns the Internet? You and I Do>, it mentioned "dropping the big I would send a deeper message to the world: The revolution is over, and the Net won. It is part of everyone's life, and as common as air and water (neither of which starts with a capital)."[1] Our society and the internet have been inseparable for more than two decades. In the digital society, e-governance has become the trend. According to the data from the UN E-government Knowledgebase's E-government Development Index, this data can be traced back to 2003.[2] E-governance has been developed for over two decades. It grows with technology and thrives with the trend towards sustainability.

### E-Governance

According to the book E-governance, Dr. Perri 6 divided the e-government into four areas of activity, respectively e-democracy, e-service provision, e-management, and e-governance. He mentioned "although they are distinct, there are important

[1] JOHN SCHWARTZ, "Who Owns the Internet? You and I Do," *The New York Times*, December 29, 2002, http://www.nytimes.com/2002/12/29/weekinreview/29SCHW.html.
[2] United Nations Development Programme, "Governance for Sustainable Development Integrating Governance in the Post-2015 Development Framework Discussion Paper," March 2014, https://www.undp.org/sites/g/files/zskgke326/files/publications/Discussion-Paper--Governance-for-Sustainable-Development.pdf.

relationships between them" [3] E-government is the use of information and communication technology (ICT); E-governance is a wider concept. Refer to the research-Digital Government and Digital Governance: Grand Concept, "the E-governance is a concept that defines the impact of technology on governance practices, the relationship between the government and the public, NGOs and private sector entities. E-governance covers the entire range of government steps develop and administrate, and to ensure successful implementation of e-government services offered to the public."[4] These two words seem similar; however, 'E-government' can be described as the use of technology in public sectors, while 'E-governance' is the broader concept encompassing the entire structure of digital government, including 'E-government' within it. As Dr. Perri mentions, they have strong relationships with each other. For instance, 'E-governance' provides E-services for citizens, essentially transforming traditional public services into digital network forms. This transformation can enhance efficiency and sustainability within society. Furthermore, the development of E-services and E-management is interdependent; if any of them lacks the necessary capabilities, none of them can improve effectively. Moreover, a more comprehensive 'E-governance' also paves the way for better E-democracy. With a more structured society, citizens are more willing to participate, which, in turn, enhances E-democracy. Therefore, these concepts are interconnected.

[3] Perri 6, *E-Governance : Styles of Political Judgement in the Information Age Polity* (Houndmills, Basingstoke, Hawpshire ; New York: Palgrave Macmillan, 2004).
[4] Vephkhvia Grigalashvili, "Digital Government and Digital Governance: Grand Concept," *International Journal of Scientific and Management Research* 06, no. 01 (2023): 01-25, https://doi.org/10.37502/ijsmr.2023.6201.

## The Sustainability of Digital Society

According to the UNDP Discussion Paper on Governance for Sustainable Development, "Democracy, good governance and the rule of law at the national and international levels, as well as an enabling environment, are essential for sustainable development including sustained and inclusive economic growth, social development, environmental protection and the eradication of poverty and hunger (General Assembly resolution 66/288)."[5] A comprehensive E-governance can contribute to sustainable development because it can address the needs mentioned above. Based on Urban Governance program by The Global Development Research Center, there are five key elements of e-governance. They include digital service delivery, transparency and accountability, Citizen participation, Efficiency and effectiveness, Digital infrastructure and cybersecurity.[6] Digital service delivery can offer both citizens and businesses a more efficient portal to access public sector services. The efficiency and effectiveness it bring can enhance economic growth and social development. Transparency and accountability in government information can help prevent corruption and build trust, encouraging citizens to actively participate in society, among other benefits. As seen in the previous examples, e-governance can contribute to sustainable development. What's more, the extent and organization of e-governance efforts correlate with the sustainability and benefits they bring, as e-governance functions like a cycle. Just as products need consumers, appealing products must be created first.

[5] "Governance for Sustainable Development Integrating Governance in the Post-2015 Development Framework Discussion Paper," *United Nations Development Programme*, March 2014, https://www.undp.org/sites/g/files/zskgke326/files/publications/Discussion-Paper--Governance-for-Sustainable-Development.pdf.

[6] Global Development Research Center, "Electronic Governance for Cities," Global Development Research Center, accessed November 8, 2023, https://www.gdrc.org/u-gov/04-egov.html.

## The Model of Estonia

### Background

Estonia, the official full name is the Republic of Estonia. It is one of the Baltic states in Northern Europe, with a total land area of 45,227 $km^2$. It was formerly part of the Soviet Union, and on August 20, 1991, the 12th Supreme Council of the Republic of Estonia adopted the Resolution on the national independence of Estonia. According to the 2023 statistics from Statistics Estonia, the population is 1.36 million people, including citizens, foreign nationals living in Estonia, and persons with undetermined citizenship residing in Estonia. The total population has increased by 2.6% compared to the previous year, with approximately 47.4% being male and 52.6% female.[7] Regarding its history, Estonia did not have substantial financial and human resources. However, it had to establish a state after regaining its independence. This demand and limitation contributed to the success of its development of a digital society. As mentioned in the Story of e-Estonia by e-Estonia,

> Our colorful history certainly plays a role in the e-Estonia success story. After restoring our independence, we had to build the state from zero very quickly and with very limited resources. Traditional solutions were just not thinkable in Estonia. We had to manage much faster and more efficiently. We saw a solution in the digitalization of processes and since then, we have continued to progress alongside technological advances.[8]

Estonia has been developing its digital sector since 1994. It created the first draft of the Principles of Estonian Information Policy, which is a strategic outline for IT development. This policy was approved by the Parliament of Estonia four years later,

[7] Statistics Estonia, "Population Figure | Statistikaamet," www.stat.ee, January 1, 2023, https://www.stat.ee/en/find-statistics/statistics-theme/population/population-figure.
[8] "Facts & Figures:Story of E-Estonia," e-Estonia, n.d., https://e-estonia.com/facts-and-figures/.

on May 13, 1998.[9] Over nearly three decades of digital society development, Estonia has built a comprehensive digital society and continues to innovate, a concept known as "e-Estonia." Per the finding of the report—e-Estonia: e-Governance in Practice by the e-Governance Academy (eGA),

> "e-Estonia" is the term commonly used to describe Estonia's emergence as one of the most advanced e-societies in the world – an incredible success story that grew out of the partnership between a forward-thinking government, a proactive ICT sector, and a switched-on, tech-savvy population. (p.6)[10]

According to the article of Welcome to analogue Estonia, it mentioned "Now Estonians are left with two administrative procedures that have to be completed at a government authority: getting married and – if that turned out to be the wrong decision – getting divorced."[11] 99% of public services are currently accessible online, at all times. The government wants to make sure that residents are not forced to perform these activities, thus the only two public services that are still in place are getting married and getting divorced.

