18th Waseda-IAC World Digital Government Ranking 2023

Waseda University

In cooperation with International Academy of CIO

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Preface

The Institute of Digital Government at Waseda University in Japan, in cooperation with the International Academy of CIO (IAC) has released the 18th Waseda World Digital Government Rankings Survey 2023, which marks digital transformation in advanced digital 66 countries/economies.

The Institute was established in 2002, and this ranking survey model was created in 2005 by Prof. Dr. Toshio Obi, a Founder of the Institute and President of IAC at the time of the First Ranking Survey. Dr. Obi was awarded a spot on "The World's Most Influential 100 People in Digital Government in 2018" by "Apolitical", a UK based Think tank and International Contribution Award on promoting "innovative digital society" by Japanese ICT (MIC) Ministers twice (2013 and 2015).

In 2023, both the Institute and the ranking survey are mainly managed by Prof. Dr. Naoko Iwasaki of Waseda University. We hope this survey will be able to contribute precious value globally to all parties concerned. This edition is extremely significant in the process of UN SDGs, as well as being the 18th memorial anniversary ranking report for digital innovation. Especially the historical trends over 18 years show the remarkable and fruitful progress by digital innovation with 3A-accessibility, affordability, and accountability.

The success of Digital Government is indispensable as a powerful engine for economic growth and strengthening international competitiveness. On this regard, Digital Government is required to act as a catalyst for administrative and financial reforms and contribute to significant cost reductions and administrative DX. Public and Private harmonization and open innovation via digitalization will support efficient government and moreover improve the healthy well-being for SDGs.

We appreciate with thanks the research fellows at Institute of Digital Government at Waseda University heading by Dr. Nguyen Hien as well as APEC Digital Government Research Center under the guidance of Dr. Obi for their great contribution. Also, thanks for international experts in 8 worldwide universities of IAC.

Prof. Dr. Toshio Obi and Prof. Dr. Naoko Iwasaki
On behalf of the team of both Waseda University and IAC

1. Executive Summary- Overall Review

- The 18th Waseda-IAC Annual Rankings of World Digital Government Survey evaluated by the Institute of Digital Government, Waseda University established by Dr. Toshio Obi, has released the results of 2023 ranking survey as the 18th consecutive years. The evaluation has been conducted in cooperation with excellent academia group of major member universities in International Academy of CIO (IAC) as well as distinguished professors at Waseda University.

- The 2023 Ranking Survey with 10 Indicators marks Denmark at first place as the same last year, followed by Canada in 2nd post. the UK ranks in 3rd, New Zealand in 4th, Singapore in 5th, South Korea in 6th, USA in 7th, Netherlands in 8th, Estonia in 9th, and Ireland ranks 10th in the top group.

- This report provides various information and data on both Digital Innovation and Digital Economy as well. These become the key to economic growth and challenges in line with the objectives of Digital Government, which indicates warning signal against digital divide and innovation gap. It might be significant trend that many governments have worked on an early warning system against increasing both cybersecurity attacks and disaster breakout.

- As a matter of fact, most governments above mentioned have increased their excellent achievements in both citizen-centric approach / demand-pull one stop services with pursuing “No one left behind” as SDGs slogan and usages of digital technologies such as AI,5G, Blockchain etc.

- Ten main indicators below evaluate the process and achievement of Digital Government ranking in 2023. The 2023 rankings are summarized based on the fruitful results by a harmonized combination by many stakeholders during every year survey, and the team prepares the relevant reports with precious lessons from various international and regional conferences and meetings by international institutions such as APEC, ITU, World Bank and OECD as well as receiving the productive comments from variety of experts from IAC member universities, government, and business groups.

- The 2023 rankings also point to significant trends in the usage of digital technologies such as generative AI in government activities. It seems that they will continue to grow strongly in the coming years. The difference between this survey and past surveys is the change of target countries. We added four countries including Uzbekistan.

- An analysis for 18 years of the Waseda Digital Government Rankings Survey 2023 indicates the following 10 highlights of the current trends:

1. DX Challenges for SDGs
2. Human resources –Shortage of ICT engineer
3. Green Transformation(GX) for climate change
4. Digital Inclusion
5. Data Driven Evaluation System
6. Threats of Cybersecurity
7. Applications of Digital Twin ,5G, Blockchain and AI for Digital Government

- Although there are lots of differentiations in the usage of AI and other technologies, many governments in developing countries have not yet made much progress on the activities of the ideal digital government due to financial, technical and other constraints. A few countries have adopted generative AI to improve the quality of service and productivity of work, most of which are concentrated in ICT developed countries. Frankly speaking, the reality is that business sectors are advanced in the usage of technology and ICT workforce in comparison with government and public sector. Therefore, any government must catch up with the sectors, to avoid the digital gap between public and business sectors.

- In addition to the above topics of the highlights, there will be five global socio-economic challenges for Digital Government to be solved. These are:

1. Digital Innovation with Standardization－Cloud computing, IoT and AI applications,
2. Ageing Society with skyrocketing population ageing,
3. Shortage of CIO (Chief Information Officer) as ICT leader,
4. Urbanization issues with rapid rise of Mega city and unbalanced harmonization of urban and rural communities" and
5. Lack of Cooperation between Central and Local governments.

- As for the UN's SDGs, the useful utilization of Digital Government might be one of major objectives for stakeholders. On this regard, Digital Government could support the smooth digital transformation (DX) needed for each SDGs sector.

- This survey is well conducted and edited by Prof. Naoko Iwasaki assisted by Dr. Nguyen Hien of Waseda University with energetic effort under the guidance of Prof. Emeritus Toshio Obi and the distinguished experts from Waseda University and 8 world-class universities under the umbrella of the International Academy of CIO in the field. These distinguished professors are Prof. Yang (Peking University, China,), Prof. Auffret (George Mason University, USA,), Prof. Sunkpho (Thammasat University, Thailand,), Prof. Suhono Bandung Institute of Technology (Indonesia,), Prof. Dahlberg (University of Turku, Finland,), Prof. Buccoliero (Bocconi University, Italy,), and Prof. Magno (De La Salle University, Philippines,). Thanks for their precious contributions to the multi-stages of the evaluation and analysis. Also, Appreciations for many professors and research staffs of Waseda University Institute of Digital Government, Tokyo, Japan for their engagement during the 18 years.

-The team hopes that this report will be able to contribute excellent values globally to all parties concerned. We recognize now that the humanity unfortunately suffered from the serious COVID-19 pandemic all over the world for about 3 years as well as 2 on-going conflicts, and we are sure that Digital Government can offer effective and productive solutions on well-being/healthy quality of life over post-corona issues. It is well noted that this edition is extremely significant in the process of promoting SDGs as well.

- In addition, we are convinced that the contents of 18th annual ranking report 2023 are well associated and harmonized with new trends of both digital transformation (DX) and innovation. Also, there are the country assessment reports of top 25 rankings.

World Digital Government Ranking 2023

Table 1: 18th Waseda University World Digital Government Comprehensive Ranking 2023

#	Country	Total
1	Denmark	93.2902
2	Canada	92.2459
3	England	91.9278
4	New Zealand	91.4979
5	Singapore	91.3919
6	South Korea	89.6937
7	USA	88.7400
8	Netherlands	85.8224
9	Estonia	85.4313
10	Ireland	83.9196
11	Japan	83.5541
12	Germany	83.4543
13	Norway	81.6249
14	Sweden	81.4611
15	Taiwan	80.6658
16	Switzerland	80.5450
17	Australia	80.3236
18	Finland	79.9412
19	Thailand	79.0126
20	Saudi Arabia	78.9733
21	UAE	78.9536
22	France	77.1086
23	Italy	76.3371
24	Iceland	76.2060
25	Indonesia	75.9850
26	Spain	74.7971
27	Austria	74.3202
28	Belgium	73.9079
29	Malaysia	73.7182
30	India	73.0972
31	Hong Kong	72.8246
32	Kazakhstan	72.6281
33	Oman	72.6097
34	South Africa	70.0274
35	Russia	69.4431
36	Philippines	68.6910
37	Israel	68.1137
38	Czech	67.8147
39	Lithuania	67.7550
40	Chile	67.0599
41	Poland	67.0386
42	Turkey	66.9790
43	China	65.3063
44	Uruguay	65.1550
45	Vietnam	64.5990
46	Portugal	64.5839
47	Brunei	64.4795
48	Kenya	63.9137
49	Columbia	63.8306
50	Mexico	62.8448
51	Egypt	62.1200
52	Romania	61.6217
53	Argentina	60.5759
54	Brazil	60.4387
55	Bahrain	60.1645
56	Bangladesh	58.7585
57	Uzbekistan	58.2306
58	Morocco	57.5710
59	Nigeria	56.9814
60	Peru	56.4251
61	Tunisia	53.5153
62	Pakistan	50.2313
63	Paraguay	49.8242
64	Fiji	48.0853
65	Costa Rica	47.6883
66	Ghana	41.8802

2. Key Evaluation Indicators and sub 35 indicators

The following table summarizes all 10 indicators and sub-indicators in 35 fields under their umbrella.

Table 2: Key field evaluation indicators and sub-35 indicator list

10 major survey items	35 Survey sub-items
Network infrastructure enhancement - NIP (Building and maintenance of public network)	1-1 Internet subscribers 1-2 Broadband users 1-3 Digital mobile phone subscribers
Contribution to administrative and financial reforms, optimization of administrative management - MO (effects of EA, etc.)	2-1 Optimization progress 2-2 Integrated EA model 2-3 Administrative budget system
Progress of various online applications and services – OS (Types and progress of online service activities)	3-1 Electronic bidding system 3-2 Electronic tax payment 3-3 Electronic payment / customs clearance system 3-4 eHealth system 3-5 One-stop service
Convenience of homepage and portal site - NPR (Status of National Portal)	4-1 Navigation function 4-2 Two-way dialogue 4-3 Interface 4-4 Technical convenience
Government CIO (Chief Information Officer) Activity - GCIO (Authority and human resource development)	5-1 Introduction of CIO 5-2 CIO Authority 5-3 CIO Organization 5-4 CIO Human Resources Development Plan
E-Government Strategy, Promotion Measures - EPRO (Achievement of the plan)	6-1 Legal response 6-2 Effective promotion business 6-3 Support mechanism 6-4 Evaluation mechanism
Enrichment of citizens' administrative participation by ICT - EPAR (Electronic participation of citizens)	7-1 Information sharing mechanism. 7-2 Exchange / Discussion 7-3 Participation in decision making
Open Government - OGD (Open data)	8-1 Legal response 8-2 Society 8-3 Organization
Cyber security - CYB	9-1 Legal response 9-2 Cybercrime measures 9-3 Internet Security Organization
Utilization of advanced ICT - EMG	10-1 Cloud utilization 10-2 IoT utilization 10-3 Big data utilization

3. Overall Data and Statistics

There are 3 tables for 2023 rankings as below: ① Overall Digital Government Ranking ② Historical trends of ranking 2006-2023 for 18 years ③ 10 Sector benchmark(Indicator) ranking by top10.

As a footnote, we have changed the target countries/economies from 64 to 66 as follows:

Omitting 2 countries and adding 4 countries -Bangladesh, Ghana, Paraguay, and Uzbekistan, and changing the weight of 2 sector Scorings-Services and Applications (OS) 12➞14 scores and E-participation (EPAR) 10➞8 scores.

Overall Digital Government Ranking

This ranking in 2023 shows important trends in the use of new digital technologies in government activities. The analysis of this report reveals some notable current trends and shows that the digital sector will continue to grow strongly. The rise of innovative technologies is influencing the promotion of digital government in 2023. However, the overall activities of the digital government during the coronavirus pandemic are not progressing as expected. There are several countries that are adopting both AI and IoT to improve the quality of their services and work productivity, but most of them are concentrated in developed countries such as Denmark, which tops the ranking. To narrow the digital divide, it is necessary to catch up with the DX level of the top digitally advanced countries. On this regard, there are six global social, economic, and political challenges to be addressed regarding digital government as follows:

(1) Closing the "Digital Innovation Gap (Cloud, IoT, AI applications)"
(2) Response to the "Ageing Societies in Japan and Europe, where Ageing Societies are most progressing rapidly",
(3) Global standardization of "open innovation" that transcends national borders,
(4) Narrowing the "digital literacy gap in both global and local communities",
(5) Solving "urban-type social problems brought about by rapidly developing Megacities and economic imbalances between urban and rural areas", and
(6) "Inadequate cooperation between the central and local governments"

In addition, this report analyzes and discusses the following points.

(1) The report contains the ranking scores from 66 advanced ICT countries as well as the country assessment reports.
(2) Analysis of the Historical Transition of Digital Government based on the past 17 years,
(3) Highlights of the new trends of digital government and their impact on the economy and society from the perspectives of "Corona", "DX", "GX (Green Transformation)", "Web 3.0 New Technology Innovation", "Personal Information Protection", "Smart City", "Human Resource Development", "Cybersecurity", and "SDGs".

4. Historical Trends over the past 18 years

This page summarizes the historical trends for 18 years since the first Waseda University World Digital Government Ranking was announced in 2005. The Waseda University World Digital Government Ranking Survey's valuable analysis of the past 18 years tells the story of how digital government has evolved since its inception. For example, in the beginning, the quality of digital infrastructure facilities was important, and countries with strong infrastructure ranked high. Similarly, in the mid-term, countries with high application penetration rates were all the rage. After that, interest began to focus on countries that are familiar with new technology and countries that are strong in cybersecurity. The following six highlights are focused as new trends in the digital field that have been observed in historical trends.

(1) New definition from electronic government “e-Government” to digital government “D-Government”
(2) Utilization/application of new technologies such as AI, 5G, and IoT to digital government
(3) Expansion of scale, such as the development of smart cities and the expansion of e- local governments
(4) Groundbreaking use of both blockchain and digital twins that have begun to contribute to the development of digital government.
(5) Building 5th generation digital government in the future
(6) Dramatic expansion of services and applications etc. is attracting attention. In particular, the attention will be focused on the formulation of new AI rules between governments considering the commercialization of generative AI.

The regular top groups can be roughly divided into Scandinavian countries such as Denmark, the United States and Canada in North America, and Singapore and South Korea in Asia.

In addition, there are domestic factors such as the coronavirus and scandals in the insurance card field, but a comparison with the progress of digital government development in middle-income countries is also an important factor.

Other countries are seriously formulating countermeasures to prevent the widening digital divide caused by the financial crisis that has surfaced due to the coronavirus problem in developing countries. Dr. Toshio Obi, advisor and professor emeritus of Waseda University and director of the APEC e-Government Research Center has been active in this field as co-chair of the digital field of T20, which brought together many think tanks from the world for the G20 Summit Indonesia 2022.

	Year 2005	2006	2007	2008	2009	2010	2011	2012	2013
1	USA	USA	USA	USA	Singapore	Singapore	Singapore	Singapore	Singapore
2	Canada	Canada	Singapore	Singapore	USA	England	USA	USA	Finland
3	Singapore	Singapore	Canada	Canada	Sweden	USA	Sweden	South Korea	USA
4	Finland	Japan	Japan	South Korea	England	Canada	South Korea	Finland	South Korea
5	Sweden	South Korea	South Korea	Japan	Japan	Australia	Finland	Denmark	England
6	Australia	Germany	Australia	Hong Kong	South Korea	Japan	Japan	Sweden	Japan
7	Japan	Taiwan	Finland	Australia	Canada	South Korea	Canada	Australia	Sweden
8	Hong Kong	Australia	Taiwan	Finland	Taiwan	Germany	Estonia	Japan	Denmark
9	Malaysia	England	England	Sweden	Finland	Sweden	Belgium	England	Taiwan
10	England	Finland	Sweden	Taiwan	Germany /Italy	Taiwan/Italy	UK/Denmark	Taiwan / Canada	Netherlands

	2014	2015	2016	2017	2018	2019	2 021	2022	2023
1	USA	Singapore	Singapore	Singapore	Denmark	USA	Denmark	Denmark	Denmark
2	Singapore	USA	USA	Denmark	Singapore	Denmark	Singapore	New Zealand	Canada
3	South Korea	Denmark	Denmark	USA	UK	Singapore	UK	Canada	UK
4	UK	UK	South Korea	Japan	Estonia	UK	USA	Singapore	New Zealand
5	Japan	South Korea	Japan	Estonia	USA	Estonia	Canada	USA	Singapore
6	Canada	Japan	Estonia	Canada	South Korea	Australia	Estonia	UK	South Korea
7	Estonia	Australia	Canada	New Zealand	Japan	Japan	New Zealand	South Korea	USA
8	Finland	Estonia	Australia	South Korea	Sweden	Canada	South Korea	Estonia	Netherlands
9	Australia	Canada	New Zealand	UK	Taiwan	South Korea	Japan	Taiwan	Estonia
10	Sweden	Norway	UK / Taiwan	Taiwan	Australia	Sweden	Taiwan	Japan	Ireland

5. The Country Assessment Report of top 25 Countries/Economies on Digital Government

Denmark

1. General Information

Area: 43,094 km^2

Population: 5,882,261

Government Type: Unitary parliamentary, constitutional monarchy

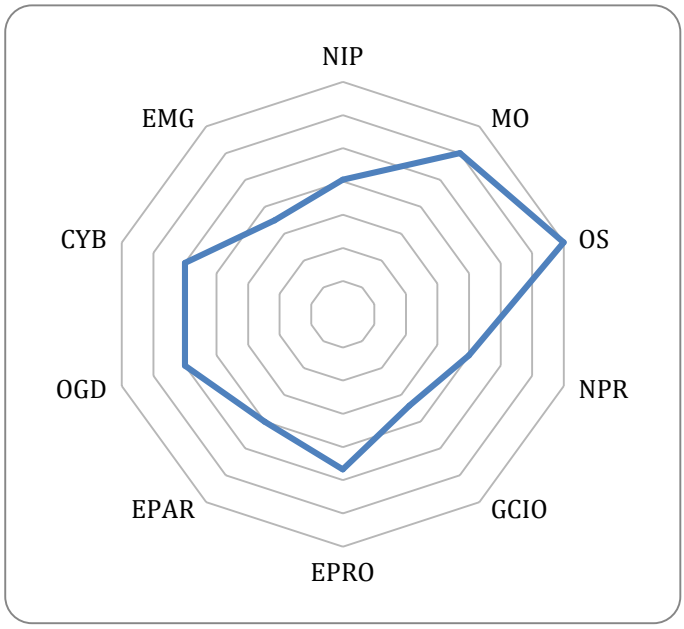
GDP: $60,535

Internet User: 96.55

Wired (Fixed Broadband User): 44.72

Wireless Broadband User: 138.67

2. Digital Government Overview in Country



3. Digital Government Development and New Trends

3.1. The development

Denmark has made great strides in digital transformation and now ranks first among 66 nations, with a total of 93.2902 scores. Denmark comes out on top in almost every research and analysis done on the topic of the digitalization of the public sector. It has the highest penetration of digital services in the

European Union, and its residents are among the happiest people anywhere in the world, with the capacity of their government to satisfy their demands. The way that digital transformation in the public sector may be effective is shown by the road that was chosen by the Danish government.

The accomplishments of Denmark in the field of digital transformation have been extensively lauded, as shown by the nation's position at the top of the Digital Economy and Society Index published by the European Union in 2017, 2018, and 2021. In 2022, according to the Digital Cities Index compiled by Economist Impact, Copenhagen came in first place worldwide.

It is believed that Denmark's relatively low population and higher-than-average tax rates have been essential in the nation's government's ability to successfully implement digitization initiatives. Even if this is unquestionably a factor, it is essential to keep in mind that Denmark's journey toward digitalization started many decades ago and, as we will see, included a multi-step process.

3.2. New Trends

Denmark has had well-defined and well-thought-out digitization plans for over 20 years. It has been argued that "Denmark is the first country in the world to ensure its citizens access to life-long learning via the network society." These objectives laid the groundwork for Denmark to become a pioneer in the field of digital governance.

First, the government made it easier for people to utilize digital technology by teaching about digitalization.

Second, by committing to digital administration, they aimed to modernize inefficient legacy systems and provide people and government workers with high-quality, user-friendly digital public services.

Finally, they did not merely make political reforms from the top down but also citizen-centered cultural changes by embracing the internet into their democracy and cultural activities.

The Danish government's digital strategy is updated often; every four years, a new report is released by the Agency for Digital Government. It routinely forms public-private alliances to advance its digital infrastructure. In addition, it regularly enhances services with a view toward expanding access and encouraging participation.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Denmark made headway by becoming the first EU country to abolish all COVID restrictions. In the previous two years, Denmark has developed a digital public sector thanks to its strong welfare system, advanced digital infrastructure, and current pandemic strategy. Danes were the first EU country to abolish all COVID restrictions; thus, they no longer required face masks or QR codes.

A robust and publicly maintained digital service infrastructure has helped Danes and Danish businesses return to normality and improve Danish society. "A national eID, user-friendly portals, and easy access to data from several centrally held registries" are among the infrastructure's many services and systems, says Danish Agency for Digitization Deputy Director-General Mette Lindstrm Lage.

4.2. Management Optimization [MO]

Denmark was ranked first in the indicator of Management Optimization in the Waseda rankings, with other four countries. To developing the Digital Growth Strategy 2025, the government of Denmark has worked in conjunction with a diverse assortment of corporations, professional groups, and advocacy organizations. The purpose of the Danish plan is to foster the development of the next generation of IT specialists and contribute to the progression of digital transformation projects on a national scale. The goal of the strategy's six pillars and 38 individual initiatives is to keep Denmark at the forefront of digital transformation and digital skills development within the European Union (EU). This will be accomplished by maintaining and enhancing Denmark's position as a leader in these areas.

An effort is being made to improve children's and everyone's digital literacy by implementing a new curriculum that places an emphasis on technology in elementary and junior high schools. Providing individuals with the education and experience they need to achieve success in the labor market, both now and in the future. Initiatives that are started in this context aim to increase employment and work satisfaction while also cultivating the next generation of STEM (Science, Technology, Engineering, and Mathematics) professionals in the digital sphere. Increasing the number of opportunities for skill-building training and development for small and medium-sized businesses to facilitate the commercialization of unique and emerging technology.

4.3. Online Service [OS]

The digital public services that make Denmark an e-government leader include.

1. Digital identification tool NemID utilized everywhere

The e-identification service NemID—“easy ID”—is essential to a digital Denmark. It allows Danish people and companies to electronically identify themselves for all public and private digital services, sign papers, log in to digital banking, health services, taxes, and more. Over 90% of Danes use NemID for digital identification. MitID (“my ID”), the third-generation Danish eID, was introduced in 2022. MitID, developed in public-private cooperation with Danish banks, addresses cyber-fraud and phishing threats with increased protection.

2. Digital Post: Secure mailbox

Digital mailboxes are nothing new—your email is one—but Denmark's Digital Post technology lets government organizations and authorities securely connect with individuals and companies. Citizens may get safe digital mail in many ways now. Digital Post is the government's service for sending communications to people. Supplemental services E-Boks and mit.dk are public-private partnerships. Digital mailboxes allow public and corporate entities to securely interact with residents, workers, partners, and consumers online. Danish citizens utilize Digital Post 94%, and 92% feel confident contacting authorities on it. As with other Danish public services, people utilize their NemID.

3. Borger.dk is a centralized portal for all Danish government services.

It's like a mall for Danish government services. Each of the various services listed below may also be accomplished entirely online. The Danish government has created an English-language version of borger.dk to better serve the country's sizable expat population.

The Danish citizen may get a reminder on her Digital Post that she has to file her taxes. The next step would be for her to visit borger.dk and go to the tax portal there. She would access the tax website using her NemID and NemLogin, complete the application, and have the refund sent to her NemKonto.

4. Apps: ID, health insurance, Digital Post

The Danish Government, like many private enterprises, demands more than merely functional digital services. Instead, they enhance usability and consumer experience. This emphasis on the customer/citizen experience is crucial to Danish residents' high digital service consumption and is likely most obvious in the creation of mobile applications for the above services and more.

The Danish Driving Licence App operates like a real license. It contains alerts when a license needs to be evaluated and dynamic QR codes that authorities and people may use to verify identification.

Their Danish Health Insurance Card, which provides healthcare in Denmark, has an app. Access your Digital Post, use your NemID, and transfer money using a phone number with applications.

4.4. National Portal [NPR]

Denmark was in the top countries in the Waseda rankings getting the highest scores for this indicator. To improve citizens' access to public sector data, the government of Denmark unveiled a new National Data Portal in 2022. The portal's principal goal is to aid users in navigating the data environment by providing helpful explanations and connections to public sector data. Geospatial data, demographic statistics, and information on Denmark's flora and fauna are only a few examples of the types of high-quality data that have a long history of use in Denmark for public administration reasons. In recent years, public sector institutions have increased their open data initiatives, making this information accessible to a wider audience.

The new National Data Portal fits into a larger European effort to use data to solve social problems, encourage innovation, and stimulate the economy. The metadata standard used by the site is DCAT-AP-DK, which is based on European and international standards and forms a fundamental part of the IT infrastructure used by the Danish government. A dedicated in-house team of developers will employ agile methods to continually improve the site in response to user feedback. Citizens may access online information and eServices supplied by the public sector via the Citizen Portal, which was first introduced in January 2007. It's a system in which federal, state, and local governments work together to provide services. A worldwide sub-site, written in English, is available via the Citizen Portal.

Information, data, and eServices are available to residents at the national, regional, and local levels via the Citizen Portal. Access to Digital Post is included (see below for more information on Digital Post). To further facilitate people' management of their relationships with government agencies, the Citizen Portal provides several self-service options. In addition, a single sign-on solution eliminates the need for individuals to create separate logins for each agency from which they need to receive information or use a service.

There are now approximately 2,000 self-service options available on the platform. The number of people that visited borger.dk in 2022 was an all-time high, at 72 million. The previous high was 70.7 million visitors, achieved in 2021. A poll found that 91% of respondents were happy with borger.dk, with 90% of users indicating they were "satisfied" or "very satisfied" with the website.

4.5. Government CIO [GCIO]

Data on Chief Information Officers (CIOs) employed at subnational levels of government are not made available to the public. The Chief Information Officer (CIO) position in the government does not exist in its current iteration. On the other hand, members of the Steering Committee for Joint Government Cooperation (STS) come from a diverse collection of administrative regions. The STS facilitates the sharing of information between various government departments on the e-government initiatives that they are working on. The findings and recommendations of the committee are made available to the public once every two years. At this point in time, there are no laws that are in effect that detail the responsibilities of the government's Chief Information Officer.

4.6. E-Government Promotion [EPRO]

The government is now putting into action 61 new projects as a component of this strategy to address the recommendations given by the Digitization Partnership. The measures will have a significant influence on the lives of Danes by slashing bureaucratic red tape for companies and accelerating the digital transformation of those enterprises, supporting the transition to a more environmentally friendly economy, freeing up funding for health care, and promoting the development and innovation of the private sector. Denmark was one of the two countries getting the highest scores for this indicator.

The government's National Strategy for Digitalization is based on 9 visions that show where digital solutions should be applied to solve real-world social challenges and strengthen the economy for everyone. These visions were developed as part of the government's commitment to digitalization. However, there is a risk of our most personal data being made public if it is not carefully looked after, new types of crime are arising, and attacks are being made on our democratic debate. It is for this reason that Denmark has invested resources into a National Strategy for Cyber and Information Security, a revamped Data Ethics Council, and a series of initiatives aimed at safeguarding the country's liberal democratic ideals and shaping the direction of digital development overseas in accordance with Danish best practices.

4.7. E-Participation [EPAR]

Denmark was one of three countries with the highest scores on this indicator. The Danish Government released its National Digital Strategy in May 2022, outlining the country's long-term vision for the country's technological future. At the same time, a new digital strategy for the public sector is being

created in tandem with the municipalities and regions of Denmark. These plans will not only guide the Agency for Digital Government's efforts but also indicate where Denmark will be heading in its digital transformation over the next several years.

There are now six focuses for the Agency for Digital Government's 350 staff to concentrate on.

- Building and maintaining the backbone of government service delivery - the national public digital service infrastructure.
- Providing a broad vision for the government's use of data and ICT.
- Institutionalizing robust protections against cyberattacks and data breaches in the public sector.
- Providing leadership for inclusive and accessible public digital services.
- Using technology to ensure that recently passed laws can be efficiently administered.
- Ensuring high-quality ICT system portfolio development for the government and efficient operations of current systems.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

Denmark typically does highly in government digitalization studies. Denmark has worked hard to digitize for over two decades. They have invested in technology, legislated to encourage digital services, educated the public, and cooperated with the private sector to deliver a full suite of efficient and unified digital public services.

NemID, Digital Post, NemKonto, borger.dk, and others helped Denmark become a data-driven, "digital first" nation. The latest award came in June 2022 when Economist Impact named Copenhagen the global digital capital. Denmark’s public administration digital transformation achievement is instructive. It shows how digital, public-focused service delivery may save government costs without compromising quality or consumer satisfaction.

4.9. Cybersecurity [CYB]

Denmark was among the five countries with the highest scores in the Waseda rankings. The nation being one of the world's most technologically proficient countries, is particularly good at grasping digital possibilities. Taking up the task of bringing technology improvements to the masses. When it comes to digitalization, the government's policy includes both the public and commercial sectors. The

strategy's goals are to improve cyber and information security; provide consistent service to individuals and businesses; free up more time for social welfare programs; boost economic growth and digital small and medium-sized enterprises; create the digital healthcare system of the future; speed up the green transition with digital solutions; place Denmark at the forefront of international digitalization; establish a solid, ethical, and responsible digital foundation; and position Denmark as a global leader in the digital revolution.

The goals of the National Strategy for Cyber and Information Security 2022-2024 include securing government and critical infrastructure ICT operations and giving individuals and companies the tools, they need to do so safely online. The plan brings together a few separate activities into a unified whole. Between 2022 and 2024, the government has committed DKK 270 million (EUR 36 million) to 34 projects designed to put the policy into action and better prepare Denmark to counter cyber threats.

4.10. The use of Emerging ICT [EMG]

The shift from analog to digital was facilitated by a great number of recently developed technologies, all of which are linked to and executed on computers. The extensive use of "Big Data" processing skills as well as other technologies such as sensors, robots, 3D printing, and artificial intelligence, are a few examples. These advancements are already making some forms of labor easier on the bodies of employees, allowing people to do jobs that were previously impossible and enhancing the overall quality of the products and services that are produced.

It is not about the introduction of a single technological innovation that the digital revolution is taking place. The fact of the matter is that multiple different technologies, some of which have been there for a very long time but have never truly functioned together, are now capable of doing so and are mature enough to be deployed in applications that are really used in the real world.

Canada

1. General Information

Area: 9,984,670 km^2

Population: 38,781,291

Government Type: constitutional monarchy

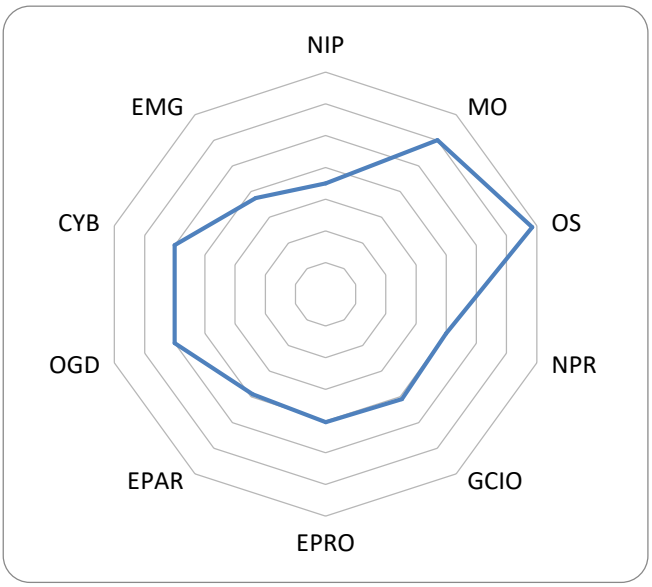
GDP: $60,914

Internet User: 92.83

Wired (Fixed Broadband User): 42.07

Wireless Broadband User: 75.08

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

Canada achieved second place by accumulating 92.2459 scores, thanks to their considerable involvement and investment in the government's efforts to digitize. Canada, much like many other countries, is in the middle of a revolution in the delivery of digital services and must change fast to fulfill the needs of customers. Finding these services, navigating them, and utilizing them may be aggravating for consumers owing to the complex flow of data and information. In today's increasingly digital world, the rate of change as well as the scope of that change are both accelerating. The world is always evolving, and new technologies are being developed. It is now believed to be the norm for new

technologies, digital platforms, and data sets to be developed at a quick rate. Programs and services provided by the government, such as Employment Insurance, passports, and Old Age Security, are relied on by millions of people in Canada, and these programs and services are made possible by hundreds of software applications. It is essential to monitor the overall health of these applications to guarantee a reliable and secure network.

All government services, including digital ones, rely on reliable and secure networks and infrastructure. The Government maintains a few networks around the country, both old and new. Most antiquated systems are unable to handle cloud computing, video, or telephone calls. Most existing networks are constructed using antiquated, difficult-to-maintain design concepts. The Government network is being consolidated and upgraded by Sharing Services Canada. As a part of the consolidation and modernization, access to external networks was increased to accommodate cloud computing and SaaS. While government networks and infrastructure are protected, the needs of the high-security organizations will be met.

3.2. New Trends

The Country's Digital Strategies - "The Ambition" authorizes an annual, three-year enterprise-wide plan to combine service, information, data, IT, and cybersecurity. It will be updated yearly to reflect a changing environment and influenced by federal public service digital and service delivery community cooperation and communication. The Ambition's four strategic themes and government-wide goals continue. The Ambition continues to emphasize outcome-driven, action-oriented solutions to digital modernization concerns.

To achieve the Ambition, Canada must establish a digital mentality throughout the government to guarantee that policies and programs incorporate digital service delivery demands from the outset and that people and their needs are at the center of work. Ambition priorities for the next year:

- Safe, secure, and dependable operations in a changing threat environment
- Measurable progress on multi-year, foundational, and transformational government-wide programs to modernize immigration, benefits (such as Old Age Security, Employment Insurance, and Canada Pension Plan), and payment system technology and processes.
- Providing the technology for “one front door” to offer a uniform and individualized federal government service experience and entry point.

- Allowing solutions that facilitate the transition from an analog to a digital environment to meet the late 2022 Access to Information review results.
- Fostering a systematic cultural change throughout government to see policy and program development via a digital-first perspective.
- Recruiting, keeping, and growing the Government's digital talent to establish a diverse community that represents our customers and can do essential, purpose-driven work.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

The Department of Defense prioritizes innovation and investment as they design and execute strategies to fight economic risks to national security in 2023–24. Protecting sensitive intellectual property, military and dual-use technologies, personal data, and essential infrastructure. Outreach and engagement activities for sensitive technologies will target key stakeholders, including industry and academia subject matter experts.

In 2023-24, Public Safety Canada and its public and corporate partners will reinforce Canada's critical infrastructure (CI). Building on 2022–203 talks, the Department will conduct policy research and analysis to ensure that Canada's enhanced CI security and resilience strategy appropriately responds to the expanding threat scenario. To do so, Canadians must work with foreign partners to learn effective ideas and approaches for Canada. The Department also wants to make more CI tools and information products available via webinars, teleconferences, newsletters, the online information portal, in-person meetings, and public availability.

Public Safety Canada will continue to build coalitions to achieve the National Strategy for Critical Infrastructure's cyber and CI targets in 2023-24. Through existing governance mechanisms and engagement tools (such as the Hex Report newsletter for subscribed CI stakeholders), the Department will continue to strengthen partnerships with provincial and territorial governments, the private sector, CI owners and operators, academic stakeholders, and international partners to disseminate information, advance priorities, and address the full spectrum of risks faced by these groups.

4.2. Management Optimization [MO]

Canada was ranked first in the indicator of Management Optimization in the Waseda rankings, with other four countries. The comprehensive framework for the integration of services, data, information technology, and cybersecurity across the government is thoroughly explained in the Department of State Plan (DOSP) for the period 2021-2024. The document presents the fundamental factors to be considered and the necessary procedures to be adhered to progress.

The allocation of resources is necessary to ensure the maintenance of a government IT system, network, and infrastructure that is both accessible and safe. Furthermore, it is crucial that these systems remain up-to-date and possess the capacity to effectively meet the demands of all agencies involved.

The objective is to develop and provide services that prioritize users by ensuring accessibility, inclusivity, user-friendliness, and security. Additionally, it is important to safeguard user privacy and enable communication in their chosen language, among other considerations.

4.3. Online Service [OS]

My Service Canada Account is a platform designed by the federal government of Canada to provide all Canadian citizens and permanent residents the opportunity to view and amend their personal information online. This platform is available to everyone who is a citizen or permanent resident of Canada. This covers things like passports, personal access codes, the status of immigration and citizenship application(s), the wage earner protection program, pension plans, employment insurance, and long-term care. In addition, a variety of programs, accounts, and other services that may be used for online financial transactions have been made accessible to the public. These can all be accessed over the internet. The assistance provided by these public services has the potential to greatly lessen the load of administrative labor, which is of utmost necessity when a pandemic is in progress.

4.4. National Portal [NPR]

Canada was in the top countries in the Waseda rankings getting the highest scores for this indicator. This places Canada among the nations with the highest scores and indicates a significant rise in the number of channels developed to encourage digital progress. Creating and keeping up to date a data inventory is the major focus of the task when it comes to discovering data sources that are appropriate for distribution. The establishment of Open.Canada.ca as the national gateway for the collection of data from Canadians has proved to be of tremendous assistance to the government in the process of organizing and making use of the data gathered from a variety of sources. Concerning the data

inventory, the question of secrecy is also something that has to be taken into consideration. The agencies that are responsible for data inventory and information protection are tasked with identifying datasets that include information that should not be made accessible to the public and protecting such datasets.