The Estonian e-governance model serves as a global exemplar that merits study. Its significance lies not only in its comprehensive nature but also in its ongoing innovation within the realm of e-governance. Perhaps the most notable innovation within the e-Estonia framework is the concept of e-Residency, which positions Estonia as the first country to provide this digital service. Estonia's e-Residency program offers advantages to non-Estonian individuals while also giving rise to complex societal issues within Estonia. To understand the motivation behind the development of this service, one can refer to the article 'Why Estonia offers e-Residency,' which outlines several

[9] Riigikantselei (State Chancellery of Estonia,), Eesti Informaatikanõukogu (Estonian Council of Informatics), "Principles of Estonian Information Policy," e-Governance Academy (Infotrükk Ltd., 1998), https://ega.ee/publication/principles-of-estonian-information-policy/.
[10] Sandra Roosna, Raul Rikk, ed., "E-Estonia: E-Governance in Practice," *E-Governance Academy*, n.d., https://ega.ee/publication/e-estonia-e-governance-in-practice/.
[11] Maris Orav, "Welcome to Analogue Estonia!," e-Estonia, June 4, 2021, https://e-estonia.com/welcome-to-analogue-estonia/.

key objectives:

- Support economic growth and innovation potential in Estonia.
- Share the digital nation's technologically innovative capabilities with the world
- Spread awareness about and preserve the country's rich history, culture, and language with people around the world; and
- Impart Estonia's important values in work, including working flexibly, assuming an entrepreneurial attitude, and finding self-fulfillment in one's career.[12]

**Main Developing Institutions**

According to the Digital Public Administration Factsheet – Estonia 2022, there are nine administration bodies responsible for digital public administration and interoperability policies. Some of these are governmental institutions, while others are non-profit organizations.[13] Based on these administrative bodies, it can be inferred that e-Estonia not only has a well-organized governmental system but also effectively collaborates with the public and private sectors. The factsheet listed the following national administration bodies:

**Governmental institutions:**

- Ministry of Economic Affairs and Communications
- Government Chief Information Officer Office (CIO)
- e-Estonia Council
- Estonian Information System Authority (RIA)
- Computer Emergency Response Team of Estonia (CERT Estonia)
- Management System of the State Information System (RIHA)

[12] Republic of Estonia E-Residency, "Why Estonia Offers E-Residency," September 27, 2023, https://learn.e-resident.gov.ee/hc/en-us/articles/360000720437-Why-Estonia-offers-e-Residency.
[13] "Digital Public Administration Factsheets - 2022 | Joinup," Joinup, August 2, 2022, https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/digital-public-administration-factsheets-2022.

**Non-profit institutions:**

- Estonian Association of Information Technology and Telecommunications (ITL)
- Information Technology Foundation for Education (HITSA)
- eGovernance Academy

The institutions mentioned above are responsible for digital public administration and interoperability policies. Nonetheless, there are several other institutions dedicated to developing e-Estonia. Some are responsible for managing programs to rise the public awareness about digital society, while others are responsible for developing fundamental systems such as e-services and legal frameworks. However, to sustain the functioning of the e-state, it is essential not only to establish the necessary foundations but also to engage users. E-participation plays a vital role in enhancing the digital society. Therefore, accessible information is crucial for the public to gain an understanding and knowledge about the e-state, to trust these intangible services, and to use these services effectively. Meanwhile, providing online information also enhances the accessibility of the e-state to the public. Below, this research provides an overview of the websites of the main institutions related to e-Estonia that are accessible to the public.

**Ministry of Economic Affairs and Communications**

The primary government body responsible for developing e-Estonia is not only accountable for developing the digital society but also for supervising the relevant government agencies. According to information compiled by the National

Interoperability Framework Observatory,

> The Ministry of Economic Affairs and Communications holds political responsibility for the development of the State information policy. In particular, the Ministry elaborates the State economic policy and economic development plans, while also drafting the respective legislation bills in a variety of fields, including informatics, development of State information systems, research and development, and innovation. [14]

Upon visiting the website of the Ministry of Economic Affairs and Communications, there is a section for e-Estonia, referred to as "E-state and connectivity." This section encompasses various aspects such as the digital agenda for 2030, green digital analysis, digital services, cybersecurity, digital skills, and connectivity. It effectively presents the government's goals, the existing services and systems, as well as transparent analyses and data for promoting e-state and gaining public trust.

**The e-Estonia Briefing Centre**

E-Estonia encompasses not only the concept of the digital society of Estonia but also a website that provides detailed information about e-Estonia and the story behind it. The website serves as a comprehensive profile of e-Estonia and is managed by the e-Estonia Briefing Centre. According to the website's introduction,

> The e-Estonia Briefing Centre was designed specifically for experiencing everything e-Estonia has to offer. Established in 2009 as an NGO, it is today part of the Estonian Business and Innovation Agency and plays an integral role in promoting the country's know-how and expertise in digital services.[15]

This e-Estonia website contains extensive information about e-governance in Estonia and the team behind it. Viewers can use this website to gain an understanding of the digital society in Estonia. Additionally, the website not only provides a brief

[14] NIFO - National Interoperability Framework Observatory, "Governance - Estonia ," Joinup, n.d., https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/governance-estonia.
[15] "About Us - E-Estonia Briefing Centre," e-Estonia, n.d., https://e-estonia.com/briefing-centre/about-us/.

introduction to e-services but also includes the stories behind them. These stories cover the history of their development up to recent news and podcasts. Furthermore, the website also connects to other related websites for key e-services. For example, e-residency, investing in Estonia, trading with Estonia, and visiting Estonia. Their website integrates all the sub-websites of e-services into one platform.

### The e-Governance Academy (eGA)

The original name of the organization is e-Riigi Akadeemia Sihtasutus, the English translation is e-Governance Academy. It founded in 2002. According to its official website, "eGA assists public sector and civil society organizations in making digital transformation happen."[16] It plays a significant role to improving the development of e-governance. As the report of eGA strategy 2025 mentioned,

> eGA's mission is to increase the competitiveness, transparency, and openness of societies through digital transformation and e-governance. For this purpose, we analyse information, create knowledge, and transfer Estonian and international best practices to governments and other stakeholders around the world.[17]

## The Model of Taiwan

### Background

Taiwan, official full name is the Republic of China, is an island country located in East Asia. It is surrounded by the East China Sea, the Philippine Sea, and the Taiwan Strait. Neighboring countries include mainland China, the islands of Japan, and the Philippines. The total land area of Taiwan is 36,197 $km^2$; the total population is

[16] "About Us," e-Governance Academy, n.d., https://ega.ee/about-us/.
[17] "EGA Strategy 2025," *E-Governance Academy Foundation*, n.d., https://ega.ee/wp-content/uploads/2015/01/eGA-strategy-2025-external.pdf.

23.265 million, approximately 49.4% are male and 51% are female.

Taiwan is a country with strengths in ICT but has yet to fully integrate e-government services. However, this not-yet-fully-developed digital society achieved a high ranking in the World Digital Competitiveness Ranking in 2022. According to the IMD World Digital Competitiveness Ranking 2022 report, Taiwan was ranked 11th overall in performance, whereas Estonia was ranked 20th.[18] The overall performance is assessed based on three factors: knowledge, technology, and future readiness, each with three sub-factors. For Taiwan, technology was ranked 6th, and future readiness was ranked 8th. Notably, one of the sub-factors, technological framework, achieved a high ranking of 4th, indicating the strength of Taiwan's ICT infrastructure. Therefore, we can know Taiwan possesses fundamental capabilities and strength to promote the e-governance.

According to the Taiwan E-Governance Research Center, the development of e-government in Taiwan can traced back to 1998. The process of its development divides into six statuses.

- During the first phase, the e-government was dedicated to building the infrastructure of government network, developing Internet applications.
- During the second phase, the major goals of the e-government were to promote and popularize the Internet services of government.
- During the third phase, the major goal of e-government was to simplify the service processes by providing proactive and readily accessible information services under the framework of integrated ICT environment.
- During the fourth phase, the e-government will make use of Web 2.0 social network to offer innovation services even more effectively meeting the public needs.
- During the fifth phase called The Digital Government Program, achieve three objectives of “providing people-centric convenient services”, “implementing open, transparent and smart governance”, and “optimizing evidence-based effective policy.”
- During the sixth phase called The Digital Government Program 2.0, aims to deepen goals such as "accelerating data release to drive data reuse," "utilizing citizen data to create new perspectives in governance," and "integrating

[18] IMD WORLD COMPETITIVENESS CENTER, “Digital Competitiveness Ranking 2022,” *Imd.cld.bz* 6th (n.d.), https://imd.cld.bz/Digital-Ranking-2022.

technological applications to usher in a new era of service innovation.[19]

President Tsai introduced the concept of the "Digital Nation, Smart Island" in 2015. This concept entails the development of a digital national infrastructure and the transformation of Taiwan into a smart island. The aim of this transformation is to encourage the public to innovate in new industries, enhance government openness and transparency, and improve people's quality of life. To promote this concept, the Executive Yuan approved the comprehensive management of the "Digital Nation and Innovative Economic Development Plan" in November 2016, which is the current policy known as DIGI+[20] Through Taiwanese digital society processes and policies, the emphasis is on enhancing its foundational elements and improving the quality of ICT infrastructure.