4.5. Government CIO [GCIO]

There have been successful anti-covid legislation implemented in a number of nations, most notably Canada. Despite the significant efforts that were made to jumpstart the economy, the search for effective digital governance is now more important than it has ever been. Administrative policies and practices need to be malleable, responsive, and dependable if the government is ever going to live up to the expectations of its commercial sector and the requirements of its individual residents. Because of this, the tactics that the government uses to manage and modify technology need to be altered. The years 2018–2022 have been set aside by the Canadian government to better support the digitalization plan that is being implemented throughout the whole government. Users can log in to the Canada.ca gateway using the credentials they already possess thanks to the OneGC system. As a direct consequence of the CoVID-19 outbreak, the Canadian government has learned a great deal of valuable information. The Government Digital Standard has is a foundation for eliminating the obstacles that stand in the way of the integration of digital technology and the development of new technologies.

4.6. E-Government Promotion [EPRO]

The Canada Digital Adoption Program (CDAP) was recently unveiled by Canadian Prime Minister Justin Trudeau. This initiative is meant to help SMEs modernize and embrace digital technologies to increase their online visibility. Thousands of young Canadians will benefit from this $4 billion investment spread out over four years, which will help create high-quality middle-class jobs throughout the country.

Small and medium-sized businesses (SMEs) in Canada may use the Canadian Digital Assistance Program (CDAP) website to assess their readiness for the digital economy and apply for grants and loans. To keep up with the ever-changing online market and the preferences of their customers, they may decide to invest the money in upgrading or adopting digital technologies and digitalizing their operations. Small business can submit their request for funding via either the Grow Your Firm Online or the Boost your Business Technology channels, depending on the size, needs, and goals of your firm. Accelerating the digital revolution can help local businesses in Canada keep their competitive edge,

provide new job possibilities, and support the economy as the country continues to recover from the pandemic.

4.7. E-Participation [EPAR]

In Canada, the organization and implementation of e-services, online information, and online citizen involvement are based on categorization rather than departmental divisions. This enhances their usability and responsiveness to the needs of the broader population. The Canadian government use two frameworks, namely 'Taking Care of Business' and 'Citizens First,' to evaluate the effectiveness of the services given to people, families, and enterprises. This practice is used to enable the government to assess the extent to which its initiatives achieve their intended goals. As a result, the universal availability of diverse digital services will be promptly accessible to all individuals. To facilitate the online work of Canadian citizens, the Canadian government offers a range of programs, accounts, tools, and services.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

The velocity and scope of transformation inside the contemporary digital environment are unsurpassed. The rapid and pervasive integration of technology, digital platforms, and data-driven processes has become a prevalent and recurring phenomenon in the daily lives of Canadians. This transformative trend has significantly impacted several aspects of individuals' lives, including their methods of learning, modes of communication, and approaches to doing business. The Canadian populace has developed a certain level of expectation about their ability to access government services via various devices at any given moment. Most citizens express their endorsement of the exchange of personal data across government entities to enhance the quality and timeliness of services provided. Considering the potential benefits associated with technology advancements, such as digitalization and data transformation, there exists a prevalent concern among the general populace over the government's handling and safeguarding of their personal information, as well as its commitment to preserving their privacy and security.

In recent years, Canada has emerged as a prominent participant in the global network of open government proponents. The country became a member of the Open Government Partnership (OGP) in 2012 and has maintained its membership ever since. The objective of this global endeavor, consisting of 75 member states and several sub-national government members, is to get specific pledges to advance

transparency, enhance citizen empowerment, combat corruption, and use emerging technology to bolster governance. This objective will be achieved via collaboration with civic society and the commercial sector. Canada has so far revealed three Open Government Partnership (OGP) action plans, whereby each plan delineates the specific measures that will be implemented to enhance government transparency and accessibility. The initiation of a fourth action plan is now in progress.

4.9. Cybersecurity [CYB]

Canada was among the five countries with the highest scores in the Waseda rankings. The completion of a public consultation on the Renewal of the National Strategy for Critical Infrastructure by Public Safety Canada has just occurred, serving as a complementary effort to the Renewal of the National Cybersecurity Strategy. The next National Cybersecurity Strategy will be somewhat influenced by this data. The cybersecurity stakeholders of the Canadian government were engaged in the public consultations held by Global Affairs in the Spring of 2022. The astute critiques they have provided on the proposed International Cybersecurity Strategy will be used to enhance the revised National Cybersecurity Strategy. It is advisable to engage in a comprehensive study of the International Strategy.

The topic of an RFI issued on buyandsell.gc.ca in January 2022 by Public Services and Procurement Canada pertained to cybersecurity policies aimed at safeguarding sensitive, regulated, unclassified information and federal contract information. Additionally, the RFI sought to understand the perspectives of stakeholders about the level of readiness in the realm of cybersecurity. The discussion also included the US Cybersecurity Maturity Model Certification 2.0 and its anticipated implications for Canadian organizations. Relevant service providers in the fields of military, security, space, aerospace, and cybersecurity, as well as other pertinent stakeholders, such as academic institutions and trade organizations, were invited to participate. The deadline for submission of the Request for Information (RFI) was March 4, 2022. To enhance support for organizations engaged in business transactions with the Government of Canada, as well as Canadian companies involved in cross-jurisdictional business activities, the Government of Canada will utilize the feedback it receives to inform its decision-making processes pertaining to cybersecurity requirements, cybersecurity certification, and related strategies.

4.10. The use of Emerging ICT [EMG]

Artificial intelligence (AI) has the potential to radically alter how the Canadian government interacts with its citizens and how services are provided to them. There is a clear commitment from both the public and the government to making sure that AI is used responsibly and in accordance with established principles, ethical concerns, and conventions. The responsible use of AI will be helped by this commitment. A public cloud is a commercially available service that has been subjected to stringent security testing in preparation for adoption by a specific government agency. The deployment paradigm standards provide for a single company to share space with multiple entities, including for-profit businesses, non-profits, and individual users. On the other hand, a private cloud is a kind of cloud service that is not generally accessible to the public but is instead developed for a single company or government agency. The deployment's architectural plan calls for the General Contractor (GC) to be the only tenant making use of cloud services. In exceptional cases, the Canadian government may be responsible for establishing and operating the whole cloud infrastructure. Sometimes, working with the private sector might make producing and maintaining the entity easier and more sustainable. That reflects why Canada ranked first in the Waseda for this indicator.

A "Non-Cloud Computer Environment" is a computer environment that does not utilize the cloud to host applications due to technical limitations. It's possible that the vast majority of the current GC apps fall into this group. The Canadian government has employed Open-Source Software (OSS) for years as part of its IT infrastructure. Open-Source Software has become more important to the government as a mechanism for effectively providing services. It is crucial that the project contributes to other projects and follows the standard of openly sharing its source code under Open-Source Licenses if it is to reach its goal of becoming a digital government. In addition, being a fully digital government is one of their main priorities. The administration is dedicated to carrying out these measures in a manner consistent with fundamental principles of administrative law, such as transparency, legality, procedural fairness, and accountability.

United Kingdom

1. General Information

Area: 242,900 km^2

Population: 67,736,802

Government Type: constitutional monarchy

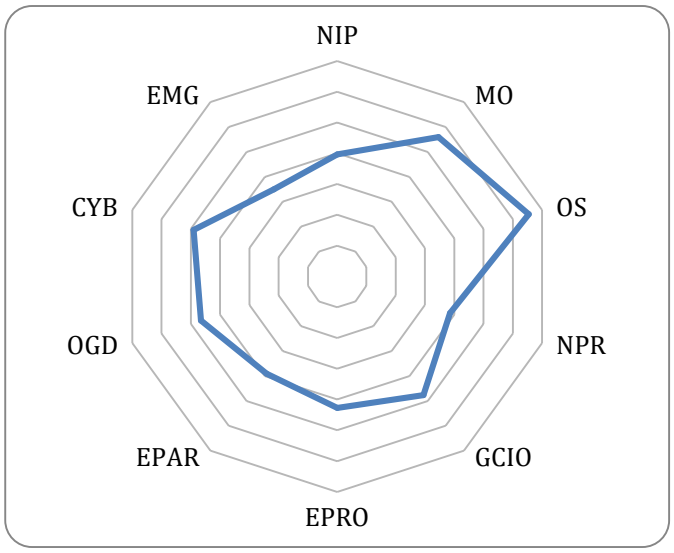
GDP: $54,430

Internet User: 96.68

Wired (Fixed Broadband User): 41.23

Wireless Broadband User: 113.30

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

UK's third place ranking with 91.9278 scores is attributed to their notable participation and investment in the government's digitization efforts. The government's goal is to become the digital leader on a worldwide scale.

The government has lofty goals to transform Britain into a technological "superpower," increase economic output, and modernize public services via digitization. It has to focus more on the fundamentals that ensure these goals can be achieved in the long run. Skills training, digitally aided services, telecommunications infrastructure improvements, device distribution programs, and reduced

internet rates have all received government backing throughout the years. They are appreciated. However, as time goes on and new technologies emerge, new norms for what constitutes digital inclusion will be established. This is a shifting objective that will take consistent political effort to address.

3.2. New Trends

The government's 2022-25 Roadmap for Digital and Data lays out a shared goal for the year 2025 and the steps we will take as a group to realize that ambition. It is a joint effort between the CDDO (Central Digital and Data Office) and other federal agencies. The National Audit Office reported in 2021 that government agencies' endeavors at digital transformation had met with varying degrees of success. In the past, plans have not been as detailed as they might be. There were also no clear lines of responsibility or ownership from businesses. Therefore, once-promising flagship programs have been gradually winding down and failing to meet expectations.

The uniqueness of this route map is intentional. Since the CDDO was established, the government has undergone a period of unprecedented digital change, characterized by unprecedented levels of cooperation and Permanent Secretary leadership for the Digital agenda. Senior government officials and digital specialists from inside and outside of government collaborated to create this road plan. The UK government established pledges that are specific, quantifiable, and ambitious but not unachievable, and we have put in place thorough strategies to collaborate across divisions to monitor and bolster progress.

Local or devolved governments will not be immediately affected by this plan, but central government agencies will. However, CDDO and the Department of Levelling Up, Housing and Communities are working together to encourage local government to reform its services and, where relevant, to merge with federal programs to bring them into line with these aims. The devolved administrations are being consulted by CDDO to ensure that their plans mesh well with the federal government's strategy.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Members of parliament have initiated an inquiry into broadband and the path to 5G to inquire about the government's pledge to provide internet connections capable of one gigabit per second to each residence and business in the United Kingdom by the year 2025. The investigation will focus on assessing how

realistic the target is, what actions need to be taken to achieve it, and how the government's strategy would affect businesses as well as individual customers. In addition, the inquiry will study the possible role that 5G technology may play as well as the consequences of initiatives like as the Shared Rural Network for expanding mobile service across the UK. The study will also look at the potential effects that the COVID-19 incident might have on the rollout of full-fiber and 5G infrastructure.

4.2. Management Optimization [MO]

Businesses that embrace digital tools see measurable increases in productivity. Small and medium-sized enterprises (SMEs) achieve 25% productivity improvements by using two or more business management systems. However, the benefits of digital adoption extend beyond the end user; wider acceptance of digital innovation in the economy means more customers for the UK's digital enterprises, which in turn helps to ensure the sector's future success.

Knowing which product to buy is a major challenge for small and medium-sized businesses looking to implement technology. For 44% of small and medium-sized businesses, the 'there is too much confused information' about proven technological solutions is an issue. DCMS funded the development and launch of Digital Boost to help businesses face this challenge head-on. Digital Boost connects nonprofits and small businesses with a community of digital experts who are willing to provide free, one-on-one mentoring and provides access to digital skills-related content, courses, and webinars. Management is an intense, nationwide training program with the goal of helping small and medium-sized enterprises (SMEs) by improving their leadership and management skills. The initiative, which was created in conjunction with the business community, offers its participants the chance to learn about the benefits of business model innovation and the advantages of adopting and investing in cutting-edge digital technology. Each participant receives ten hours of one-on-one coaching with a business expert to create a customized Growth Action Plan and integrate those strategies into the participant's existing company model.

The government will keep working with stakeholders who share our principles to improve Internet governance. This involves major international talks in advance of the 2025 UN General Assembly conversation on the future mission of the World Summit on the Information Society, as well as the Internet Corporation for Assigned Names and Numbers (ICANN) and the Internet Governance Forum.

4.3. Online Service [OS]

UK economic development has relied on a robust and trustworthy digital economy. The U.K. has an objective for laws to keep up with digital technologies as they evolve and become more important. The digital economy and broad use of new technology have also changed how individuals engage with politics and democracy. According to a London School of Economics study, internet access to information and political involvement has increased, which has improved public engagement with the UK's robust democratic institutions. The Digital Inclusion Strategy states that trust is essential to increasing online service use. Some individuals avoid the internet because they worry about their personal data. We must handle digital technologies' new threats to democratic rights in the digital era.

The groundbreaking Online Safety Bill, currently before Parliament, would create a worldwide precedent and provide the UK the formidable regulatory and legal instruments to protect internet users, particularly children and vulnerable people. Search and social media providers must remove and restrict unlawful information and safeguard minors from hazardous content. The Bill will also protect free speech and the press. We anticipate additional major governments to embrace the Online Safety Bill, and social media companies may then apply its standards globally.

Disinformation is detrimental; thus, the UK government takes a multifaceted strategy. The DCMS-led Counter Misinformation Unit monitors and analyzes misinformation to determine its breadth, size, and reach. It also works with social media companies to encourage responsible information distribution in the UK and remove harmful material that violates their terms of service. Recently, COVID-19 and Russia's invasion of Ukraine deception have been addressed. The Online Safety Bill compels corporations to address misinformation and disinformation on their websites, providing Ofcom the right to hold them accountable. State dangers will be addressed by more laws from the government. This Act would equip our law enforcement and intelligence services to combat a wide variety of state threats and make the UK a tougher place for nations to foment hostility. The National Security Bill introduces vital new measures to protect the British public, modernize counter-espionage laws, and address the evolving threat to our national security from hostile foreign states. The new foreign interference crime would include state-sponsored misinformation.

Through our Online Media Literacy Strategy, we aim to create audience resistance to misinformation and disinformation and equip individuals to properly use the Internet. The government's online media literacy action plan supports the policy, and the Media Literacy Taskforce improves media literacy offerings to disengaged or unsupported individuals. Safety technology, one of the fastest-growing

sectors of our digital economy, offers firms the goods and services they need to identify and handle dangerous and unlawful material online. The UK is supporting its development. We're helping this high-potential industry flourish. This involves managing the Safety Tech Challenge Fund, the Safety Tech Innovation Network, a world-first Safety Tech Expo, and an online safety data infrastructure initiative.

4.4. National Portal [NPR]

Over the course of the last seven years, there have been significant transformations in technological capabilities and the expectations of customers. To enhance user satisfaction, GOV.UK will transition from a responsive strategy to a proactive one in its user interactions. A strategy grounded in users' informed consent entails notifying them of obligatory tasks, aiding their comprehension of potentially relevant information, guiding them through intricate life events, and facilitating their progression to the subsequent phase of their employment. The change of GOV.UK is now being propelled by a well-defined vision and strategic approach according to established best practices.

In addition to other functionalities, GOV.UK allows users to securely process financial transactions. The integration and development of pay systems may be easily achieved to meet the standards outlined in the Digital Service Standard. The use of online payment systems allows citizens to engage in secure transactions with the government, resulting in reduced time and effort spent in doing business with governmental entities. Moreover, this approach obviates the need for the government to continually procure or develop new payment systems.

4.5. Government CIO [GCIO]

The Government Chief Information Officer (GCIO) remained in function under the jurisdiction of the United Kingdom. The Government Accountability Office (GAO) has been rebranded as the General Data Service (GDS). Local governments are under no obligation to adhere to directives imposed by the Government Chief Information Officer (GCIO).

4.6. E-Government Promotion [EPRO]

The United Kingdom (UK) has a prominent position in the realm of digital commerce, actively engaging in cooperative efforts with its worldwide counterparts to advocate for the promotion of free markets and to capitalize on the many prospects that digital trade offers. The government is implementing advanced digital trade clauses in newly established trade agreements to facilitate the expansion of possibilities inside our digital industry.

As the United Kingdom finalizes new trade agreements, it will endeavor to include a chapter specifically addressing digital commerce, with provisions of a high level of ambition pertaining to tariff-free digital trade, protection of source code, and measures facilitating the unrestricted movement of data. The country will continue in its role as a prominent advocate for unrestricted and contemporary commerce. The United Kingdom now has a leading position in the establishment of innovative trade agreements that prioritize digital advancements, and it is anticipated that this trend will continue in the future.

The United Kingdom has recently entered into significant trade agreements with Japan, Australia, and New Zealand. These agreements have a direct positive impact on the digital economy of the United Kingdom since they provide enhanced prospects for UK businesses to engage in digital commerce with these specific countries. Furthermore, in the year 2022, the United Kingdom and Singapore entered a Digital Economy pact, widely regarded as the most groundbreaking trade pact globally. In accordance with this agreement, the United Kingdom and Singapore will engage in an examination of the requisite procedures for fostering compatibility and interoperability between their individual digital identification systems, with the aim of mitigating obstacles in cross-border commerce. Notably, this is the inaugural cooperation agreement of its kind for the United Kingdom.

The Export Strategy created by the government outlines a comprehensive framework aimed at fostering economic growth via the promotion of exports. Its primary objective is to realize the ambitious goal of attaining £1 trillion in exports by the mid-2030s.

The Department for Digital, Culture, Media, and Sport (DCMS), the Department for International Trade (DIT), and the Foreign, Commonwealth and Development Office (FCDO) will proactively engage in the identification of significant major markets and facilitate the promotion of British exports pertaining to cutting-edge UK innovations. Sovereign Wealth Funds will get specific attention in this context. By September 2022, a working group comprising of pertinent industry players would be formed to forward the ongoing efforts. The government shall maintain a keen awareness of the need to safeguard national security. The export control system and the recently enacted National Security and Investment Act will be used with prudence and balance to safeguard crucial national interests without excessively impeding investment and commerce. It is anticipated that interventions will continue to be infrequent; nonetheless, UK will not hesitate to implement them when deemed necessary, particularly in regions characterized by heightened sensitivity.

4.7. E-Participation [EPAR]

Adults require digital abilities to take part in contemporary society and succeed in non-digital jobs. Digital abilities like Microsoft Office and digital application usage are lacking in 30% of skill-shortage positions. The Digital Entitlement lets English individuals with no or poor digital abilities (below level 1) study the new Essential Digital Abilities Qualifications (EDSQs) for free. ESDQs teach people all the digital skills they need for life, business, and school. From August 2023, DfE will provide new digital Functional Skills Qualifications (FSQs) with uniform content and assessment to give companies a clear digital skills baseline.