## Main Developing Institutions

### Executive Yuan

The Executive Yuan is the primary governmental institution responsible for the development and promotion of the digital society in Taiwan. It initiated the DIGI+ policy in 2017. On August 27, 2022, the Ministry of Digital Affairs was established[21] as one of the ministries under the Executive Yuan.

### DIGI+

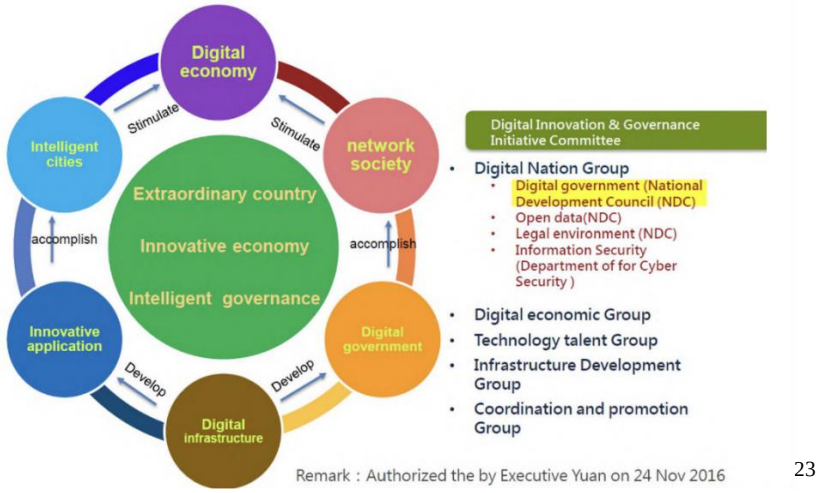
It is an organization established by the Executive Yuan to oversee the primary digital government policy in Taiwan. This policy consists of four key programs: digitization, innovation, governance, and inclusion. The name of the policy, as defined

[19] "數位治理研究中心 | Taiwan E-Governance Research Center - 數位化政府大事紀," www.teg.org.tw, n.d., https://www.teg.org.tw/event/history.php?lg=eng&id=11313&gid=11314.
[20] "行政院智慧國家推動小組-簡介," digi.nstc.gov.tw, n.d., https://digi.nstc.gov.tw/Page/A1701D7654C6B83C.
[21] "關於 Moda-本部簡介," 數位發展部 Ministry of Digital Affairs, August 29, 2023, https://moda.gov.tw/aboutus/introduction/404.

by the Executive Yuan,

> DIGI+ is an acronym derived from the fundamental concepts underlying the program. The "D" is for development and a solid keystone to support it. "I" comes from innovation, a necessary component of an innovative digital economy. "G" stands for the governance of a smart tech nation, and the final "I" indicates inclusion as embodied by Taiwan's welcoming and inclusive civil society. The "+" at the end of the acronym may be read as "plus" or "upgrade," in the sense that promotion of the DIGI+ program will deliver improvements in the nation's foundational digital infrastructure, as well as spur innovation at every level of society and the economy.[22]

**Figure 1. Digital Nation and Innovative Economic Development Program (DIGI+)**



[23]

This policy fosters these four dimensions to ensure societal preparedness with the objective of advancing digitalization across the entire nation and society. The organization is divided into four groups, each aligned with one of the mentioned dimensions: the foundation of digitalization, digital innovation, digital governance, and digital inclusion. Each of these groups is allocated to relevant ministries.[24] Below is a figure explaining the structure and distribution of this organization.

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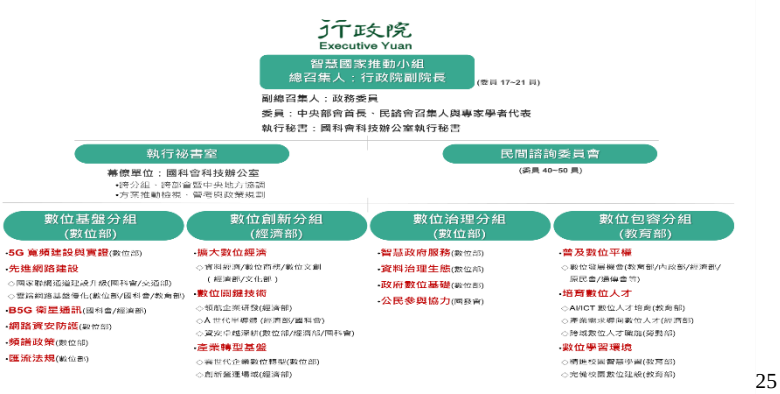
[22] Ibid.

[23] 國家發展委員會, "Digital Government Program 2.0 of Taiwan (2021-2025)," n.d., https://ws.ndc.gov.tw/Download.ashx?u=LzAwMS9hZG1pbmlzdHJhdG9yLzExL3JlbGZpbGUvMC8yMDYwLzVkYTI0OWMzLTVkYzYtNGI0Mi1iMTdiLWEyMWNkNmM0NWM0Zi5wZGY%3D&n=RGlnaXRhbCBHb3Zlcm5tZW50IFByb2dyYW0gMl8wIG9mIFRhaXdhbiAoMjAyMS0yMDI1KS5wZGY%3D&icon=..pdf.

[24] "行政院智慧國家推動小組-組織架構," digi.nstc.gov.tw, n.d., https://digi.nstc.gov.tw/Page/79FC5257BE5338CD.

**Figure 2. The Structure of DIGI+**

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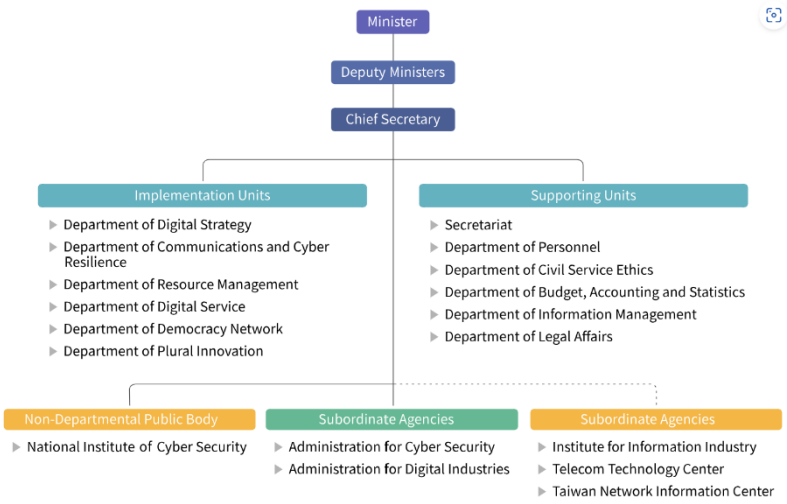
## Ministry of Digital Affairs (moda)

Taiwan's digital policy innovation and change are promoted by the Ministry of Digital Affairs (moda). Moda plans digital development policies and coordinates infrastructure, environment preparation, and resource management to ensure national cyber security, promote cross-sectoral digital transformation, and improve digital resilience for all. Moda does this by combining the five major fields of telecommunications, information, cyber security, internet, and communications.

There are eight core digital affairs: digital strategy, communications and cyber resilience, resource management, digital services, democracy network, plural innovation, administration for digital industries, and administration for cyber security[26]. As indicated in the organizational chart, the first six areas serve as the primary implementation units. The remaining two administrations under subordinate agencies focus on local administration, which is closer to practical application by the citizens.

[25] Ibid.
[26]Ministry of Digital Affairs, "Digital Affairs｜Ministry of Digital Affairs," moda.gov.tw, accessed November 7, 2023, https://moda.gov.tw/en/digital-affairs/348..

**Figure 3. The Organizational Chart of moda**

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## E-Participation

E-participation is an essential element of e-governance. The promotion of e-governance aims to enhance convenience not only for the government but also for its citizens. If the system lacks users, it will not only hinder the development of e-governance but also impede its effectiveness as a digital society. Therefore, e-participation can be viewed as a criterion for assessing the level of e-governance. A well-implemented e-governance system that truly benefits citizens and gains the trust of users will also have a positive impact on e-participation.

### E-Participation in Estonia

Estonia is renowned for its e-governance initiatives and continues to develop its digital society comprehensively. According to the UN E-Government Knowledgebase's E-Government Development Index, Estonia has consistently ranked in the top ten

[27] Ministry of Digital Affairs, "Organizational Chart-about Moda｜Ministry of Digital Affairs," moda.gov.tw, August 27, 2022, https://moda.gov.tw/en/aboutus/organization/620#toTop.

countries for the past three years. In terms of the E-Participation Index, Estonia has also consistently ranked among the top three countries over the same period, and even ranked the first one in 2020.[28] Even if Estonia doesn't hold the top position in the E-Government Development Index, its high E-Participation Index indicates that e-governance is well-developed in this country to a significant extent.

According to an article on the website of the Government of the Republic of Estonia, the government has approved a vision for the Estonian digital society for the next decade. "The Digital Society Development Plan until 2030 strengthens the necessary foundations in three areas: digital state development, national cyber security, and transmission connections."[29] These three areas were essential building blocks for the development of e-Estonia. Many other e-services and solutions had already been created, and more will be developed in the future. Establishing these foundations was a prerequisite for their development. As mentioned in the report 'e-Experience Export' published by e-Estonia,

> The role of the government is to guarantee the existence of the fundamental elements: internet connectivity, digital identity, secure data exchange, trusted digital signatures. Once these are in place, services from both the government and private sector will quickly appear.[30]

In the e-governance model of Estonia, its high e-participation rate is closely related to the comprehensive ecosystem. It not only offers a diverse range of e-services in various aspects but also establishes the most significant foundations to address the biggest concerns for most users—security as comprehensively as possible. This includes aspects such as cyber security, digital identification, and interoperability,

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[28] UN E-Government Knowledgebase, "Data Center," UN E-Government Knowledgebase, 2020, https://publicadministration.un.org/egovkb/Data-Center.

[29] "The Government Approved the Vision for the Estonian Digital Society for the next Decade | Eesti Vabariigi Valitsus," www.valitsus.ee, n.d., https://www.valitsus.ee/en/news/government-approved-vision-estonian-digital-society-next-decade.

[30] "E-Experience Export," *E-Estonia*, n.d., https://e-estonia.com/wp-content/uploads/faq-a4-v02-e-experience-nov2023.pdf.

among others. The role of these foundations is to solve fundamental problems and engage users in the digital society.

### E-Participation in Taiwan

Taiwan achieved high ranking on the IMD World Digital Competitiveness Ranking 2022.[31] According to the report, it achieved high ranking on several aspects. However, Taiwan lacks rankings in two sub-factors: e-Participation and e-Government. This indicates that e-Governance in Taiwan is underdeveloped, in contrast to Estonia's well-developed e-Estonia. Estonia excels in this aspect, with e-Participation ranked 1st and e-Government ranked 3rd, both earning high rankings. The e-participation in Taiwan is one of the main problems to promote the e-governance. Taiwan also has been developing the e-governance for a long time. However, the citizens lack of trust to use the related services from e-governance such as digital identification.

## E-Residency

According to the official website of e-Estonia, "in 2014, Estonia was the first country in the world that launched its e-Residency program to fulfill its ambition of creating a borderless digital society for global citizens."[32] As the definition by E-Residency website of Estonia, "E-Residency of Estonia is a government-issued digital identity which gives global entrepreneurs remote access to the world's most digital country. It provides the possibility to securely authenticate yourself online and sign documents using the most secure and efficient electronic signatures. Plus, the ability to

[31] IMD WORLD COMPETITIVENESS CENTER, "Digital Competitiveness Ranking 2022," *Imd.cld.bz* 6th (n.d.), https://imd.cld.bz/Digital-Ranking-2022.
[32] "E-Residency," e-Estonia, n.d., https://e-estonia.com/solutions/e-identity/e-residency.

start a company 100% online from anywhere."[33] E-residency could bring many benefits not only for government but also business. Especially, it could improve the sustainability of economic growth. However, it is not a e-service can directly develop. Before generating the service of e-residency, the whole system of e-governance and other related e-service, for example, the ID card, smart ID, mobile ID, cyber securities. need to develop well first. A comprehensive e-governance is the foundation of e-residency.

With strong ICT capabilities in Taiwan, it might be a good idea to consider developing e-Residency. Given the many similarities between these two countries, as mentioned in the article "E-residency and open governance,"

> Small nations that are overlooked by the world's mainstream media can seek recognition that transcends national boundaries. Joining traditional international organizations under a national title is no longer the only way for nations to gain influence. In the age of the Internet, using broader and more flexible definitions of sovereignty and citizenship can garner recognition in the international community. The "e-residency" concept could be an especially valuable lesson for Taiwan to learn.[34]

The e-Residency is a great concept; however, if a country would like to develop e-Residency, it needs to build the foundation for a digital society first. Therefore, the ecosystem of a digital society raises the first question for Taiwan: How to improve e-governance in society?

[33] "What Is E-Residency | How to Start an EU Company Online," e-Residency, n.d., https://www.e-resident.gov.ee.
[34] Hochen Tan , "E-Residency and Open Governance - Taipei Times," Taipei Times, July 25, 2018, https://www.taipeitimes.com/News/editorials/archives/2018/07/25/2003697314.

# METHODOLOGY

## Research Design

This is qualitative research. The study population focus on the e-governance of Estonia and Taiwan. This research employs a comparative approach and content analysis. Separately research e-governance in Estonia and Taiwan, focus on indicators for each model. The indicators respectively are cyber security, e-identity, and interoperability. Subsequently, conducts a comparative analysis, highlighting the differences between the indicators of two models. Finally, this research aims to discuss methods for enhancing e-governance in Taiwan.

## The Proposition

This research assumes that the model of Estonia represents a comprehensive e-governance case, while the model of Taiwan is one in need of improvement. Therefore, this research will investigate whether Estonia serves as an example of comprehensive e-governance. If it does indeed offer lessons for Taiwan, the study will compare how the model of Taiwan needs to improve or what Estonia can learn from Taiwan.

## Research Process

### Data Collection for Estonia and Taiwan Models:

In the initial phase, data is gathered for the Estonia and Taiwan e-governance models. This research separate e-governance into three indicators, including cyber security, e-identity and interoperability which are important foundations for e-participation.

**Data Organization and Summarization:**

After the data collection phase, the information is systematically organized into predetermined categories. Subsequently, a concise summary is provided for each indicator. These initial steps form the foundation for outlining the content of indicators in each model.

**Comparative Analysis and Criticism Collection:**

The research then proceeds to perform a comparative analysis of the data from the two models, yielding valuable insights into their respective e-governance systems. Concurrently, criticisms of e-governance within each model are gathered. Notably, the data for each model predominantly draws from official documents and information provided by the relevant development institutions, while the criticism data is sourced from external perspectives, encompassing scholars, press media, and citizens.

**Drawing Insights and Future Discussions:**

In the final phase of the research, building upon the analysis and summaries presented above, the study explores the future of e-governance in Taiwan and discusses strategies to enhance an e-governance model within Taiwanese society.

## DATA ANALYSIS

E-governance has emerged as an enduring trend, gaining momentum in recent years, particularly accelerating in the aftermath of the pandemic. Beyond the evident convenience it brings, e-governance also contributes to sustainability and bolsters the societal economy. Government administrations worldwide are increasingly adopting digital platforms, prompting a shift towards comprehensive e-governance models. Despite this widespread adoption, the crucial question persists: how can we construct an all-encompassing e-governance ecosystem that actively engages and enhances the entire society?