The government created free, flexible 16-week Skills Bootcamps in England as part of Skills for Life. Skills boot camps include software development, digital marketing, and data analytics. This course gives participants a fast track to interviews for digital or technical professions. Up to 16,000 participants attended Skills Bootcamps in 2021/22. With £150 million more money in 2022/23, DfE is expanding up delivery. The government began offering level 3 ‘free courses for jobs’ in April 2021. This allows persons 19+ without a level 3 (A-level equivalent) certification to take fully funded courses to learn in-demand skills. The credentials supported by this offer have high salary results and match skills demands. Digital, computer science, and cyber abilities are included. The policy now covers jobless or National Living Wage adults, including those with level 3 qualifications, as of April 2022. This will be trialed during the Spending Review to help more individuals retrain in high-demand fields like digital.

In England, firms in this area have created 26 high-quality apprenticeships in data science, cybersecurity, digital and technology solutions, AI, data, and creative digital design. Front-loaded and expedited apprenticeships are among the DfE's flexible training approaches to make apprenticeships more accessible to companies. Accelerated apprenticeships let young people to develop sector-specific skills via T levels, traineeships, and Skills Bootcamps. Early digital Skills Bootcamp participants have proceeded to accelerated apprenticeships.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

Any citizen of the United Kingdom (UK) may use Data.gov.uk to access, browse, download, and analyze publicly available government data. To show its support for the G8 Open Data Charter, the UK government made publicly available government data on the data.gov.uk website, joined the Open Government Partnership, ranked first in the Open Data Barometer, and published the "Open

Government National Action Plan." The central and municipal governments of the United Kingdom, as well as other public institutions, have made accessible more than 10,000 datasets for use in the creation of new goods and services. The Find Open Data app aids users in discovering and making use of such information. The program also facilitates the accuracy of data by assisting its creators in this regard.

The GDS Open Standards group mandated that all government departments make their data freely accessible in a variety of forms. To guarantee the widest possible variety of data is shown as "open data," the Open Standards Board has established 14 standards; the Cabinet Office and the Open Standards Board are responsible for selecting and implementing these standards in an open and transparent manner. As a result, it has improved government decision-making, bolstered the United Kingdom's status as a worldwide leader in open data, and made it easier for outside stakeholders to call the government to account. To comply with the Digital Service Standard, the Performance Platform incorporates almost 800 services.

4.9. Cybersecurity [CYB]

When it comes to the United Kingdom's economy, the technology industry is invaluable because of the employment, growth, and essential services it provides. The UK's National Security and Investment Act ('the NSI Act'), which went into effect in January 2022, makes it possible to continue investing in the country while preserving national security. It allows the government to act and investigate any threats to national security posed by acquisitions of control of businesses and assets. It's worth noting, however, that these authorities don't apply to the great majority of purchases; therefore, the government won't be assessing them or attaching restrictions.

Because of the growing and changing nature of cyber threats, the Telecommunications (Security) Act 2021 ('the Telecommunications Act') was proposed to safeguard the public networks and services. The government now has the authority to set security laws and publish codes of conduct, and public telecommunications providers now have additional responsibilities to detect and prevent security breaches because of the Telecommunications Act. It also grants the government additional national security authorities to regulate the procurement of products, services, and infrastructure from approved vendors by public communications providers operating inside UK telecommunications networks. Since then, the government has recommended that telecommunications operators phase out Huawei

equipment from public 5G networks by the year 2027, and it has held public hearings on measures to make that recommendation law using the Telecommunications Act.

4.10. The use of Emerging ICT [EMG]

The advent of digital technology has had a profound impact on several aspects of human existence, and it is expected to persistently shape our lives in the foreseeable future. The United Kingdom's economic trajectory, employment landscape, pay dynamics, overall prosperity, national security, cost of living, productivity levels, global competitiveness, and geopolitical positioning are all contingent upon sustained and expanding achievements in the realm of digital technology. Hence, it is imperative for the United Kingdom to enhance its status as a prominent global force in the fields of science and technology. Consequently, the government is undertaking measures to accomplish this objective.

The United Kingdom has several inherent advantages. The foundational elements of the digital economy, such as widespread high-speed internet connectivity across the United Kingdom and the development of robust cybersecurity capabilities, are now either established or actively being constructed. Universities in the United Kingdom are at the forefront of global advancements in both fundamental and applied scientific research. The United Kingdom (UK) has established itself as a global frontrunner in new domains such as artificial intelligence (AI), advanced semiconductor design, and quantum computing.

United Kingdom Research and Innovation (UKRI) will persist in playing a pivotal role in expediting innovation by spearheading investment in research and development (R&D) within both the corporate and academic sectors. Since 2007, Innovate UK, a constituent of UK Research and Innovation (UKRI), has facilitated the establishment of 8,500 entities, therefore generating about 70,000 employment opportunities and contributing an estimated worth of £18 billion to the economy of the United Kingdom. Investments will persist in adopting a targeted and coordinated methodology to capitalize on new prospects promptly and effectively. A deliberate endeavor will be undertaken to attract private-sector financing in conjunction with governmental investment.

New Zealand

1. General Information

Area: 270,467 km^2

Population: 5,185,288

Government Type: parliamentary democracy and a Commonwealth realm

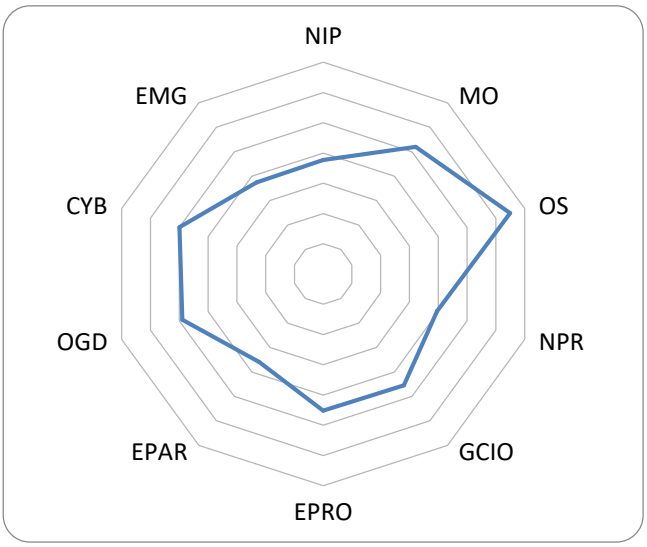
GDP: $40,634

Internet User: 91.50

Wired (Fixed Broadband User): 36.60

Wireless Broadband User: 101.43

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The government of New Zealand is heavily investing in digital technology because it sees the potential for enhancing service delivery. Launched in 2014, the Digital Government Strategy lays out the direction and objectives for the government's digital transformation. To better serve its inhabitants and companies, the government is committed to creating new and improved digital services. This involves making it easier to access government resources online by creating user-friendly websites and portals. New Zealand's remarkable participation and investment in the government's digitization efforts led them to secure the fourth spot with a score of 91.4979 scores.

The government is using data and analytics to enhance policymaking and make better judgments. Data and Analytics Partnership and the newly created position of Government Chief Data Steward are two initiatives with this goal in mind. New Zealand is dedicated to fostering openness and transparency in governance. To provide more transparent and accountable public services, the government has initiated the Open Government Partnership. The government is investing in cybersecurity measures to safeguard confidential data and guarantee the robustness of digital infrastructure considering the growing dependence on these technologies. The Cybersecurity Strategy and the National Cybersecurity Centre are two examples of this.

The government is working to increase the public sector's digital competence and proficiency. Efforts to improve people' digital literacy and train government workers on cutting-edge tech are included. The overarching goal of New Zealand's Digital Government Development is to improve government connectivity, accessibility, and efficiency so that it can better serve its residents. This is an ongoing endeavor that calls for new ideas, partnerships, and investments in digital tools to be made often.

3.2. New Trends

The COVID-19 pandemic hit New Zealand particularly severely, making it one of the country's most significant disasters in modern history. The economics, transportation, trade, housing, communication, and politics are only few of the spheres of life that have been impacted. This has helped to highlight the disparities experienced by marginalized communities. The government of New Zealand has been praised for its constant response to the outbreak. New Zealand’s relative geographical isolation had a role in this favorable result since it allowed New Zealand to track the spread of the virus and prepare a national response.

The goal of New Zealand's digital strategy is to make life in the country better for everyone: workers, consumers, workers, and law enforcement. To achieve this goal, New Zealand has established a comprehensive set of policies that create a climate conducive to digital innovation. By prioritizing collaboration and making sure everyone benefits from digital transformation, New Zealand hopes to become one of the world's most technologically equipped economies. The success of the workforce responsible for design and development in the new environment is just as important as the use of cutting-edge technologies.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

There are still some New Zealanders who lack the access they need to participate fully in the online world, despite the country's extensive investments in its internet infrastructure. The improved communication, government interactions, skill development, and employment possibilities made possible by the widespread availability of the Internet in New Zealand have contributed to the country's rising standard of living. This highlights the importance of figuring out the future of digital equality in our society.

Getting updated facilities isn't the biggest problem New Zealanders have to deal with today. Ninety-three percent of Kiwis say they have internet connection at home, according to a recent poll. Connectivity options range from fixed wireless to copper and cable to fiber optics. Most New Zealanders will have access to speeds of at least 50 Mbps by the year 2025. The country should redirect its attention to the digital gaps that are unconnected to infrastructure, such as the cost of internet services and people's lack of familiarity with and comfort using the internet. When both the Ultra-Fast Broadband and the Rural Broadband Initiative rollouts are complete, it is projected that only around 16,000 residences and companies would lack access to broadband with a minimum of 20 Mbps download speed. However, true digital equality can only be achieved if all citizens of New Zealand are provided with the tools and training, they need to fully embrace the digital era.

4.2. Management Optimization [MO]

The government's Strategy for a Digital Public Service aims to modernize and transform the public sector, placing people and enterprises at the core. The strategy's objective is to ensure that government agencies have access to effective methods and resources, without attempting to establish rigid regulations for the future. It is dedicated to a unified Public Service and focuses on the attitudes, practices, and institutional frameworks that will enable the contemporary Public Service to embrace, adapt, and expand in an ever-changing and unpredictable future. The overarching goal is for New Zealanders to thrive in the information age, with the public sector reflecting this progress. The strategy is guided by four key objectives:

1. New Zealand stands to gain significant benefits from a fully digitalized public sector.

2. New Zealanders should have a more positive and seamless experience when interacting with their government.

3. The government should be progressive, flexible, and responsive in its operations.

4. The relationship between the Mori and the Crown should be strengthened and reinforced.

4.3. Online Service [OS]

The New Zealand government is open about its digital initiatives, including the ways in which it collects and uses citizens' personal information. In addition, anyone may use a web-based system to report problems with government services. A key component of the country's commitment to open government is its privacy management system, which encourages direct lines of contact between government departments and the public on matters of privacy protection.

Participants in the Digital Identity Programme have worked together, conducted research, and engaged with industry pioneers during the program. As more and more services are moved online by businesses and governments, citizens want to be able to use those services and complete transactions remotely, safely, and with as little paperwork as possible. With this program, consumers may be certain that their information is safe.

The government of New Zealand has made significant strides in recent years toward its stated goals of raising productivity, improving lines of communication, and providing residents with superior support. The major objective is to provide uniformity in the delivery of digital services, which will stimulate development across a wide range of fields, including business, education, social welfare, law enforcement, and technology. For this reason, the government has unveiled the Strategy for a Digital Public Service, which details the steps that will be taken to digitize government processes to make them more easily accessible to the public and private sector alike.

4.4. National Portal [NPR]

Govt.nz is the primary portal for all New Zealanders and anyone interested in moving to or visiting New Zealand to interact with the government. Govt.nz's principal focus is on improving and streamlining contacts with the government by increasing inter-agency cooperation and establishing a solid reputation for government agencies. The website helps people get government aid without having to guess which agency to contact by offering all the information and direction they need in one place.

Digital.govt.nz was created as a helpful tool to speed up the government's move to digital systems. With its extensive resources, this site is a direct replacement for the Web Toolkit and ICT.govt.nz. To a

worldwide audience, digital.govt.nz presents the public sector's digital capabilities with the goal of defining and promoting New Zealand's digital strategy and approach. The government retains ultimate editorial authority over the website, despite contributions from other departments.

4.5. Government CIO [GCIO]

The Government Chief Information Officer (GCIO) plays a pivotal role in interacting with companies to inform them about foundational ICT services, aid them in improving their ICT use, and track the results of business adoption. Businesses that are required to submit four-year plans to the Treasury must include plans to maximize the use of shared information and communication technology (ICT) services as part of their submissions.

The GCIO is responsible for auditing the use of shared ICT services by departments and determining the commercial value of proposed IT enhancements. The GCIO's other duty is to guarantee that the company's ICT investments pay off. The goal of the GCIO's initiatives is to improve the efficacy, efficiency, and creativity of corporate ICT.

4.6. E-Government Promotion [EPRO]

Together with the Chief Data Steward and other state sector executives, the New Zealand Government's Chief Digital Officer (CDO) works closely on digital initiatives. Their common goal is to improve public services for the people of New Zealand by making the most of emerging digital technology. Fifty-five high-ranking executives from over twenty different organizations have come together to work on this strategic project. They coordinate their efforts to build a unified, department-spanning digital infrastructure via the Digital Government Partnership.

In addition, New Zealand is an active member of a wide range of international alliances, through which it shares knowledge and works with other countries to solve common problems. New Zealand now chairs the OECD E-Leaders, and the country is also a member of the Open Government Partnership and the International Open Data Charter, both of which are notable partnerships. New Zealand was instrumental in forming the Digital Countries, often known as the D9, a group of world-class digital powers in 2014. New Zealand had a pivotal role in the formation of this group, which was once known as the Digital Nations.

4.7. E-Participation [EPAR]

New Zealand's culture and society have developed over the years with the country's fast expanding civilization. For these reasons, New Zealand has emerged as a global leader in developing the next generation of electronic government. The phrase "information and communications technology" (ICT) refers to a wide variety of resources used daily by both private citizens and public institutions. Limitations of an online participation platform, however, are slowing New Zealand's advancement in this area.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

When it comes to open government data and digital transformation (DX), New Zealand is a global leader. In the role of chair of the OECD E-Leaders, the GCIO works closely with international partners to find solutions to common digital issues. Their dedication to openness and data availability is further shown by our membership in the Open Government Partnership and the International Open Data Charter.

4.9. Cybersecurity [CYB]

New Zealand was among the countries with the highest scores in the Waseda rankings. The New Zealand Information Security Manual (NZISM) is a detailed handbook explaining the protocols and protections that must be in place to keep all New Zealand government data secure. It provides additional security beyond that offered by standard operating procedures and controls. These fundamental safeguards define the bar for adequate safety.

New Zealand's cyber threat environment can't be understood or mitigated without the help of CERT-NZ, which is part of a worldwide network of cybersecurity specialists. To better the country's cybersecurity, it offers trustworthy and knowledgeable counsel and information. All New Zealand government agencies that deal with personally identifiable information must follow all applicable privacy and security requirements.

4.10. The use of Emerging ICT [EMG]

New Zealand was among the four countries with the highest scores. There is a growing tendency toward greater dependence on human labor as a solution to the expanding need for companies to comprehend and forecast consumer behavior. The goal is to increase output per worker by automating as many tasks as possible and learning from the massive volumes of data available.

Vodafone New Zealand has just introduced an enhanced portfolio of IoT capabilities aimed squarely at local companies. Connect is Vodafone New Zealand's version of Vodafone's worldwide IoT Data Service Platform, and it will be available via the XONE innovation laboratories. Spark, a local competitor, has also put resources into creating IoT solutions for businesses in New Zealand; it provides productized solutions for asset monitoring and management to both big and small companies. However, Vodafone New Zealand has an overwhelming lead in subscriber numbers and maintains its worldwide edge because to its extensive partner network.

Singapore

1. General Information

Area: 710 km^2

Population: 6,014,723

Government Type: republic

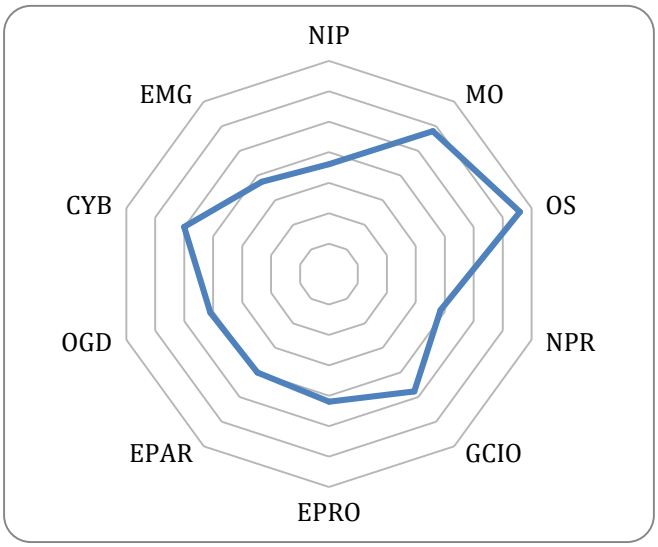
GDP: $74,983

Internet User: 91.10

Wired (Fixed Broadband User): 25.69

Wireless Broadband User: 147.48

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The Singapore government has been actively pursuing digital transformation initiatives to enhance efficiency and improve citizen services. Some key highlights of Singapore's government digital transformation include:

1. Smart Nation Initiative: Singapore's Smart Nation Initiative aims to harness technology and data to create a seamless and connected digital ecosystem. It focuses on areas such as digital infrastructure, digital services, and digital talent development.

2. Digital Government Services: The Singapore government has been digitizing its services to provide convenient and accessible online services to citizens. This includes services like e-payments, digital identity verification, and online government transactions.

3. Data-driven Governance: Singapore is leveraging data analytics and artificial intelligence to make informed policy decisions and improve public service delivery. Data-driven governance enables evidence-based decision-making and enhances the effectiveness of government programs.

4. Cybersecurity and Data Privacy: With the increasing reliance on digital technologies, the Singapore government has prioritized cybersecurity and data privacy. It has implemented robust cybersecurity measures and regulations to safeguard sensitive information and protect against cyber threats.

5. Innovation and Collaboration: The government has fostered a culture of innovation and collaboration by partnering with industry players, startups, and research institutions. Initiatives like the GovTech Hive innovation lab and the Open Innovation Network encourage collaboration and co-creation of digital solutions.

The government's digitization efforts received substantial support and investment from Singapore, which resulted in their fifth-place finish with 91.3919 scores. These highlights demonstrate Singapore's commitment to leveraging technology and digital solutions to build a smart and efficient government that enhances the lives of its citizens. A thriving startup ecosystem, including e-commerce, digital health, and financial services, has emerged in Singapore because of the country's earlier investments in digital technology. Some companies have reached the "unicorn" stage, and these include Razer and Sea (Garena). Large investments are being made in Singapore by international digital companies like Google and Salesforce to grow their R&D and engineering operations and hence create more jobs. Six cybersecurity startups were born out of Singapore's National Cybersecurity R&D Programme, an example of the country's robust public research capabilities.

3.2. New Trends

The rapidly changing global digital landscape has been accelerated by the COVID-19 pandemic, leading to a greater demand for digital platforms, software, hardware, and services. To adapt to these shifts, it is crucial to focus on developing and implementing digital technologies in both the public and private sectors. Additionally, the transfer of research and development (R&D) advancements into commercial applications for industries is essential. As global supply chains evolve and more interactions occur

online, there is a growing need to ensure the reliability and origin of products like food, medicine, and technology components. Singapore can leverage digital technologies like blockchain to become a trusted innovator and intermediary in assuring supply and provenance. The government aims to strengthen the Singapore brand by developing new skills and establishing partnerships for expertise and market expansion. These initiatives will be supported by a pool of digital talent, with a focus on cultivating scientists, engineers, and product managers in critical technological fields through the SNDE program.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

With the launch of 5G services, connectivity in public spaces in Singapore is expected to greatly improve. The implementation of 5G technology will cost the Singaporean government $30 million. With the help of a wide variety of sensors, the Smart Nation Platform will produce massive volumes of data that can be analyzed and used to improve crucial public services like transportation and utilities. Apps on smartphones and analytical processing of data may also aid citizens in making wiser choices.

To retain efficiency, the government is modifying procedures and implementing productivity initiatives, such as providing officials with convenient internet access at work. The provision of government services has not been altered. Updating network architecture and protocols, as well as conducting a thorough risk assessment, are all necessary steps for a smooth transition to quantum-safe networks. Future-proofing their systems and guaranteeing long-term security for critical data and communications requires companies to investigate quantum-safe solutions in anticipation of the post-quantum age.

To facilitate quantum-safe communications and quicken regional development, Singapore's deputy prime minister introduced the National Quantum-Safe Network Plus (NQSN+) at the ATxSummit Social. The rollout of NQSN+ is a component of Singapore's Digital Connectivity Blueprint, with an emphasis on strengthening the digital economy's ability to withstand disruption and attack. Despite their revolutionary promise, quantum computers present new security challenges. It is critical for Singapore to adopt quantum-safe technology to protect its digital infrastructure and increase its defenses against quantum assaults.

4.2. Management Optimization [MO]

The government of Singapore is actively engaged in the pursuit of digital transformation to optimize management practices and improve overall efficiency. The organization has implemented many significant programs and strategies. The Singaporean government is now through a process of digitalization to enhance the accessibility and convenience of public services for its inhabitants. This encompasses the creation of user-friendly digital platforms and mobile apps designed to facilitate a range of transactions, including permit applications, tax payments, and access to healthcare services.

The use of data analytics for the purpose of acquiring valuable insights and facilitating informed decision-making is being actively pursued by Singapore. Through the examination of extensive datasets, the government has the capability to discern patterns, trends, and opportunities for improvement across diverse domains such as transportation, healthcare, and urban planning. Automation and artificial intelligence (AI) technologies are being used to optimize operational efficiency and minimize the need for human labor. This encompasses the integration of robotic process automation (RPA) to handle repetitive operations, the use of AI chatbots for customer service purposes, and the exploitation of machine learning algorithms for predictive analytics.

The need of cybersecurity and data protection is being emphasized in Singapore due to the growing digitalization of services and data. The implementation of robust cybersecurity measures, including encryption, firewalls, and intrusion detection systems, is being undertaken to ensure the protection of sensitive information and mitigate the risks posed by cyber-attacks. Singapore acknowledges the significance of cooperation and partnerships in facilitating the process of digital transformation. The government is proactively collaborating with industry stakeholders, entrepreneurs, and research institutions to cultivate innovation, exchange optimal methodologies, and collaboratively develop solutions to tackle intricate difficulties.

4.3. Online Service [OS]

The GovTech division known as Government Digital Services (GDS) employs agile practices, including Kanban, XP, Scrum, and LeSS in the delivery of digital services. Using agile methods, GDS was able to create the smartphone app myResponder in only six months. The goal of this program is to help those having heart attacks right away. To guarantee a user-centric design, it was developed iteratively via a series of workshops attended by people and officers from the defense force.

Open Government Products, a division of GovTech, is an enthusiastic supporter of agile methodology. Digital public goods are the responsibility of Open Government Products. For instance, the team was able to design and develop the FormsSG platform from scratch in less than a year. Using this method, government employees may create digital forms that can be utilized across all departments' computer networks. It has been employed by 90 different organizations, resulting in savings of S$5,000 to $150,000 per form. The shift to an incremental and agile approach to software development has not been simple. Government leaders understand that new approaches are not enough; they also need to see changes in mindsets, power dynamics, and institutional structures, and they must build substantial levels of trust.

To pay for government-issued digital services or invoices, citizens may now use QR codes. Government QR payment, created by GovTech, lets people pay their government bills digitally or in paper form by scanning a QR code. This means that citizens no longer have to input information such as their bill reference number and the amount owed into a separate field each time they interact with the government. Citizens may utilize any of the payment apps from DBS, OCBC, UOB, NETS, and PayNow to make Government QR payments, thanks to a partnership between GovTech and the industry. To realize the Digital Government Blueprint's vision of offering end-to-end digital services for residents by 2023, the Government QR payment option was developed.

4.4. National Portal [NPR]

The latest updates on subjects including taxation, public health, immigration, and the economy may be found on the official National Portal of Singapore, which can be accessed at http://www.gov.sg/. Anyone, whether a local or a visitor to Singapore, may use this site. It helps Singaporeans connect with one another by sharing vital economic data, online public services, and their goals and dreams for the nation. The site also features ministerial addresses, news announcements, critical data, and contact information for numerous government agencies.

The Singaporean government's official online hub of information and means of communication is found at www.gov.sg. New policies, data, and developments in Singapore's history are all available here. The webpage also has a translation engine for official jargon and access to a directory of government service providers.

4.5. Government CIO [GCIO]

The Government Chief Information Officer (GCIO) of Singapore plays a pivotal role in driving the government's overall digital transformation. To ensure that government services are improved, efficiency is increased, and innovation is fostered via the use of technology, the GCIO plays a critical role in developing and executing the country's digital strategy.

The GCIO collaborates with other government departments, private sector partners, and key stakeholders to plan and implement strategic digital projects that advance national objectives. To achieve this goal, it is necessary to take use of new technology, apply data analytics, and advocate for increased cybersecurity to build a solid digital foundation.

To help Singapore reach its goal of becoming a "Smart Nation," the GCIO is essential in promoting the use of digital solutions and coordinating the use of technology across all areas of government. The GCIO also prioritizes promoting a culture of innovation within the government and developing a workforce that is proficient in digital technologies.

4.6. E-Government Promotion [EPRO]

The government of Singapore has been pushing for e-government programs to better connect the country's inhabitants and companies to government services, increase productivity, and streamline the digital lives of those involved. Here are a few of the most important programs and policies that Singapore has put in place to foster e-government: The Smart Nation Initiative is Singapore's national policy to better the lives of its citizens via the use of data and technological advancements. It includes several e-government projects, with an emphasis on digital infrastructure, government services, and the economy.

The Singaporean government takes a holistic view of e-government by coordinating the delivery of services across all government departments and organizations. For people to receive government services, this method does away with the need to visit several websites and platforms. The OneService App is a smartphone application for reporting municipal concerns such as trash, broken lighting, and unpermitted parking. The software helps expedite the reporting procedure, which in turn speeds up the time it takes for relevant government authorities to respond and resolve the issue. SingPass is a digital identification platform that is used by both individuals and corporations to get access to various online government services. It's a quick and easy method to prove your identity and get access to a wide range of online government services. MyInfo is a digital tool that allows users to quickly and easily pre-fill

their personal information into government applications. The process of using government services is simplified as redundant data entering is removed.

To better serve its citizens, the Singaporean government encourages all its departments to share and integrate their respective data. The National Data Repository and the National Digital Identity system are two examples of such programs that promote safe data exchange and compatibility across systems. To facilitate interactions with government agencies, the government promotes the adoption of digital payment systems. Payments may be made using a citizen's mobile phone number or NRIC/FIN number via programs like PayNow.

4.7. E-Participation [EPAR]

Singapore, Italy, and Denmark were the top three countries with the highest scores of this indicator. The residents of Singapore have developed a habit of actively communicating with their government via a range of Internet channels, so demonstrating their active involvement in public affairs. An example of such a platform is Reach (www.reach.gov.sg), which provides residents with the opportunity to actively participate in public policy and affairs discussions via various channels such as online forums, in-person events, and public consultations. The demonstration of deliberative democracy is shown via the use of information and communication technology in the realm of public administration. Furthermore, the government also gathers the viewpoints and proposals of people via an alternative accessible platform (www.suggestions.citizen.sg), which is made available to the wider public.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

AI and data analytics are being used by Singapore's civil officials as part of the country's ongoing push toward full digitization. By the year 2023, it is envisaged that all government personnel would have achieved a base level of digital literacy, and each ministry will have implemented at least one artificial intelligence project. Through the Open Data site, the government encourages openness; the enhancement of public services; innovation; and efficiency; and demands the completion of ten data analytics projects that include several government agencies each year. This effort intends to offer residents with unfettered access to information provided by the government, involve them in the process of enhancing public services, and allow data-driven initiatives for both individuals and businesses.

4.9. Cybersecurity [CYB]

Singapore was among the countries with the highest scores in the Waseda rankings. The Singaporean government prioritizes cybersecurity as a means of safeguarding its digital infrastructure and ensuring the well-being of its populace. The implementation of diverse steps to bolster cybersecurity has been undertaken, which encompasses the formation of the Cybersecurity Agency (CSA) to supervise national cybersecurity plans and facilitate coordination across various sectors. In addition, the government engages in partnerships with industry stakeholders and foreign entities to facilitate the exchange of knowledge and optimal methodologies. Furthermore, the government does periodic cybersecurity drills and assessments. Moreover, Singapore has effectively established stringent rules and legislation to effectively combat cyber threats and foster a culture of cybersecurity awareness and education among its populace and enterprises.

4.10. Emerging ICT [EMG]

Being among the top-ranked countries in the Waseda ranking, Singapore has devised and executed initiatives aimed at the recruitment and retention of highly skilled personnel to effectively execute the Smart Nation initiative. This encompasses the provision of competitive remuneration packages and prospects for professional growth and the implementation of the Smart Nation Fellowship Program aimed at attracting Singaporean individuals employed in technology enterprises overseas. The government has established working groups to tackle subjects such as Artificial Intelligence (AI), Digital Identity, and Cybersecurity to foster the development of optimal methodologies and investigate the complexities associated with these domains. The AI working group has developed a Minimum Viable Product (MVP), including best practices for AI projects. In parallel, the Digital Identity working group concentrates on the use of Verifiable Credentials (VCs) and the attainment of worldwide interoperability. The Cybersecurity working group engages in discourse about the involvement of governments and the industry in the implementation of Zero Trust and other complementing cybersecurity methodologies.

South Korea

1. General Information

Area: 100,210 km^2

Population: 51,784,059

Government Type: republic

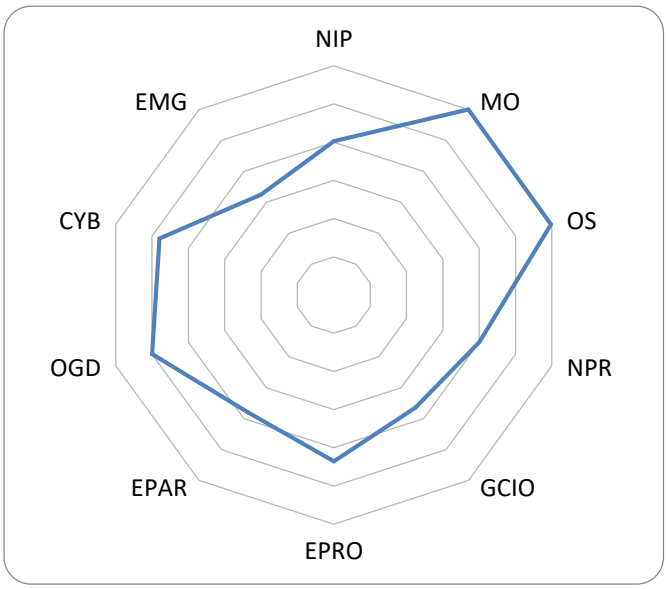
GDP: $37,069

Internet User: 97.57

Wired (Fixed Broadband User): 44.27

Wireless Broadband User: 117.15

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

Over the years, South Korea has made significant efforts in the development of its digital government infrastructure. The significance of digitalization in enhancing public services, augmenting efficiency, and fostering transparency has been acknowledged by the government. The e-government system is regarded as a pivotal undertaking in the advancement of South Korea's digital government growth. The primary objective of this system is to offer citizens with online services that are both easy and easily accessible. The range of services provided encompasses online tax filing, online business registration, and online application for public benefits. The e-government system facilitates public access to

government information and enables their engagement in online consultations and surveys. The government's digitization initiatives received substantial support and investment from South Korea, leading to their sixth place ranking with 89.6937 scores.

South Korea has likewise made substantial investments in the advancement of smart cities. These urban areas employ sophisticated technologies and digital infrastructure to enhance the well-being of their inhabitants. Smart city projects encompass the utilization of Internet of Things (IoT) devices for the purpose of effectively managing energy usage, implementing intelligent transportation systems, and providing digital healthcare services. Furthermore, South Korea has been aggressively advocating for the adoption and implementation of digital identity systems. The implementation of a digital identification system known as "i-PIN" (Internet Personal Identification Number) by the government enables individuals to safely access online services and verify their identity. The system has gained significant traction and is employed across many domains, including but not limited to online banking, e-commerce, and government services.

The South Korean government has also been actively advocating for the implementation of open data programs. The organization has implemented an open data portal that facilitates access to diverse datasets generated by the government. This enables individuals, enterprises, and scholars to utilize and examine the data for diverse objectives, including scholarly inquiry, technological advancement, and strategic decision-making. In general, the digital government development in South Korea has prioritized the utilization of technology to enhance the quality of public services, optimize operational effectiveness, and foster a culture of openness and accountability. To attain these objectives, the government has enacted a range of policies and made substantial investments in digital infrastructure.

3.2. New Trends

The Korean government underwent a COVID-19 test and demonstrated its commitment to transparency, democracy, and openness by swiftly and aggressively applying its innovative administrative skills. The Korean government unveiled its digital government strategy for 2021–2025, which highlights its intention to implement intelligent service design and delivery, data-driven public administration, and a robust and inclusive digital infrastructure. This strategy also addresses weaknesses identified by the DGI. To enhance the daily lives of its residents, the government will strive to expand the existing public data and public service digital ecosystem.

South Korea has implemented comprehensive digital government strategies to drive its digital transformation and enhance public services. These strategies encompass various areas, including digital infrastructure, digital services, and digital inclusivity. In terms of digital infrastructure, South Korea has focused on building a robust and reliable digital infrastructure network. This includes the development of high-speed broadband connectivity across the country, ensuring that citizens have access to fast and reliable internet services. The government has also invested in the deployment of advanced technologies such as 5G to support the growing demand for digital services.

To improve digital services, the South Korean government has implemented various initiatives. This includes the development of user-friendly online platforms and mobile applications to provide convenient and accessible public services. Additionally, the government has embraced digital innovation, such as artificial intelligence and big data analytics, to enhance service delivery and personalize the user experience. South Korea is also committed to digital inclusivity, ensuring that all citizens can benefit from digital government services. The government has implemented initiatives to bridge the digital divide, providing digital literacy training and support to underserved communities. Efforts have also been made to make digital services accessible to individuals with disabilities, ensuring equal access and participation for all. These digital government strategies reflect South Korea's commitment to leveraging technology to improve governance, enhance public services, and create a more inclusive and connected society.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

South Korea has made significant progress in laying the foundation for a digitally advanced future. Authorities have acted against Mobile Network Operators (MNOs) for violations related to 5G device subsidies, resulting in penalties amounting to KRW 51.2 billion. In a collaborative effort, Huawei, and LG U+ have joined forces to develop Seoul TechCity, while the number of 5G clients is approaching eight million. Additionally, SK Telecom has successfully conducted public road tests for autonomous vehicles.

Turning our attention to the Network Infrastructure market in South Korea, it is projected to reach a revenue of US$4.1 billion by 2023. Service Provider Network Infrastructure dominates the market, with a projected market volume of US$3.0 billion in 2023. Revenue is expected to demonstrate an annual

growth rate (CAGR 2023-2028) of 6.03%, leading to a market volume of US$5.5 billion by 2028. Furthermore, the average Spend per Employee in the Network Infrastructure market is projected to reach US$145.90 in 2023.

When considering global comparison, it is noteworthy that China is anticipated to generate the highest revenue in this sector, with an estimated amount of US$43,730 million in 2023. These developments highlight South Korea's commitment to building a robust and technologically advanced network infrastructure to support its digital government initiatives.

4.2. Management Optimization [MO]

The South Korean government is committed to optimizing its digitalization management to enhance efficiency and effectiveness. South Korea was ranked first in the indicator of Management Optimization in the Waseda rankings, with the other four countries. This includes improving the delivery of non-contact services to residents, utilizing natural language processing and user-friendly interfaces for better service delivery, and adopting a data-driven approach to government management. The government is also strengthening the digital economy through public-private partnerships and investing in disaster preparedness. However, there is a need for regulatory clarity in the digital assets sector to ensure consumer protection and risk management. The broad scope of current regulations has impacted innovation in the sector, with only a few entities meeting the requirements for full licensing.

4.3. Online Service [OS]

The South Korean government is focusing on digital governance innovation to improve services for its residents. Efforts include increasing the availability of non-personal services, using natural language processing and user-friendly interfaces, and adopting a data-driven approach to government management. The government is also strengthening the digital economy through public-private partnerships and investing in disaster preparedness. However, there is a need for regulatory clarity in the digital assets sector to ensure consumer protection and risk management. The broad scope of current regulations has impacted innovation in the sector, with only a few entities meeting the requirements for full licensing. Additionally, South Korea's retail industry is experiencing significant growth in online shopping, with a shift towards mobile payments and digital wallets.

4.4. National Portal [NPR]

The official website of the Korean government, www.korea.net, offers information on various topics such as events, the government, the economy, arts and culture, history, and society. It provides links to both government and private websites about Korea in English. The one-stop Civil Service Portal allows users to access government services and policies from central government agencies, public institutions, and local governments 24/7. It offers a search function for 88,000 government services, including customized subsidy services. Users can apply for 2,500 of these services online. The portal also provides government news, policy information, research reports, legal information, and statistics. Mobile services are available for user convenience. South Korea was in the top five countries in the Waseda rankings getting the highest scores for this indicator.

4.5. Government CIO [GCIO]

The Ministry of Security and Public Administration has taken on the responsibility of overseeing the electronic governance of the government. Within the government, each department and agency now have a designated chief information officer (CIO). The nomination process for CIOs at the national and bureau levels is outlined in the Presidential Directive and the Fundamental Law on National Informatization. As per Presidential Directive No. 157, every ministry and federal entity is required to have a Chief Information Officer.