In response to this question, the focus of this research is on addressing the improvement of e-governance in Taiwan. The study adopts a comparative approach, analyzing two e-governance models with Estonia as the benchmark due to its comprehensive and well-developed nature. The objective is to uncover valuable insights from Estonia's model that Taiwan can implement to enhance its own e-governance framework.

The literature review chapter delves into the pivotal role of e-participation in the context of e-governance. Despite Taiwan's relatively shorter history of e-governance development compared to Estonia, the nation has successfully established a well-organized structure and is actively pursuing continuous improvement.

To identify strategies for elevating e-participation rates in Taiwan to match Estonia's levels, this research employs a comparative analysis of foundational elements in both models. The data collection method involves pinpointing three critical foundations for e-participation in Estonia—cybersecurity, e-identity, and interoperability—as key indicators. The study aims to observe the effectiveness of these

indicators in Estonia and assess their current development status in Taiwan.

Drawing conclusions based on the findings, this research will explore the feasibility of implementing robust e-governance in Taiwan and propose targeted strategies for improvement. Through this comprehensive approach, the study seeks to contribute valuable insights to the ongoing discourse on enhancing e-governance practices in contemporary societies.

**Table. 1Data Collection**

| Study Population | Indicators | |
|---|---|---|
| The Model of Estonia | Cyber Security | |
| | e-ID | |
| The Model of Taiwan | Ineroperability | X-Road |
| | | T-Road |

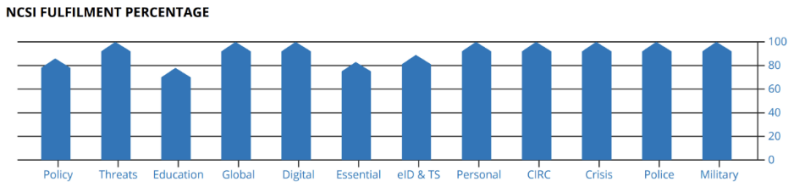
## The Model of Estonia (Foundations)

### Cyber Security

Cyber security is considered a significant foundation, not only for the success of e-Estonia but for the broader digital society as well. Living in a digital society inevitably exposes us to cybersecurity threats, and this, in turn, will influence the development and future of the digital society. According to the report from 2022 provided by the National Cyber Security Index (NCSI), Estonia was ranked 3rd in both the national cybersecurity index, with scores of about 94%. The National Cyber Security Index measures a country's cybersecurity capabilities as implemented by the central

government. (Estonia, CS-1) The figure below represents the NCSI fulfillment percentage for Estonia in 2022, providing an overview of cybersecurity in various domains.

**Figure 4. NCSI Fulfilment Percentage of Estonia in 2022**




(Estonia, CS-1)

**E-Identity (e-ID)**

It was launched in 2002 (Estonia, eID-1), and thanks to this launch, the first digital signature was implemented in the same year(Estonia, eID-2). All Estonians possess a state-issued digital identity (e-ID). According to the website of the Information System Authority (Estonia, eID-3),

> Electronic identity (eID) – a collection of data that connects the person with his/her physical identity in an electronic environment. In Estonia, each person has one physical identity and the same applies to electronic identity.

This aspect encompasses various services, such as the ID-card, mobile ID, e-Residency, and smart ID. Consequently, each citizen can use a single e-ID for multiple purposes. As e-Estonia's introduction to e-Identity mentions, “Estonians can use their e-ID via state-issued identity or ID-card, using Mobile-ID on their smartphones, or the application Smart-ID (Estonia, eID-4).” According to e-Estonia's report on e-identity(Estonia, eID-5), “99% of Estonians have ID-card, which is their digital identity carrier; 19% of Estonians have mobile-ID, which is also their digital identity carrier; 44% of Estonians use Smart-ID, which can be used to log in to financial sector e-services and confirm transactions and agreements” The high percentage of ID-card usage is attributed to its mandatory nature for citizens and permanent residents, as stated

on the official website of the ID-card (Estonia, eID-6) :

> ID-cards are identity documents that are mandatory for Estonian citizens and citizens of the European Union who are permanently residing in Estonia. ID-cards are valid for five years and are issued by the Police and Border Guard Board.

According to the official website of the ID-card, these are usages for ID-card (Estonia, eID-7):

- A physical identity document
- Digital means of identification
  You can use the ID-card to log in to e-services.
- Digital signing tool
- Client card
- E-voting
- Providing an @eesti.ee e-mail address for sending official documents.

**Figure 5. Sample of ID-card in Estonia**

(Estonia – eID-7)

**Interoperability:X-Road**

X-Road is an important service for interoperability. According to the definition on e-Estonia (Estonia, X-Road-1),

> X-Road®, an open-source software and ecosystem solution that provides unified and secure data exchange between private and public sector organizations, is the backbone of e-Estonia. Invisible yet crucial, it allows the nation's various public and private sector e-service information systems to link up and function in harmony.

It is considered the backbone of e-Estonia due to its role in making 99% of public

services available online with 24/7 access (Estonia, X-Road-2). According to the factsheet of X-Road was published on e-Estonia (Estonia, X-Road-3), “if a state or private sector organization wants to offer automated e-services, it just has to connect its databases to X-Road which is the basis for the automation of public services in Estonia.”

These three elements are crucial foundations for e-Estonia. They are considered the cornerstones of e-Estonia. As mentioned in the article－Enter e-Estonia: the Background and Basic Principles by e-Estonia (Estonia, X-Road-4), “the three cornerstones of e-Estonia are e-identity, interoperability solutions, and cybersecurity.”

## The Model of Taiwan (Foundations)

### Cyber Security

Cybersecurity is becoming increasingly important in the face of rising cyber-attacks, especially in Taiwan, which is prone to becoming a target due to geopolitical tensions. If these tensions escalate, the frequency of attacks is expected to rise. According to reports (Taiwan, CS-1), “Taipei, Aug. 16 (CNA) Fortinet, a provider of internet security software, said Wednesday that it detected an average of 15,000 malicious cyberattacks in Taiwan in the first half of 2023.” The U.S. cybersecurity firm claims that Taiwan, being a crucial link in the global supply chain, has become a hotspot for malicious activities. Consequently, the number of attacks discovered in the first half of this year has increased by more than 80 percent compared to the same period last year.

To address the concerns of cybersecurity, the most fundamental solution is to design relevant regulations. Fortunately, Taiwan has several pertinent regulations or laws, including the Cyber Security Management Act, Personal Data Protection Act,

Criminal Code, and others (Taiwan, CS-1,2). Additionally, following the establishment of the Ministry of Digital Affairs, there is a sector called the Administration for Cyber Security. It has an official website that provides information, particularly on the related regulations.

Even with the regulatory framework, Taiwan still needs to improve in enforcement of cyber security. According to the article: Cyber Security in Taiwan (Taiwan, CS-4),

> Taiwan is viewed as having been disappointingly underprepared for operational technology related cyber threats (i.e., acts related to digital transactions). It is estimated that 81% of Taiwanese firms that suffered such attacks did not have a specific incident-response plan, despite a 2,000% increase in operational technology related security incidents in 2019 alone. Industry sources also express concern that many Taiwanese manufacturers still use outdated Windows operating systems or, in some cases, second-hand computers.

If Taiwan is well-prepared for operational technology in cybersecurity, it has the potential to establish a professional industry and nurture talent in this area. The extensive experience gained from dealing with numerous cyber-attacks can serve as valuable lessons for learning and improvement. Furthermore, a trustworthy cybersecurity framework plays a significant role in e-participation, reflecting people's willingness to engage in e-governance.