The role of the chief information officer encompasses several crucial responsibilities, such as budget allocation, updating e-Government regulations, and planning initiatives related to information and communications technology. This position demands not only a strong commitment to implementing new administration through information technology but also extensive knowledge of current agency operations, a comprehensive perspective, and professional competence in information technology, encompassing all its various aspects.

4.6. E-Government Promotion [EPRO]

The Digital Government Initiative (DGI) evaluates and sets criteria to assess the maturity and implementation of digital government policies across the entire government. Its aim is to support governments in adapting to an increasingly digital and global world. In South Korea, the initiative provided an opportunity to evaluate progress in six key areas: digital by design, government as a platform, data-driven public sector, open by default, user-driven, and proactiveness. Through the E-

Leaders theme groups, South Korea gained insights and lessons on digital identity, data-driven public sector, and service design and delivery from peers and the OECD.

The Republic of Korea seeks to establish a one-stop government that breaks down barriers between ministries. It aims to create a Digital Platform Government that offers integrated, personalized, and proactive services from the public's perspective through collaboration and data sharing among ministries. Another important goal is to build a data-driven policymaking system for a scientific government. The Digital Platform Government will serve as a platform for public-private cooperation. To achieve this, the committee will open most government-owned data and support private companies in delivering government services through Open API integration. The Republic of Korea's Digital Platform Government will also serve as a testbed for collaborative experiments and innovations between the public and private sectors.

When a digital platform that enables collaboration between citizens, businesses, and the government is established, new value will be created through data sharing and convergence. Services will be improved in terms of timeliness and relevance through the introduction of cloud technology, resulting in increased value. Additionally, the cost of building and operating the system will be converted into a subscription fee based on usage, reducing the overall cost of the information system. The combined effect of increased value and decreased cost will lead to greater benefits for all stakeholders.

4.7. E-Participation [EPAR]

For the past decade, Korea has emerged as a global leader in the field of e-government. Nevertheless, achieving this significant milestone was a tough undertaking. Considerable resources have been allocated towards the advancement of the Korean e-Government, with the objective of improving the quality of life for citizens and fostering their engagement in governmental matters. The Moon Jae-in administration has introduced two significant initiatives aimed at fostering public participation: the "Gangwon 1st Street" and the "Blue House Online Petition System." These efforts facilitate the online submission of policy ideas by individuals, which then prompt governmental action. Moreover, the administration has a strong dedication to resolving the concerns expressed by its residents. Moreover, individuals have the opportunity to avail themselves of customized government services via the online platform known as the "Government 24" website. Korea endeavors to adopt digital innovation by incorporating the most recent technologies of the 4th Industrial Revolution into the realm of digital

governance. The nation endeavors to disseminate its experience and knowledge to the international community, promoting the ongoing assimilation of novel concepts by both the governmental and societal spheres.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

The central government of the Republic of Korea has consistently prioritized the promotion of open government principles to enhance transparency, foster public engagement, combat corruption, and strengthen the country's administration by harnessing state-of-the-art information and communication technologies. To demonstrate its unwavering commitment to open government and democracy, the Korean government has formulated and implemented four National Action Plans (NAPs) since joining the Open Government Partnership (OGP). As the co-chair of the OGP for the past two years, I have been driven to deepen my engagement in this endeavor.

The GovSec strategy encompasses three pivotal elements that align with the Korean government's objectives for digital transformation in the public sector. With the unveiling of the Digital Government Master Plan 2021-2025, the Korean government has pledged to implement a comprehensive digital transformation across all government agencies. Building upon the foundations of simplicity, efficiency, and transparency in government processes, they have also endeavored to enhance citizen-centric public services by integrating cutting-edge technologies into the public sector.

4.9. Cybersecurity [CYB]

Korea has emerged as a prominent global leader in the field of technology, particularly in the domain of cybersecurity. However, the nation also confronts significant challenges in the form of large-scale cyberattacks. It is imperative for businesses to ensure the safeguarding of their data and networks. The government has taken measures to enhance cybersecurity. Prominent statistics pertaining to cybersecurity in South Korea:

The projected revenue for the Korean cybersecurity industry is expected to reach $3.13 billion by the year 2022, exhibiting a compound annual growth rate (CAGR) of 16.55% from 2022 to 2027. This growth can be attributed to the rising prevalence of internet-connected devices in the country. Phishing schemes in South Korea resulted in financial losses amounting to around $1.24 billion over the course of the past five years, with a mere 30% of the total losses successfully recovered.

The Republic of Korea has seen increasingly sophisticated cyberattacks, potentially originating from the Democratic People's Republic of Korea. These attacks have had significant consequences for private sector enterprises, resulting in financial losses and interruptions to their systems.

4.10. The use of Emerging ICT [EMG]

The government of South Korea acknowledges the significance of Information and Communications Technology (ICT) and has undertaken many measures to foster its expansion and advancement. The Digital New Deal has been initiated by the government with the objective of facilitating digital transformation in multiple areas, particularly information and communication technology (ICT). Furthermore, the government has implemented nationwide regulations and initiatives aimed at facilitating the growth and development of the artificial intelligence (AI) industry. This encompasses the implementation of AI business incubator programs aimed at fostering and providing assistance to startups and organizations with a focus on artificial intelligence. The objective is to establish a flourishing artificial intelligence ecosystem within the borders of South Korea.

South Korea is striving to bolster its semiconductor industry with a focus on hardware development. Despite already being a prominent player in the memory chip industry, the nation is currently directing its efforts toward the advancement of microprocessors and sensors to sustain its worldwide competitiveness. The government has formulated a strategic plan to allocate investments towards the development of system and AI semiconductors, with the overarching goal of attaining a 20% share in the worldwide semiconductor industry by the year 2030.

Moreover, the expansion of the cloud computing industry in South Korea can be attributed to the rising utilization of cloud services by enterprises and governmental organizations. Prominent entities within the Korean cloud computing sector encompass Amazon Web Services (AWS), Microsoft, and Google. Foreign corporations are also making investments in Korea with the objective of acquiring a greater portion of the market. In general, South Korea exhibits a strong commitment to attaining a prominent position on the world stage in the realm of information and communication technology (ICT), with a specific focus on artificial intelligence (AI), semiconductors, and cloud computing. The commitment of the government to accomplishing this aim is exemplified via its various programs and investments.

United States

1. General Information

Area: 9,372,610 km^2

Population: 339,996,563

Government Type: republic

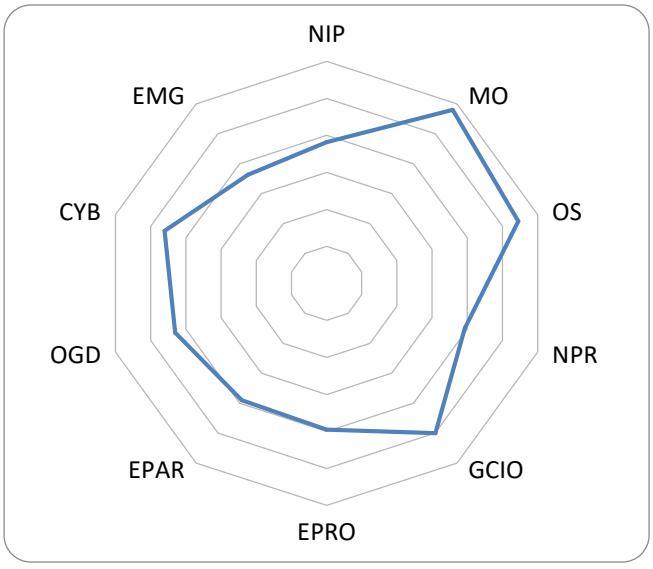
GDP: $78,516

Internet User: 91.75

Wired (Fixed Broadband User): 37.35

Wireless Broadband User: 165.79

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

Technology plays a prominent role in many aspects of daily activities. The phenomenon significantly influences our modes of communication and social interactions. Websites and applications have emerged as a pivotal means through which the American populace engages with the government. To effectively adapt to the increasingly digitized landscape, it is imperative for the Federal Government to enhance its use of technology and digital services. The General Services Administration (GSA) is spearheading efforts to not only update federal technology but also enhance the user experience for all American citizens engaging with the government via digital interfaces. USA's significant involvement and investment in the government's digitization efforts resulted in their seventh-place ranking with a

score of 88.74 scores. The General Services Administration (GSA) is a federal entity responsible for delivering real estate, procurement, and technology services to both the United States government and its citizens. The General Services Administration (GSA) has historically played a pivotal role in the modernization of technological systems throughout the government. Currently, the General Services Administration (GSA) is not only focused on modernization efforts but also actively engaged in the transformation of the government's digital environment. The General Services Administration (GSA) has outlined in its latest strategy plan a commitment to establish a digital government that effectively serves the public by using reliable, easily accessible, and user-centric technology.

The aim of the General Services Administration (GSA) entails the establishment of a government that has robust technological capabilities. It is essential that government technology exhibits qualities of user-friendliness and accessibility to facilitate public engagement. The General Services Administration (GSA) intends to cultivate technological advancements that may be disseminated across various government entities and effectively used across many projects and platforms. The primary focus of this technology and its design is centered on prioritizing the user. One illustrative instance is the proactive efforts of the General Services Administration (GSA) to enhance the functionality of vote.gov, while concurrently striving to augment the populace's digital connectivity to governmental entities through login.gov. The organization has built four novel accelerators that are revolutionizing procedures, methodologies, and frameworks to transform the manner in which digital services are created and provided.

This objective signifies a novel perspective on technology. This signifies a shift in focus from only maintaining outdated systems to effectively digitizing government operations and prioritizing user-friendly design principles. This objective, along with the associated efforts, did not occur in isolation. The efficacy of this innovative approach was contingent upon robust relationships and extensive participation throughout the whole of the endeavor.

3.2. New Trends

The Digital Government Strategy has three primary objectives:

- Facilitate the accessibility of superior digital government information and services to the American populace and a progressively mobile labor force, regardless of location or device, so ensuring widespread availability and convenience.

- It is imperative that the government effectively adapts to the emerging digital landscape, therefore capitalizing on the potential to acquire and oversee devices, apps, and data in a manner that is intelligent, secure, and cost-effective.
- Harness the potential of governmental data to stimulate innovation on a national scale and enhance the quality of services provided to the citizens of the United States.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

As a result, the United States has made great strides in its efforts to digitally transform the globe. A new undersea cable built by Google links the three countries of Spain, the United Kingdom, and the United States. The Network Infrastructure market is expected to generate $41.4 billion by the end of the forecast period (2023). With a predicted market volume of $28.8 billion in 2023, service provider network infrastructure is expected to maintain its dominant position. It is forecasted that revenue will increase at a CAGR of 5.93% between 2023 and 2028, leading to a market volume of US$55.2bn at the end of that period. The Network Infrastructure market is expected to reach a Spend per Employee average of $245.90 in 2023. China will be the largest contributor to global income (US$43,730m in 2023) when compared to other countries.

4.2. Management Optimization [MO]

The advancements seen in the field of information technology (IT) throughout the last decade have significantly influenced productivity, user-friendliness, and efficacy within the business domain. As a consequence of inadequate management of its technological investment funds, the Federal Government has mostly encountered difficulties in capitalizing on this transition. In the realm of information technology (IT), projects that exceed their budget by hundreds of millions of dollars and exhibit prolonged execution timelines ultimately provide solutions that are rendered obsolete upon completion. Consequently, our objective is to minimize the disparity between prosperous private enterprises and the operational practices of the federal government.

The government's Chief Information Officer (CIO) is responsible for overseeing the Office of E-Government and Information Technology (E-Gov). The primary mandate of this department includes the development and supervision of Internet-based technologies aimed at enhancing citizen and

business engagement with the Federal Government. The overarching objectives of these initiatives are to minimize expenses and expedite participation.

4.3. Online Service [OS]

In the United States, technology companies have established a dominant position in the mobile payment business. There exists a possibility that firms might get advantages from the expansion of mobile payment methods; yet this may have adverse effects on the most profitable facets of the organization.

After a period of about 15 years, all 50 states have achieved complete compliance with the regulations outlined in the REAL ID Legislation, as set by Congress. Most states have shown compliance with the legislation during the last four years. Currently, all fifty states have issued ID-compliant licenses and ID cards, including about 38% of the total population of drivers and ID holders.

Essential safety measures include the use of anti-counterfeiting technologies, the mitigation of insider fraud, and the thorough documenting and authentication of individuals' identities. Federal authorities are prohibited by law from granting access to government facilities, like as nuclear power plants or commercial flights, to anyone with licenses or identification cards that fail to meet the prescribed criteria. As a result of these imposed limitations, state-issued identity papers such as driver's licenses and ID cards have seen an enhancement in their reliability and accuracy.

4.4. National Portal [NPR]

Numerous materials may be accessed by Americans on the official government website, www.usa.gov. This platform serves as a centralized hub for the consolidation of information and online services provided by several government entities. The facilitation of citizens' access to data and services that may otherwise be unavailable serves to bridge the gap between citizens and their government. Moreover, it contains specific information that aids the listener in comprehending the severity of the issue. Customers can establish government accounts and customize the website according to their own requirements. The website offers a range of convenient features, including flexible chat hours, a live chat platform, and accessibility options.

This website facilitates access to authorized government materials. This website's clear and organized design facilitates the enumeration of many governmental programs and resources. The National Portal serves as a comprehensive platform that facilitates electronic tax filing, driver's license acquisition, complaint submission, doctor search, passport application, and trip research. The website's design

facilitates easy navigation to both comprehensive, general knowledge and tailored, individualized services. To delineate the subsequent phase of governmental modernization, the government has developed enterprise Roadmaps and modernization profiles.

4.5. Government CIO [GCIO]

The United States of America was ranked first in terms of GCIO in the Waseda rankings. The Chief Information Officer (CIO) is a top-level business executive who pushes the company's top brass to reevaluate the role of technology in achieving the company's goals and the impact digital disruptions are having on business models. The CIO's role is to enable and grow the agency's digital business environment at lightning speed while maintaining a high level of digital security. An organization's chief information officer (CIO) is responsible for leading changes, overseeing innovations, training new employees, facilitating the use of data, and capitalizing on new technology.

During the onboarding process, the Federal Chief Information Officers Handbook is made available to help incoming CIOs, Deputy CIOs, agency heads, and other senior officials learn about the CIO function and the CIO Council. The chief information officer (CIO) of any government agency may learn valuable skills and knowledge from this guide. It's meant to be helpful to someone who's never worked for the government before, as well as someone who's spent their whole career in the public sector. This guide is essentially a curated collection of materials that shed light on various aspects of the Federal IT environment and the challenges and possibilities facing Federal management in this area.

4.6. E-Government Promotion [EPRO]

The Chief Information Officer (CIO) is a top-level business executive who pushes the company's top brass to reevaluate the role of technology in achieving the company's goals and the impact digital disruptions are having on business models. The CIO's role is to enable and grow the agency's digital business environment at lightning speed while maintaining a high level of digital security. An organization's chief information officer (CIO) is responsible for leading changes, overseeing innovations, training new employees, facilitating the use of data, and capitalizing on new technology.

4.7. E-Participation [EPAR]

Individuals residing in the United States can engage in interpersonal communication, actively participate in societal progress, and attain more independence via the use of advanced methodologies. To enhance governmental efficiency, it is essential for the government to engage in effective

cooperation with the general people, hence facilitating improved decision-making processes. Enhancing the degree of openness within the federal government might potentially be achieved via the use of new approaches, such as augmenting public participation. This undertaking is executed via the use of Challenge.gov, the Open Government Dialogue Platform, and the Citizen Engagement Platform.

Based on the above data, significant progress has been made in the advancement of e-government inside the United States. The national site offers inhabitants a comprehensive range of online services, including various functionalities such as tax payment, tax return submission, driver's license application, complaint registration, passport acquisition, and trip advance request, among other available choices.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

Digital.gov provides comprehensive advice and training resources aimed at enhancing the digital service delivery of Federal agencies. During the fiscal year 2022, the Digital.gov team at GSA saw further expansion in its external digital communities of practice. These communities provide assistance to Federal workers and contractors across the agency who are responsible for managing Federal websites. The number of members in government wide communities had a growth of 17%, increasing from 8,349 to 9,748 individuals. Additionally, the team organized a total of 37 events with a specific emphasis on enhancing digital services within the government sector. The discussed subjects included a wide variety of areas, including user experience, accessibility, multilingual communications, the U.S. Web Design System (USWDS), website administration, and the importance of use plain language in communication.

The Digital Dashboard is a government wide analytics tool provided by the General Services Administration (GSA). Currently limited to government use exclusively, it offers agencies a means to get website compliance and conformance data for their public-facing websites. During the fiscal year 2022, the General Services Administration (GSA) effectively modernized the outdated Digital Dashboard by undertaking three key initiatives. Firstly, the system was migrated from an on-premises environment to a cloud-based solution. Secondly, the transition from Drupal 7 to Drupal 9 was executed. Lastly, the solution was integrated into the IT Dashboard's Visualization Platform, thereby establishing a foundation for forthcoming public-facing reporting. The use of cloud technology and the implementation of optimal scanning techniques not only enable more frequent scanning intervals

(weekly as opposed to monthly), but also enhance the reporting capabilities, expanding the coverage from 1,300 to over 20,000 public-facing websites throughout the whole government.

4.9. Cybersecurity [CYB]

The United States aims to provide support to developing country governments through the Digital Connectivity and Cybersecurity Partnership. This assistance will be in the form of technical guidance and capacity building, with the objective of aiding these governments in the establishment of robust information and communications technology (ICT) policy and regulatory frameworks. The goal is to foster the growth of a dynamic and inclusive digital economy. The backing is in accordance with the P2C pillar titled "Value Creation: Building Digital Ecosystems." Consequently, the United States Government has provided a total sum exceeding $47 million towards these endeavors up to this point.

The allocation of funds towards connectivity providers and fintech companies is a strategic investment decision. The Digital Invest initiative, a component of the Digital Connectivity and Cybersecurity Partnership (DCCP), is being used by the United States to facilitate the mobilization of private finance for the development of digital connectivity infrastructure and financial services. The objective of these investments is to enhance the robustness, compatibility, dependability, inclusivity, and security of digital ecosystems in developing economies. This program aligns with the "Accelerate: Incentivizing Investments" pillar of the P2C strategy.

4.10. The use of Emerging ICT [EMG]

The impact of the United States' advancements in information and communication technology on both local and international spheres is significant. Consequently, the United States emerged as the leading country in the Waseda rankings for Emerging ICT. The allocation of increased resources by the United States Department of State towards artificial intelligence (AI) is driven by the recognition of both the potential benefits and risks it poses to democracy and human rights. The Department of State engages in collaborative efforts with various groups to create an international policy environment that promotes advancements in artificial intelligence (AI), safeguards national and economic security, and upholds generally recognized values. To advance the secure use of dependable AI technology, the Department engages in bilateral and international dialogues with many governmental agencies.

The Department of Energy successfully established five quantum computing facilities at national labs in the United States via a comprehensive five-year initiative, which received a total financing of $625

million from prominent industry players like IBM, Microsoft, Intel, Applied Materials, and Lockheed Martin. Voice recognition and spam filtering systems, with several other sophisticated computer applications, have become commonplace in most enterprises. Despite being in its early stages, quantum computing is believed by several experts to have a significant impact on the development of new materials, financial forecasts, and delivery systems due to the unique physics of the ultra-small scale. In response to this, governmental efforts aim to augment the quantity of foundational research conducted in these domains. The prioritization of developments in vital sectors is a shared focus by the government, private business, and institutions in the United States. The Manhattan Project, renowned for its creation of the atomic bomb during World War II, the Apollo program, notable for its successful human lunar missions, and the Defense Advanced Research Projects Agency (DARPA), recognized for its sponsorship of the internet's development, all adhered to this trajectory.

Netherlands

1. General Information

Area: 41,850 km^2

Population: 17,618,299

Government Type: constitutional monarchy

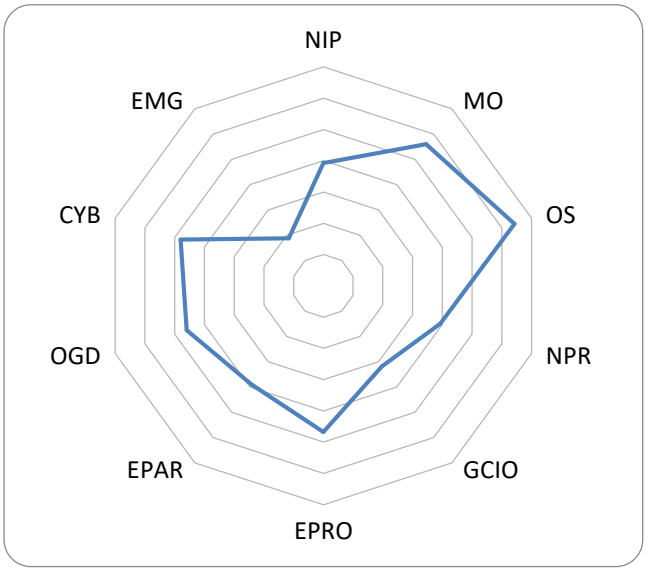
GDP: $60,891

Internet User: 92.05

Wired (Fixed Broadband User): 43.51

Wireless Broadband User: 138.72

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The Netherlands has access to the tools essential to capitalize on new opportunities, such as a highly educated workforce that is open to new forms of technology. New ideas emerge when business organizations, the academic community, and the government work together effectively. With this contribution, Netherlands was ranked eighth in the Waseda rankings, with 85.8223.

The global spread of the COVID-19 pandemic forced everyone to remain inside and continue with their regular schedules. The government was able to create and execute several measures in spite of the coronavirus limitations thanks to the rapid transition to an all-digital operation. The extensive use of

digital technologies across all sectors of the economy has propelled the nation ahead. The vital aspects of the Dutch industry and society were able to keep running because to our well-prepared digital infrastructure. The rapid growth has also heightened concerns about security, privacy, and dependability.

A new cabinet post called the Minister for Digitalization was established on January 10, 2022. The designated Minister will be responsible for organizing the government's digital goals. In July of 2020, the Dutch government unveiled several reform measures. The proposal's main takeaways were the importance of having a clearer definition of the GDI, having a clear direction for the GDI's coherence and future development, having clearer roles and responsibilities of governance, and understanding the negative effects (such as less use) of a financing system based on the profit principle. All these learnings are crucial. A multi-year investment framework and an annual cycle for determining priorities and distributing money in consultation with relevant parties are essential features of the new plans. The work to rebuild and reinvigorate the Global Development Index (GDI) is continuing.

3.2. New Trends

Civil society has shown its flexibility and vitality in the context of the rapidly evolving digital world. Advocacy and lobbying have had to move online because to the limitations imposed by the COVID-19 epidemic. But as technological progress quickens, so do the difficulties civil society faces in responding to the inevitable negative social consequences and abuses that accompany it. The use of facial recognition technology to track activists for civil liberties or identify protesters, the rapid spread of misinformation that deepens divisions in society, the imposition of censorship measures that curtail free speech on the internet, and the widening digital divide, which disproportionately affects women, girls, the elderly, and people living in rural areas with limited access to the internet, all contribute to this crisis. Individuals and institutions face formidable obstacles in their pursuit of online autonomy because of the prevalence of online dangers. To maximize civil society's participation in the implementation of the 2030 Agenda and its commitment to ensuring inclusivity and upholding human rights and basic freedoms, the Dutch government recognizes the importance of establishing an open and welcoming digital platform for civic engagement.

The Strategic I Agenda 2021-2025 was submitted to the House of Representatives by the Minister of the Interior in February 2019. The CIO council acts as an interdepartmental council of Chief Information Officers, and the Strategic I plan mainly aims at the central government, outlining the broad

areas of concentration for the council. The importance of reliable information and data, the value of stable, consistent, and powerful information and communication systems, the development of relevant expertise, and the introduction of strategic Internet governance are all on the upcoming agenda. A letter to Parliament providing an update on the situation was issued on January 6, 2021.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

In conjunction with NL DigiBeter2.0, the Policy Framework for the Further Development of the Digital Government Infrastructure was issued. It comprises guidelines for constructing the fundamental infrastructure of the digital government and the general functions of that infrastructure. The electronic payment system known as iDeal is the most popular option in the Netherlands, which uses the private sector as its only provider. Customers can make online payments with direct bank transfers using iDeal. The eIDAS infrastructure intends to link to informed eID ways to boost traffic, and the amount of traffic coming from the Netherlands is growing at a fast rate.

4.2. Management Optimization [MO]

To further the objectives of the Dutch Digitalization Strategy and to outline the government's efforts to maintain its role as the leading digital leader in Europe, the Ministry of Economic Affairs and Climate Policy has produced the Connectivity Action Plan.

The key goal of this system is to guarantee a constant and stable connection that can easily meet a broad variety of requirements while being cost-effective and widely available in all parts of the world. With this initiative, the Dutch government shows its commitment to the goals of the European Union Gigabit Society. There must be universal availability of high-speed Internet connections capable of at least 100 megabits per second (Mbps) in every home. By 2023, most homes should be able to connect to the internet at speeds of 1 gigabit per second (Gbps).

The government of the Netherlands has created an extensive API Strategy to facilitate the widespread usage of APIs. The strategy has two parts: providing background information and making specific recommendations. The Rest API Design Rules and the NL GOV Assurance profile for OAuth 2.0 are two national standards that have given their approval to these sections. With the intention of providing unfettered access to all relevant information for government agencies, IT developers, and

subcontractors, the Developer Overheid website was created in 2019. This webpage is promoted as a thorough explanation of the government's available APIs (application programming interfaces).

4.3. Online Service [OS]

Over EUR 73 billion is spent yearly in the Netherlands on goods, services, and salaries. The purpose of creating the Dutch Public Procurement Expertise Center, or PIANOo, was to elevate the status of procurement and tendering inside government agencies. Its goals include better use of resources and compliance with the law. PIANOo is an organization that facilitates open lines of communication between government agencies that do procurement and private companies who provide goods and services. Assisting contracting agencies and service providers, Tenderned is an online public procurement platform. It manages contract notifications and facilitates EU eProcurement initiatives. The Standardization Platform eInvoicing is responsible for the upkeep of the NLCIUS, a national variant of the European standard CIUS. It promotes the use of electronic invoicing and the European Norm. With iDeal, clients in the Netherlands may make online payments through direct bank transfers, making it the most popular ePayment option in the country. More than 12,689 requests will be filed in 2022 for someone to act on their behalf for a particular service using DigiD Authorize.

4.4. National Portal [NPR]

Overheid.nl is a government site that improves openness in government. It's the one-stop shop for learning about all the many branches of government. The portal features service information for both consumers and companies, broken down by topic, life event, and geographic region. It provides access to federal laws, official documents, state and regional laws, and legal advice over the internet. There are references to relevant papers, publications, and news items from the respective ministries, as well as external resources such as EU law and the Open Data Portal. The portal provides a customizable interface. In 2022, there were 45,000,000 visitors to the site.

Ondernemersplein, often known as business.gov.nl, is the official government website for entrepreneurs and small company owners in the Netherlands. It encompasses all tiers of government and may be accessed via a variety of mediums, including online forms, electronic mail, telephone, and live chat. The challenges and requirements of the corporate world are the primary emphasis. There were 10.3 million users who used the portal in 2022, with 3.2 million of those users connecting from outside the United States. Most users (76%) and the vast majority (84%) of those who used business.gov were

pleased with their experience. The website also provides a discussion board where business owners may vent about pressing issues. Together with Denmark, the Netherlands was the country getting the highest scores for this indicator.

4.5. Government CIO [GCIO]

In 2019, the Minister of the Interior presented the Strategic I plan for digital development to the Parliament. The strategy delineates the protocols for the CIO council, with a specific emphasis on the acquisition of knowledge, development of skills, and use of dependable information and communication technologies (ICTs). The Ministry presented the I-strategie Rijk 2021-2025 to Parliament in 2021. This strategic document encompasses 10 key areas pertaining to information, information, and communication technology (ICT), skills, and governance. The progress made in July 2022 was reported to the Parliament.

4.6. E-Government Promotion [EPRO]

The strategy for digitization is meant to promote digital rights and values, strengthen digitalization fundamentals, boost resilience, and maximize social and economic advantages. The Open Government Vision and Action Plan highlights the positive effects of transparency on the economy, politics, and society. To preserve its autonomy from its suppliers, the Dutch government supports open standards and may seek help from the Standardization Forum.

In January 2022, a new government was formed, and with it came a Priority Framework for Digitalization, which superseded the previous National Digitalization Strategy. The digital infrastructure, economics, government, and society are all given special attention. Topics, including digital identity, data control, rule of law, digital inclusion, privacy, democracy, equitable treatment, and policies for an inclusive digital government, are all on the Value Driven Digitalization Work Agenda, which puts public values first.

Passed in March 2023, the Digital Government Law provides people and companies with secure access to government services. It also establishes the required bare-bones minimum, sufficient information, and communication technology (ICT) literacy and proficiency. The Ministry presented the I-strategie Rijk 2021-2025 to Parliament in 2021. It addresses 10 topics associated with data, technology, education, and administration. In July of 2022, Parliament was informed of developments.

4.7. E-Participation [EPAR]

API, or Application Programming Interface, is playing a pivotal part in the current digital transition taking place in the nation. To aid in this endeavor, a national API alliance has been established, and APIs for the Knowledge Platform are assisting the Dutch government in resolving issues that have arisen while installing and using APIs. Diginetwerk is a network that facilitates encrypted communication between government institutions. Diginetwerk makes it possible for one company to share data with various government agencies, while GovNet ensures secure communication across governments. Despite not being a member of the EU, the Netherlands makes heavy use of the TESTA network, the primary cross-border infrastructure for digital communication among EU organizations, institutions, and member states.

The standard known as Cooperating Catalogues makes it easier for consumers and companies to access government offerings. Metadata on goods and services may be published and exchanged, making them discoverable via websites like overheid.nl and ondernemersplein.nl. Mijnoverheid.nl is a site that provides individualized services to residents by giving them access to government-issued digital communications and data. The portal's features include looking up individual information in government databases, communicating with government agencies, and monitoring service requests at the local level.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

Businesses in the Netherlands have responded to the COVID-19 outbreak by aggressively boosting their digital capacity to cushion the country's economy. This change has also opened the door to new businesses, such as e-health, and has the potential to increase the country's anemic productivity growth. Parliament has been presented with the Open Government Vision and Action Plan, which calls for more transparency, accessibility, and accountability inside government. Data Agenda NL Digital is the government's plan for making better use of data and using data to solve societal problems. The new Priority Framework for Digitalization identifies these four areas as top priorities: foundational strengthening; digital economy; digital government and society; and digital citizenship. The public's values are central to the Value Driven Digitalization Work Agenda. Over 16,000 datasets from over 185 government agencies are available via the Dutch Open Data Portal. The Open Government Vision and Action Plan encourages openness, accessibility, and responsibility in government. Commitments to increase government transparency have been included in the Netherlands' fourth Action Plan for Open Government 2020–2022.

4.9. Cybersecurity [CYB]

There is a strong relationship between the digitalization plan and the National Cybersecurity Action Plan (commonly known as the National Cybersecurity Agenda, or NCSA). Its major purpose is to outline critical cybersecurity practices to counteract the growing number of online threats and security flaws.

In October of 2022, the Netherlands released its Cybersecurity Strategy 2022-2028. In this plan, the government lays out its goals for ensuring the safety of the Internet and the digital economy, as well as the responsibilities of government agencies, private companies, and the public. It comes with a plan of action outlining steps that may be taken to make the Netherlands a safer place to live.

There are four main components to the plan:

- Improving the ability of governments, corporations, and nonprofits to withstand cyberattacks is a top priority.

- Offering reliable, cutting-edge digital wares.

- Dealing with cyberattacks from governments and criminals.

- Increasing public cyber resilience by ensuring an adequate supply of cybersecurity professionals, educators, and students.

4.10. The use of Emerging ICT [EMG]

Partners from the Dutch government, academic institutions, and the private sector have come together to form the Dutch Blockchain Coalition (DBC). As part of the Dutch government's Digitalization Agenda, it seeks to increase the prevalence of secure and trustworthy blockchain applications; foster an environment conducive to the development of such applications and put blockchain technology to use in ways that benefit Dutch society. The DBC plays a catalytic and facilitative role, linking together various public and private sector entities.

Both the artificial intelligence and blockchain groups are discussing how to implement new technology into government management. Together with these groups, the Dutch government is working to establish a Community of Practice that may serve as a resource for those working to create and deploy blockchain and AI-based solutions. Use cases are adopted with the use of a variety of tools, including hackathons, buyer groups, and pre-commercial procurement.

In August of 2022, a new policy on the usage of cloud technology by the national government was announced by the Ministry of the Interior and Kingdom Relations. Information security, avoiding vendor lock-in, and taking advantage of emerging technology are all priorities for this strategy. Dutch lawmakers are now debating whether to mandate mandatory standards for the digital security of Internet of Things devices. Routers, security cameras, smart thermostats, refrigerators, lights, doorbells, and other internet-connected gadgets will all be subject to these regulations. On July 1, 2024, the law is scheduled to go into effect.

To monitor the deployment of AI in government operations, cities like Amsterdam and Helsinki have created public AI registries. The goal is to enhance service accessibility and customer experiences while ensuring that AI employed in public services abides by values of accountability, transparency, and security. The Dutch Blockchain Coalition (DBC) is a group made up of representatives from the government, academic institutions, and businesses. The foundation's goal is to increase the prevalence of secure and trustworthy blockchain applications and to use this technology to improve the quality of life for all Dutch citizens. The DBC acts as an instigator and coordinator, bringing together and energizing members of the public and private sectors. The use of artificial intelligence and distributed ledger technology in government administration is a focus of both groups. The Dutch government is committed to establishing a Community of Practice to facilitate the creation and implementation of AI and blockchain solutions to enhance public services and solve social issues. Use-case generation tools include hackathons, pre-commercial procurement, and buyer groups.

Estonia

1. General Information

Area: 45,227 km^2

Population: 1,322,765

Government Type: republic

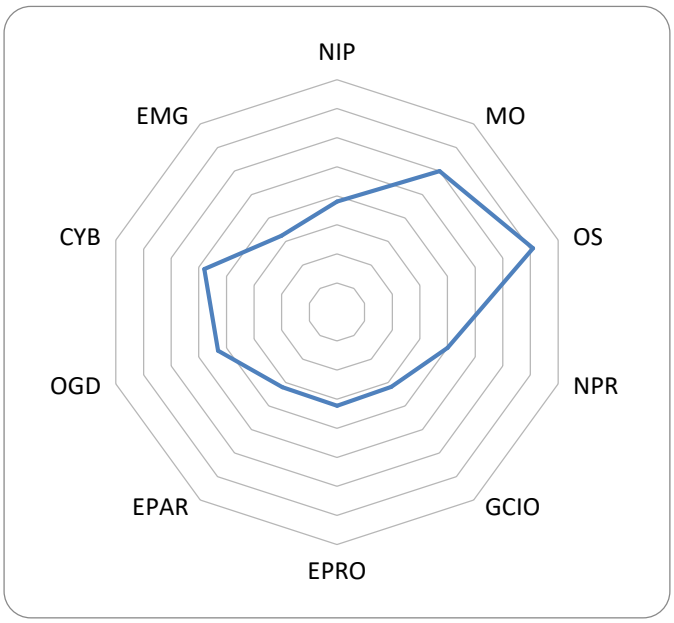
GDP: $30,317

Internet User: 91.04

Wired (Fixed Broadband User): 37.44

Wireless Broadband User: 180.06

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

Estonia has dedicated significant resources and energy to digital transformation, resulting in the country's ninth position in the Waseda rankings. The process of Estonia's shift towards a free-market capitalist system and liberal democracy is characterized by three notable elements: notable economic achievements, the digitalization of its public sector, and a significant and enduring rise in social disparity inside the country. Estonia has emerged as one of the most disparate societies in Europe. The correlation between economic success and the growing disparity in social inequality may be attributed

to the interrelated nature of both phenomena. This can be seen through the lens of neoliberal policies, which facilitated market liberalization and enabled the unfolding of globalization's impact inside national boundaries. Consequently, this process has resulted in the emergence of both beneficiaries and those who have experienced adverse consequences. However, Estonia has achieved significant progress in its pursuit of a digital agenda. Of relevance is the way the public sector of the nation spearheaded the process of digital transformation within the context of a mostly neoliberal policy environment. In the realm of economic policy, Estonia demonstrated adherence to the renowned concept of the invisible hand by swiftly implementing market liberalization measures. However, in the field of information and communication technology (ICT), Estonia seems to have adopted a distinct approach to governing. Within this field, policy implementation has adhered to the concept known as the concealing hand, as originally proposed by Albert Hirschman. This notion suggests that policymakers often undertake endeavors that they believe to be manageable, without fully comprehending the complexities and potential hazards associated with them. Consequently, this approach may lead to unanticipated opportunities for acquiring knowledge and fostering innovation.

Despite its relatively limited geographical area and historically strained ties with Russia, Estonia is poised to emerge as a prominent global force in the realm of digital technology. The digital transformation of the country, initiated twenty years ago, has positioned it as a paradigm for smaller countries seeking to digitalize their own businesses and governmental institutions.

Despite being geographically apart, Saudi Arabia and Estonia exhibit a significant commonality, namely the comprehensive adoption of digital technologies, resulting in a total digital revolution inside their respective societies. Like the case in Saudi Arabia, most Estonia's governmental services have been digitalized.

3.2. New Trends

The Estonian Digital Agenda 2030 places significant emphasis on the development of digital competency, with the following objectives identified:

Ensure an adequate supply of information and communication technology (ICT) experts, including those with expertise in cybersecurity, at the requisite skill levels. To meet future ambitions, it is imperative that the economy experiences a minimum twofold growth in the number of information and communication technology (ICT) professionals by 2030. Furthermore, it is essential that the percentage

of cyber specialists within this workforce also grows accordingly. To achieve this objective, it is essential to consistently broaden the scope of relevant educational experiences and enhance the quality of learning across all educational tiers.