**E-Identity (e-ID)**

Twenty years ago, Taiwan promoted a program called "citizen card" which is similar to the new e-ID. The citizen card was a card with identification and health care card. This program dates back to 1998, it was promoted by the Research, Development and Evaluation Commission, Executive Yuan. The Executive Yuan had integrated and reissued all the functions of account information, health insurance information,

fingerprint information, electronic signature, and electronic wallet; however, due to strong reactions from civil groups, the project ended in vain (Taiwan, eID-1). After twenty years, the new-eID policy was approved by the Executive Yuan President Su Chin-Chang in May 2019 (Taiwan, eID-2). Also, the government enacted related laws in response to the new-eID policy: the Ministry of the Interior announced the Regulations for the National-wide Replacement of National ID Cards on 19 March, 20220. According to the content of regulations (Taiwan, eID-3), “these Regulations shall refer to the renewal of national ID cards of original styles (hereinafter referred to as the "Old ID Cards") for national ID cards of new styles (hereinafter referred to as the "New ID Cards).” However, there were a lot of against voices from various organizations or the public, for example, Taiwan Association for Human Rights, Open Culture Foundation, and Judicial Reform Foundation. This policy was eventually suspended in November 2021. In a press release by the Executive Yuan, it was mentioned that they will establish a digital identity card replacement system through special legislation, obtain social consensus, and then proceed in accordance with the law. This policy has currently been postponed (Taiwan, eID-4).

**What are the problems for building e-ID in Taiwan?**

The main expectations from the public, as summarized from the related article, are as follows:

- Implementation of specialized legislation
- Establishment of dedicated data protection authorities
- Recognition of potential risks related to insufficient data protection and cybersecurity in digital identity cards. (Taiwan, eID-2)

**Interoperability: T-Road**

In the past, numerous government agencies established exchange channels using diverse data formats and non-uniform transmission methods. Some agencies set up dedicated lines, while others transmitted data via existing methods provided by the National Development Council (NDC). However, it was not a long-term solution. As new information transmission architectures emerge, standards for data transmission security are gradually becoming more apparent. The advancement of smart government necessitates the establishment of a unified exchange mechanism, enabling secure and controlled data exchange among various units. Without this, Taiwan's government digital data delivery may face challenges related to poor efficiency and difficult management.

The T-Road in Taiwan is similar with the X-Road in Estonia. The inspiration for the establishment of T-Road originated from the X-Road. It is built on top of the government's existing backbone network (GSN). T-Road establishes a data transmission channel where the NDC regulates the data transmission format and guidelines. This enables nationwide interconnection and sharing of business data among multiple levels of government organizations while adhering to a common standard. Furthermore, the NDC is developing a smart living site that will serve as a gateway for citizens to access online government services while ensuring a consistent experience for diverse government online services. (Taiwan, T-Road-1)

**The current situation of T-Road**

According to the press, the Digital Minister Audrey Tang mentioned the 2023 policy direction. The government has prioritized the implementation of a zero-trust framework as a primary goal. There is a concerted effort to facilitate cross-agency

data exchange among government entities, with a focus on expanding the use of T-Road for such exchanges. It is anticipated that over the next two years, government agencies with A-level security for the personal information of the entire population will adopt these standards. (Taiwan, T-Road-3)

> As of the end of September 2023, 26 government agencies with A-level security for the personal information of the entire population, including the Ministry of the Interior's National Police Agency, the Bureau of Labor Insurance, and the National Health Insurance Administration, have successfully implemented T-Road. (Taiwan, T-Road-4)

## The Comparison of Two Models

### Focus 1. Cyber Security

Estonia relies on two foundations, namely e-ID and X-Road, to fortify its cybersecurity. A well-organized e-governance ecosystem requires promotion from the government and related industries, foundational services, and, most importantly, user participation to maintain its circulation. As the ecosystem circulates, it enhances the potential for related industries. Estonia serves as an exemplary model; its e-services cover a wide range of aspects, including personal daily living, work, school, and healthcare. The e-Estonia initiative not only provides services but also actively builds a digital society.

While Taiwan already possesses the necessary government sectors, programs, and IT capabilities to promote e-governance, these three foundations are still not stable in Taiwan. Given the high risk of cyber-attacks, gaining the ability to prepare for cybersecurity is crucial.

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**Focus 2. E-Identity**

Estonia serves as a notable example of successfully implementing e-identity, primarily because it not only adopted but also made it mandatory. This compulsory policy has led to a high rate of participation, fostering public trust and ensuring the seamless functioning of the entire e-governance ecosystem. The e-ID system in Estonia offers a diverse range of services, significantly contributing to the development of a digital society.

In contrast, Taiwan is still in the process of promoting e-ID, facing challenges and encountering public resistance. The implementation is hindered by various obstacles, including skepticism and opposition from the public. One of the main controversies revolves around whether to make e-identity mandatory. In the Estonian model, the mandatory adoption of e-identity is a key factor behind its high e-participation. However, in Taiwan, there is a lack of trust in the digital society, and some individuals are opposed to making it mandatory. For instance, the Taiwan Association for Human Rights opposes this policy, particularly its mandatory nature (Taiwan, eID-5).

The new e-ID policy in Taiwan is currently suspended. In the latest press release, Digital Minister Audrey Tang mentioned that the main concern is the security of the transformation of personal information between government organizations rather than the physical ID card itself. He stated (Taiwan, eID-7),

> What concerns everyone more is that after the introduction of this card, the backend exchanges among government agencies may make it easier to collect personal information. So, it's not just about the card; it's about things we are currently doing, like T-Road. Civil society, including the Constitutional Court, believes that there should be an independent body to oversee the use of this backend data. In response to this, the National Development Council has proposed amendments to the Personal Information Protection Act. Following support in the Legislative Yuan, an independent authority for personal information will be established. Our role in the Digital Ministry is to ensure that technologies such as T-Road and zero-trust can earn the trust of the future independent personal

information authority.

Therefore, with the development of T-Road and the establishment of special legislation, the implementation of e-ID in Taiwan is still possible in the future.

**Focus 3. Interoperability: X-Road vs. T-Road**

Interoperability is a critical aspect of both T-Road in Taiwan and X-Road in Estonia, with T-Road drawing inspiration from the Estonian model. These systems function as the backbone network for their respective governments, providing a secure channel for data transmission. This infrastructure facilitates the exchange of personal documents and business-related information among various levels of government organizations. The commonality between T-Road and X-Road lies in their commitment to establishing a robust and secure environment for seamless data sharing and communication within the government framework.

However, the development of T-Road is not as mature as that of X-Road. The e-Estonia ecosystem, utilizing X-Road, provides 99% of public services available online. In contrast, Taiwan is still in the process of implementation, and its general adoption in society is not yet widespread. If the implementation of T-Road becomes mature in Taiwan, it can yield benefits for cybersecurity and instill trust in the public. Moreover, it opens up more possibilities for the adoption of e-ID. Therefore, the improvement of T-Road may further the development of e-governance in Taiwan.

**Summary**

The pillars of e-governance, specifically cyber security, e-identity, and interoperability, serve as crucial elements in the prosperity of e-Estonia. These three

components significantly bolster the security and confidence of users, consequently fostering increased engagement in e-governance initiatives. A robust foundation not only fortifies the ecosystem but also facilitates seamless interactions within it.

Despite Taiwan not currently reaching full maturity in these domains, it has already initiated relevant programs and displays a commitment to continuous improvement. Through ongoing efforts, Taiwan is positioning itself to harness its potential for the establishment of a comprehensive digital society. The outcomes of this research unmistakably indicate that Taiwan possesses the capacity to evolve into a flourishing digital society with a well-structured e-governance framework.

## Discussion

### How to improve e-governance in society?

When comparing the Estonian and Taiwanese models, the primary distinctions lie in their foundational elements. Estonia boasts stable fundamental e-services, encapsulated in the three cornerstones of e-Estonia: e-identity, interoperability solutions, and cybersecurity. The e-ID and X-Road not only play crucial roles in cybersecurity and interoperability but also contribute significantly to building trust between users and the digital society. In other words, these fundamental services have a profound impact on e-participation, a vital aspect for a digital society. Therefore, if Taiwan can thoroughly implement these foundations, it may build a relatively solid foundation for e-governance.

## Solutions for improving the e-governance in the digital society in Taiwan.

### Improving education and awareness on e-governance

When comparing the institutions in both models, both have well-structured organizations for developing the digital society. Even though the responsible institution in Taiwan does not have a long history, it has developed several related policies for various aspects of e-governance. However, the official websites for e-governance are more similar to datasets, with abundant transparent data. It will be even better to provide more educational resources to improve public awareness.

### Improving e-participation

E-participation is an essential element for e-governance, and it underscores the importance of education as it influences the public's understanding and knowledge of the digital society. While e-governance in Taiwan still requires substantial improvements from the government's side, as citizens, we also need to better comprehend the digital society.

A well-organized digital society does not mean it is without risks. People need to learn to acknowledge the presence of risks in the digital society and embrace them. It is important for the public to participate because the public also plays a role in enhancing the development of e-governance. The digital society may have its risks, but it also offers benefits to our daily lives.

# CONCLUSION

The field of informatic technology is in a perpetual state of improvement, showing no signs of fading away. In today's world, people of all ages are interconnected through the internet, making it an integral aspect of our lives. In an era where digitalization is unstoppable, our focus should shift from restricting the use of digital tools to learning how to effectively coexist with the digital society and harness its benefits. E-governance has emerged as a concept actively pursued by governments worldwide in recent decades. Therefore, this research aims to delve into the e-governance process in Taiwan and explore ways to enhance its role in Taiwanese society.

This research constitutes a qualitative exploration of e-governance practices in both Estonia and Taiwan. It has adopted a comparative approach combined with content analysis, utilizing the Estonian e-governance model as a comprehensive and successful reference case, while considering Taiwan as a comparative case study. The core objective of this study has focused on collecting data from the institutions involved in the development of these two e-governance models. Subsequently, we have analyzed this gathered data to draw comparisons and insights, ultimately aiming to provide recommendations for enhancing e-governance within Taiwanese society.

The theme of this research represents a relatively new and evolving aspect. As a result, it is intriguing that the research process will yield valuable insights into various dimensions of the digital society. This is a vast topic encompassing areas such as policy structuring, essential components for enhancing the e-governance ecosystem, and unfamiliar technologies within this domain. Nevertheless, it is challenging to comprehensively introduce even a single model due to the breadth of the concept. Thus, this research offers an overview of the aspects related to policy development and significant foundations. Furthermore, in this study, some related terms lack precise

definitions, occasionally making it difficult and complex to differentiate between them during data collection.

The primary objective of this research is to understand the challenges in the development of e-governance in Taiwan and to explore potential solutions for improvement. It is anticipated that this research will contribute to enhancing the audience's understanding of the concepts related to e-governance and the digital society. The entire content has been created by the author, this research has utilized Chat GPT as an editing tool to refine the text.

## BIBLIOGRAPHY


NIFO - National Interoperability Framework Observatory. “Governance - Estonia .” Joinup, n.d. https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/governance-estonia.

digi.nstc.gov.tw. “行政院智慧國家推動小組-簡介,” n.d. https://digi.nstc.gov.tw/Page/A1701D7654C6B83C.

digi.nstc.gov.tw. “行政院智慧國家推動小組-組織架構,” n.d. https://digi.nstc.gov.tw/Page/79FC5257BE5338CD.

e-Estonia. “About Us - E-Estonia Briefing Centre,” n.d. https://e-estonia.com/briefing-centre/about-us/.

e-Estonia. “E-Residency,” n.d. https://e-estonia.com/solutions/e-identity/e-residency.

e-Estonia. “Facts & Figures:Story of E-Estonia,” n.d. https://e-estonia.com/facts-and-figures/.

“E-Experience Export.” *E-Estonia*, n.d. https://e-estonia.com/wp-content/uploads/faq-a4-v02-e-experience-nov2023.pdf.

e-Governance Academy. “About Us,” n.d. https://ega.ee/about-us/.

e-Residency. “What Is E-Residency | How to Start an EU Company Online,” n.d. https://www.e-resident.gov.ee.

“EGA Strategy 2025.” *E-Governance Academy Foundation*, n.d. https://ega.ee/wp-content/uploads/2015/01/eGA-strategy-2025-external.pdf.

Global Development Research Center. “Electronic Governance for Cities.” Global Development Research Center, n.d. https://www.gdrc.org/u-gov/04-egov.html.

“Governance for Sustainable Development Integrating Governance in the Post-2015 Development Framework Discussion Paper.” *United Nations Development Programme*, March 2014. https://www.undp.org/sites/g/files/zskgke326/files/publications/Discussion-Paper--Governance-for-Sustainable-Development.pdf.

Grigalashvili, Vephkhvia. “Digital Government and Digital Governance: Grand Concept.” *International Journal of Scientific and Management Research* 06, no. 01 (2023): 01-25. https://doi.org/10.37502/ijsmr.2023.6201.

國家發展委員會. “Digital Government Program 2.0 of Taiwan (2021-2025),” n.d.

https://ws.ndc.gov.tw/Download.ashx?u=LzAwMS9hZG1pbmlzdHJhdG9yLzExL3JlbGZpbGUvMC8yMDYwLzVkYTI0OWMzLTVkYzYtNGI0Mi1iMTdiLWEyMWNkNmM0NWM0Zi5wZGY%3D&n=RGlnaXRhbCBHb3Zlcm5tZW50IFByb2dyYW0gMl8wIG9mIFRhaXdhbiAoMjAyMS0yMDI1KS5wZGY%3D&icon=..pdf.

IMD WORLD COMPETITIVENESS CENTER. “Digital Competitiveness Ranking 2022.” *Imd.cld.bz* 6th (n.d.). https://imd.cld.bz/Digital-Ranking-2022.

Joinup. “Digital Public Administration Factsheets - 2022 | Joinup,” August 2, 2022. https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/digital-public-administration-factsheets-2022.

Ministry of Digital Affairs. “Digital Affairs｜Ministry of Digital Affairs.” moda.gov.tw. Accessed November 7, 2023. https://moda.gov.tw/en/digital-affairs/348.

———. “Organizational Chart-about Moda｜Ministry of Digital Affairs.” moda.gov.tw, August 27, 2022. https://moda.gov.tw/en/aboutus/organization/620#toTop.

Orav, Maris. “Welcome to Analogue Estonia!” e-Estonia, June 4, 2021. https://e-estonia.com/welcome-to-analogue-estonia/.

Perri 6. *E-Governance : Styles of Political Judgement in the Information Age Polity*. Houndmills, Basingstoke, Hawpshire ; New York: Palgrave Macmillan, 2004.

Raul Rikk, Sandra Roosna, ed. “E-Estonia: E-Governance in Practice.” *E-Governance Academy*, n.d. https://ega.ee/publication/e-estonia-e-governance-in-practice/.

Republic of Estonia E-Residency. “Why Estonia Offers E-Residency,” September 27, 2023. https://learn.e-resident.gov.ee/hc/en-us/articles/360000720437-Why-Estonia-offers-e-Residency.

Riigikantselei (State Chancellery of Estonia,), Eesti Informaatikanõukogu (Estonian Council of Informatics). “Principles of Estonian Information Policy.” e-Governance Academy. Infotrükk Ltd., 1998. https://ega.ee/publication/principles-of-estonian-information-policy/.

SCHWARTZ, JOHN . “Who Owns the Internet? You and I Do.” *The New York Times*, December 29, 2002. http://www.nytimes.com/2002/12/29/weekinreview/29SCHW.html.

數位發展部 Ministry of Digital Affairs. “關於Moda-本部簡介,” August 29, 2023.

https://moda.gov.tw/aboutus/introduction/404.

Statistics Estonia. “Population Figure | Statistikaamet.” www.stat.ee, January 1, 2023. https://www.stat.ee/en/find-statistics/statistics-theme/population/population-figure.

Tan , Hochen . “E-Residency and Open Governance - Taipei Times.” Taipei Times, July 25, 2018. https://www.taipeitimes.com/News/editorials/archives/2018/07/25/2003697314.

UN E-Government Knowledgebase. “Data Center.” UN E-Government Knowledgebase, 2020. https://publicadministration.un.org/egovkb/Data-Center.

www.valitsus.ee. “The Government Approved the Vision for the Estonian Digital Society for the next Decade | Eesti Vabariigi Valitsus,” n.d. https://www.valitsus.ee/en/news/government-approved-vision-estonian-digital-society-next-decade.

## APPENDIX-The Model of Estonia

Table of the Database Established for Data Analysis: Model of Estonia

| Ref No. | Title | Source of Data | Data Location |
|---|---|---|---|
| The Model of Estonia- Cyber Security (1) | 2022 report of Estonia | NCSI, 2022 | https://www.ncsi.ega.ee/country/ee/?pdfReport=1 |
| The Model of Estonia- Cyber Security (2) | Estonia is a digital society | visit Estonia, 30,09,2020. | https://www.visitestonia.com/en/why-estonia/estonia-is-a-digital-society |
| The Model of Estonia- e-ID (1) | EServices in Estonia: A Success Story a Secure Identity Alliance Visit Report | Secure Identity Alliance, June 2014. | https://secureidentityalliance.org/publications-docman/public/11-14-06-02-sia-estonia-visit-report/file |
| The Model of Estonia- e-ID (2) | Factsheet of E-Identity | E-Estonia, Aug. 2022 | https://e-estonia.com/wp-content/uploads/e-identity-factsheet-aug2022.pdf |
| The Model of Estonia- e-ID (3) | Electronic Identity EID | Republic of Estonia, Information System Authority | https://www.ria.ee/en/state-information-system/electronic-identity-eid-and-trust-services/electronic-identity-eid |
| The Model of Estonia- e-ID (4) | ID-Card — E-Estonia | e-Estonia, 2017 | https://e-estonia.com/solutions/e-identity/id-card/ |
| The Model of Estonia- e-ID (5) | FREQUENTLY ASKED QUESTIONES : e-Identity | e-Estonia | https://e-estonia.com/wp-content/uploads/e-identity-faq-aug2022-1.pdf |
| The Model of Estonia- e-ID (6) | Introduction of ID | ID.ee | https://www.id.ee/en/rubriik/introduction/ |
| The Model of Estonia- | ID-Card and Its Uses | ID.ee | https://www.id.ee/en/article/id-card-and-its-uses/#what-can |

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|---|---|---|---|
| e-ID (7) | | | |
| The Model of Estonia-<br><br>X-Road (1) | Interoperabillity seervices-X-Road | e-Estonia, 2017 | https://e-estonia.com/solutions/interoperability-services/x-road/ |
| The Model of Estonia-<br><br>X-Road (2) | E-Estonia Guide | E-Estonia | https://investinestonia.com/wp-content/uploads/eestonia-guide-veeb.pdf |
| The Model of Estonia-<br><br>X-Road (3) | Factsheet of X-Road | E-Estonia, Mar. 2020 | https://e-estonia.com/wp-content/uploads/2020mar-facts-a4-v02-x-road.pdf |
| The Model of Estonia-<br><br>X-Road (4) | Enter E-Estonia: The Background and Basic Principles | e-Estonia, Harle Pihlak, February 5, 2020, | https://e-estonia.com/enter-e-estonia-video-basic-principles/ |

## APPENDIX-The Model of Taiwan

Table of the Database Established for Data Analysis: Model of Taiwan

| Ref No. | Title | Source of Data | Data Location |
|---|---|---|---|
| The Model of Taiwan-<br><br>Cyber Security (1) | 15,000 cyberattacks detected per second in Taiwan: Software provider | Jeffrey Wu and Evelyn Kao, Focus Taiwan CAN English News, 08/16/2023 07:01 PM | https://focustaiwan.tw/sci-tech/202308160017 |
| The Model of Taiwan-<br><br>Cyber Security (2) | Cyber Security Management Act<br>&<br>Related Regulations | Executive Yuan, November 2021. | https://www-api.moda.gov.tw/File/Get/acs/en/vf22NwGcyvQdrr7 |
| The Model of Taiwan-<br><br>Cyber Security (3) | Cyber Security Policies and Regulations | Administration for Cyber Security, moda, 2022-09-03. | https://moda.gov.tw/en/ACS/operations/policies-and-regulations/648 |
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|---|---|---|---|
| The Model of Taiwan- Cyber Security (4) | Cybersecurity in Taiwan | Paul Shelton, The European Chamber of Commerce Taiwan, 12 May, 2022. | https://euroview.ecct.com.tw/category-inside.php?id=1064 |
| The Model of Taiwan- e-ID (1) | 數位經濟 | 行政院 Excutive Yuan, October 25, 2021, | https://www.ey.gov.tw/achievement/5B6F7E717F7BADCE |
| The Model of Taiwan- e-ID (2) | 從被迫喊卡的數位身分證政策，看台灣與「數位國家」的距離 | 李梅君、劉致昕, 報導者 the Reporter, January 27, 2017, | https://www.twreporter.org/a/e-id-in-taiwan-2021-failed |
| The Model of Taiwan- e-ID (3) | Regulations for the National-Wide Replacement of National ID Cards - Article Content - Laws & Regulations Database of the Republic of China (Taiwan) | Ministry of the Interior（內政部）, Laws & Regulations Database of The Republic of China (Taiwan), March 19, 2020. | https://law.moj.gov.tw/ENG/LawClass/LawAll.aspx?pcode=D0030035 |
| The Model of Taiwan- e-ID (4) | 暫緩數位身分證發行計畫 | 行政院 新聞傳播處, December 1, 2011. | https://www.ey.gov.tw/Page/9277F759E41CCD91/e80e55a2-0102-4031-b6d3-a7c40f4cac6a |
| The Model of Taiwan- e-ID (5) | 【聯合聲明】eID宣判，訴訟已達階段性任務 | 台灣人權促進會 12 May 2023, 10:49 AM | https://www.tahr.org.tw/news/3370 |
| The Model of Taiwan- e-ID (6) | 數位身分證如何確保個資安全？數位部建置「T-road」加密傳輸平台 | 自由財經，2023/05/11 11:03 | https://ec.ltn.com.tw/article/breakingnews/4298039 |

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|---|---|---|---|
| The Model of Taiwan-<br><br>e-ID (7) | 數位身分證重啟？唐鳳：關鍵在 T-Road 及獨立專責機關 | 吳琍君，中央廣播電台，2023-05-11 11:10 | https://www.rti.org.tw/news/view/id/2167398 |
| The Model of Taiwan-<br><br>T-Road (1) | 111 年度「政府資料傳輸平臺(T-Road)維運及輔導機關介接委外服務案」 | 國家發展委員會, Febaruary 2022. | https://ws.ndc.gov.tw/Download.ashx?u=LzAwMS9hZG1pbmlzdHJhdG9yLzEwL3JlbGZpbGUvNjE4NS8zNTY1NS8xNTQzOWE5Ny0wYTVmLTQ4ZGUtOTQxOS1jMzVhYThjZDkwNzgucGRm&n=MDItMTEx5bm0X1QtUm9hZF9SRlAo5aWJ5qC4KS5wZGY%3d&icon=.pdf |
| The Model of Taiwan-<br><br>T-Road (2) | 智慧政府 T-Road 計畫 | KPMG | https://kpmg.com/tw/zh/home/insights/2020/08/tw-digital-governance-t-road.html |
| The Model of Taiwan-<br><br>T-Road (3) | 數位發展部 2023 年施政方針，確保政府資安：力推零信任網路架構和 T-Road 平臺 | 黃彥棻 , iThome, 2022-12-28 | https://www.ithome.com.tw/news/154918 |
| The Model of Taiwan-<br><br>T-Road (4) | 資料加密專線 T-Road 數位部：26 個 A 級機關已導入 | 王育偉，中央社，2023-10-10 09:45 | https://www.rti.org.tw/news/view/id/2182836 |