To advance the economy and public administration towards a higher degree of digital maturity, it is imperative to enhance efforts aimed at reskilling and upskilling individuals in the realm of digital skills. Professionals across many disciplines must acquire specialized digital expertise to begin and/or facilitate digital transformations inside their respective firms. The integration of specialized digital skills should be an inherent component across all levels of schooling. Additionally, it would augment the capacity of personnel to effectively adjust to changing circumstances.

It is important to ensure that individuals possess contemporary proficiencies to navigate digital solutions effectively and securely. By the year 2030, it is expected that a significant proportion of the adult population in Estonia will have become regular users of the Internet. This presents us with the chance to ensure their adequate competencies, encompassing a fundamental degree of consciousness, so enabling them to further optimize their utilization of services in light of the significant advancement in digital governance.

To enhance the capabilities of the digital society, it is recommended to allocate resources towards research and development endeavors. There is a need to enhance the participation of professionals to develop intelligent solutions and identify information and ideas that can be expeditiously validated and used within the public sector and economy.

The realization of the digital society vision is contingent upon several other domains and policies included under alternative development strategies. As a result, this development plan explicitly delineates specific expectations for other policy domains.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

It is imperative that broadband Internet connections become commonplace, both in people's homes and when they are traveling. The performance of Estonia's permanent Very High-Capacity Network (VHCN) connection is rather satisfactory. However, extra investment is required to bring the outlying regions of the nation up to speed.

The commercial introduction of 5G services in Estonia has been delayed because the Estonian government does not have enough authorized spectrum resources. By the year 2025, Estonia intends to have developed a 5G network in all its main cities and along the country's most critical thoroughfares. In Estonia, the Gigabit Society has not yet been established. Both the expeditious allocation of the "pioneer" bands for 5G and the adoption of its digital strategy for the year 2030 is very necessary.

4.2. Management Optimization [MO]

The Estonian government is now engaged in the process of revising its information and communication technology (ICT) policy across many sectors, while concurrently coordinating this endeavor at a national level. The coordination of their respective information and communication technology (ICT) strategies involves the participation of various governmental bodies, including the Ministry of Education and Research, the Ministry of Finance and its Information Technology Centre, the Ministry of Environment, the Ministry of the Interior, the Ministry of Social Affairs and its Health and Welfare Information Systems Centre, and the Ministry of the Interior and its Information Technology (IT) and Development Centre. Estonia was ranked first in the indicator of Management Optimization in the Waseda rankings, with other four countries.

4.3. Online Service [OS]

Estonia was ranked the second in the Waseda rankings for this indicator. Mobile-ID is a digital identification method that allows users to authenticate their identity and sign documents electronically. The mobile-ID is a system for identity verification and digital signatures that is based on ID cards and designed specifically for users of mobile phones in Estonia. The mobile phone, which utilizes a standardized SIM application, functions as a secure device for signing purposes. In a manner similar to the eID card, the mobile-ID facilitates the process of verification and digital signature of documents, hence possessing equivalent legal validity. The certificates belonging to the user are stored on the SIM card of the telecommunications operator and need the input of a personal identification number (PIN) by the user for their use.

Estonia has introduced a novel private sector-provided identification system known as smart-ID, which serves as a viable substitute for the conventional mobile-ID. The smart-ID is a versatile tool that enables users to access eServices, conduct online financial transactions, and digitally sign documents. The signatures provided via the use of smart-ID possess legal validity and are acknowledged throughout all

European Union member states. These signatures have an equivalent legal weight as traditional handwritten signatures.

4.4. National Portal [NPR]

Estonia was in the top five countries in the Waseda rankings getting the highest scores for this indicator. It has been estimated that the National Data Portal would be completely functioning by the time the year 2023 ends. The primary objectives of the portal are as follows: (i) to disseminate descriptions of datasets; (ii) to promote and facilitate the reuse of semantic assets, such as vocabularies and ontologies; (iii) to provide information on the availability of services, privacy-enhancing technologies (PETs), data services, and open datasets for reuse; (iv) to offer the option to request access to restricted data; and (v) to foster knowledge sharing and provide direction.

4.5. Government CIO [GCIO]

Formerly known as the State Information System Department, the Government Chief Information Officer (CIO) Office is a government agency under the Ministry of Economic Affairs and Communications that plays a pivotal role in formulating Estonia's information society policy. Development of IT-related activities related to the information society, as well as the drafting of legislation in related sectors, are within the purview of the Government's Chief Information Officer (CIO) Office. More specifically, the Government CIO Office is responsible for formulating development plans for State administrative information systems and coordinating efforts related to State IT policy. Budgets, laws, programs, audits, attempts to standardize, IT procurement practices, and international cooperation are all part of the world of State information systems.

4.6. E-Government Promotion [EPRO]

According to the minister, the newly developed Digital Agenda 2030 will serve as the essential framework for future developments in the digital sphere. The aforementioned project intends to provide goals and a strategic roadmap for maintaining and improving e-Estonia's current infrastructure and processes. At the same time, it hopes to leverage cutting-edge digital technology to boost the Estonian economy, improve governmental efficiency, and advance humankind. E-Estonia is an abbreviation for the Estonian Agency for Information and Communication Technology.

Estonia is making significant strides toward its goal of being the global leader in the digitization of government services. The recent epidemic has helped propel the country to the forefront of international

competition in this field. It is hoped that Estonia's new cybersecurity policy will help cement the country's position as a forerunner in Europe and beyond when it comes to the digitalization of government services. The Estonian government has lately announced plans to further digitize its already advanced administrative infrastructure.

4.7. E-Participation [EPAR]

With the use of an information system for administration and development, the Estonian Information System Authority strives to provide the best possible service to the public. The Authority also coordinates projects, participates in international initiatives, and monitors the growth of government information systems.

To facilitate more openness and involvement from its populace, the Estonian government created the Rural Municipality Portal. The company was founded on an innovative principle and makes use of an open-source platform for materials management. The model being offered is well suitable for local government organizations due to its pre-established website structure. Integration with public databases and other administrative site management features provide for streamlined communication.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

The goal of the Action Plan is to make it easier for Estonia to achieve the goals set out in its long-term development strategy, Estonia 2035. The goal of establishing Estonia as a country that places a premium on innovation, reliability, and the needs of its citizens is intrinsically linked to the goals of the Action Plan.

In line with the goals of "Estonia 2035," the Action Plan will help the people of Estonia become more educated, civically active, and physically fit. Those who are proactive in their daily lives exhibit healthy coping strategies, take on meaningful roles in their communities, and contribute significantly to the growth of our country. In addition, Estonian culture is known for its generosity, friendliness, and spirit of cooperation. Strong social ties and citizen engagement are the bedrock of Estonia's cooperative society. Each person, group, and NGO has the capacity and motivation to contribute meaningfully to social organization and work amicably with others.

Several strategic development papers and sector-specific action plans contribute further to the realization of these goals. Collaboration between government agencies and NGOs in carrying out different activities is given high priority in the OGP Action Plan. The suggestions made throughout the

public idea-gathering process and the work of many ministries have informed the selection of activities. The Government Office is in charge of supervising the Action Plan's creation and implementation.

4.9. Cybersecurity [CYB]

Findings from the 2008-2013 and 2014-2017 strategies have been included in the 2019-2022 Cybersecurity Strategy. The objectives, primary areas of activity, and associated duties and responsibilities of this cybersecurity and general security strategy are laid forth. This document establishes the framework for a comprehensive, in-depth, and all-encompassing sectoral policy. The approach serves to coordinate and distribute resources across the area. Government (civilian and military defense), critical service providers, local industries, universities, and research organizations all have a role in Estonia's cybersecurity as part of a broader horizontal approach.

In October 2021, Estonia's Ministry of Economic Affairs and Communications unveiled a brand-new Development Plan for the Estonian Digital Society 2030. The Estonian plan for the development of the information society by the year 2020 inspires this method. The new plan addresses issues of digital sovereignty, network infrastructure, and data protection. The goal of this initiative is to offer a comprehensive, long-term framework to safeguard the development of Estonia's digital society.

4.10. The use of Emerging ICT [EMG]

The State Infocommunication Foundation (RIKS) and Cybernetica, Dell EMC, Ericsson, OpenNode, and Telia created the Estonian Government Cloud.

Estonia pioneered flexible electronic public services for citizens and e-residents. Government Cloud offers a solid foundation for online public services and solutions, making Estonia the most digital nation. Estonia accelerates its digital transformation towards an ICT society with this solution.

The Estonian Government Cloud will modernize and renew information systems, exploit cloud technology, and give government agencies and providers of essential services to residents and e-residents more flexibility in delivering electronic services.

The Estonian Government Cloud will be implemented in two sites, one outside the city, to handle data and information systems distributedly and meet physical security needs. Estonia has a long-term intention to construct eEmbassies in friendly foreign nations to assist digital independence and public IT service continuity in emergencies.

Second National Strategy on Artificial Intelligence 2022–2023 was released in 2022. The present plan emphasizes five pillars: public sector, business sector, education and R&D, law, and data as an enabler. The Digital Agenda 2030 includes AI-powered governance, which uses chatbots to do public sector jobs. Public sector efficiency has increased with AI. The nation will create a 2024–2025 AI plan in 2023. The nation is developing an action plan to deploy Privacy Enhancing Technologies (PETs) to protect privacy and eliminate bias in data analysis.

Ireland

1. General Information

Area: 70,273 km^2

Population: 5,056,935

Government Type: Republic

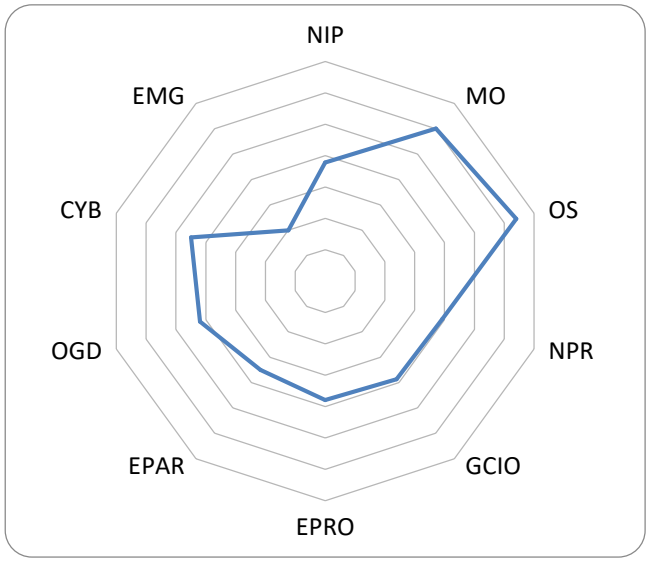
GDP: $111,161

Internet User: 95.17

Wired (Fixed Broadband User): 31.63

Wireless Broadband User: 108.66

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

In recent years, the government of Ireland has prioritized digital transformation and development initiatives. The goal is to leverage digital technology to enhance public services, boost efficiency, and encourage citizen participation. The goal of the Digital Transformation Programme is to improve citizens' access to and satisfaction with government services by digitizing and updating them. It also seeks to simplify procedures and cut down on red tape. The government has created several online resources as part of its digital transformation initiatives. For instance, the MyGovID site has made it easier for individuals to communicate with various government agencies in a safe and streamlined

manner. Through extensive investment and hard work in digital transformation, Ireland has propelled the country to the forefront of the Waseda rankings.

The government has been pushing open data programs, which aim to increase the availability and transparency of public records. This opens the floodgates for individuals and corporations to mine government databases for insights that might inform research, product development, and policy choices. The government has also been making investments in the enhancement and dissemination of digital education and training. To make sure that everyone can reap the benefits of the digital transition, programs like "Digital Skills for Citizens" are working to increase people's digital literacy. The government has also been striving to strengthen cybersecurity safeguards to better safeguard information stored and sent online. Among these measures are regular vulnerability assessments and the introduction of stringent new security measures. Enhancing public services, boosting efficiency, and boosting citizen involvement are all top priorities for the Irish government, which is why they are investing heavily in digital transformation and development. The end goal of these initiatives is to make Ireland a more open and connected digital society.

3.2. New Trends

The government of Ireland has embarked on an enormous digital transformation journey, with a plan that includes eighteen major projects. Using cutting-edge developments in a wide range of fields, these projects are meant to strategically advance the five pillars of the Public Service ICT Strategy. The creation of the Gov.ie website, the passing of laws, the launch of the Government Private Cloud, and the launch of the ICT Apprenticeship program are all instances of such endeavors. The government is currently looking at options like mobile device authentication to increase MyGovID's user base and capabilities. They want to integrate public cloud services with their private cloud architecture to get the advantages of both at a reduced cost. The administration has also acknowledged the importance of open data in the current digital sphere and said that it would be a future priority.

Ireland has adopted strategic goals focusing on speeding up change, innovation, and the implementation of new business models in response to the current pandemic and the country's economic recovery. The government is dedicated to easing the way for businesses to become digital and embrace new technologies in the hopes of improving their efficiency. The government's goal is to help people understand and embrace digitization by giving priority to remote work, marketing, capacity assistance,

and communication. Ireland is now during a multi-year strategy to digitize its economy, during which it will contribute to the establishment of national policies designed to increase the digital competence of its customer base and speed up digital transformation. The administration is also trying to build relationships with the United States and its regional partners, notably in the fields of research and innovation. Ireland is committed to a low-carbon economy, and the country's companies can join that effort by maximizing their use of cutting-edge manufacturing methods and adopting cutting-edge technologies.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Ireland's e-government has made great strides in several important areas. To provide access to high-speed Internet throughout the nation, National Broadband Ireland has been hard at work improving the infrastructure of broadband networks. The eir network currently provides 5G connection to around 57% of the population, while trials of Starlink's satellite broadband service have begun. Increasing competition and broadband availability, the government has ordered eir to allow other providers access to its fiber networks. The NB-IoT and 5G services offered by Vodafone are also being made available in more areas.

More and more people are making use of SIRO's Gigabit Hub Initiative and the superior internet speeds it provides. Ireland has also paid attention to blockchain technology and cryptocurrency. The nation has committed to working with others to build up a European Blockchain Services Infrastructure (EBSI) by signing the declaration creating the European Blockchain Partnership. Ireland was an active member of the partnership, contributing to debates on policy, technology, and use case groups. The nation is also active in international organizations like the OECD and the International Association for Trusted Blockchain Applications (INABTA).

Blockchain Ireland is a public-private partnership established by the Irish government to encourage cooperation between the blockchain sector and academic institutions. Ireland's international financial services industry is actively using cutting-edge technology like blockchain as part of the country's continuous execution of the Ireland for Finance Strategy (IFS) 2025. Implementations include an MSc in Applied Blockchain, integration of innovation strategies throughout the IFS ecosystem, and the creation of a DLT platform for aircraft leasing.

An internal working group has been formed to track innovations in blockchain and digital currency. This team monitors developments on a global and European scale, evaluates potential threats and gains for the economy, consults with experts, works with other government agencies to shape policy, spreads knowledge about the technology's capabilities, and ensures that all efforts are in line with Ireland's IFS2020 goals.

4.2. Management Optimization [MO]

Ireland was ranked first in the indicator of Management Optimization in the Waseda rankings, with other four countries. Electronic prescriptions, online referrals, Telehealth, and the development of patient data summaries are just some of the several measures that have been put into place by the Irish government to promote eHealth. In addition to this, they have released a Knowledge and Information Strategy with the goal of enhancing the delivery of healthcare and catering to the requirements of the public. In addition, the government has initiated an Action Plan to entice and keep IT specialists in their employ, and they provide funding to the Housing, Planning, Community, and Local Government Department to provide assistance to local governments. Applications that can be used by the government are being developed by the Office of the Government Chief Information Officer, which helps the government become more efficient and save money. In addition, the government is in the process of rolling out an application suite that will be shared throughout all ministries.

4.3. Online Service [OS]

The Personal Public Service Number (PPSN) is used in Ireland to get access to various government services by authorized government agencies and individuals. Vaccinations, public health services, financial help, housing subsidies, and driving inspections are only some of the services that need PPSNs from agencies like the Health Service Executive, the Revenue Commissioners, and the Department of Employment Affairs and Social Protection. Whether you use them in person, over the phone, or online, the PSC will keep your personal information safe and secure. The process of applying for or renewing a passport is now available online for Irish citizens. Passport applications from Irish nationals above the age of 18 may be submitted online or by mobile app. By using this digital service, travelers can freely move across the European Union, the European Economic Area, and Switzerland.

The eTenders platform is Ireland's national electronic tendering system, and it is managed by the Office of Government Procurement (OGP). By using eTenders, Contracting Authorities in the public sector

may advertise procurement opportunities, distribute tender material, receive answers from tenderers, manage communications, and announce contract awards. Organizations in the public sector, health care, local government, and other sectors that get funding from the European Union or individual states all utilize the platform. Over nine thousand tenders were posted on eTenders in 2022, and there are presently over 180,000 registered organizations. This service is invaluable to the digitization of public procurement in Ireland, and it's offered at no cost to users. In 2023, eTenders will upgrade to a new platform from a different service provider, bringing with it a better user experience and more digital integration across the board.

4.4. National Portal [NPR]

The government domain acts as a one-stop shop for all online government services, making it easy for individuals to find what they need. The Irish Government News Service Portal provides insight into the inner workings of the government by presenting official actions as news. The site's main purpose is to provide impartial reporting on various issues. This allows anyone with an interest in government to access a consolidated source of information through the Portal. All government news releases are available via RSS feeds and are linked to relevant departmental websites. The Portal also provides up-to-date and relevant information under the 'Issues' section. This platform is the result of teamwork between the GIS, GPO, and IT.

Citizens' Information is distributed through the Citizens Information Board, a government organization. The site covers a range of topics, from workplace rights to buying a home to studying abroad or relocating internationally. There are 14 distinct sections, each corresponding to a specific life phase. Case studies, supplementary materials, and downloadable forms from other organizations complement the information presented.

The gov.ie website gathers services from various government entities, with new services constantly being added. The site has seen a significant increase in users, with 66 million in 2022 compared to 6 million in 2019. The eGovernment Strategy refers to this hub as the Digital Service Gateway, and ongoing efforts are being made to improve it. This includes shutting down department-specific domains and migrating their content to the gov.ie domain. The project is expected to be completed in 2023.

In 2014, the Irish government started distributing data in open, free, and reusable formats through the Open Data Portal. In 2022, Ireland ranked second on the Open Data Maturity Benchmark. The Irish

Government News Service Portal offers a unique perspective on governmental operations by reporting on a wide range of activities as news. The site's main objective is to provide impartial coverage of current events. Individuals with an interest in government can access the latest news in one convenient location through the portal. Official news releases can be accessed through RSS feeds or links to various government agencies. The 'Issues' section of the site provides topical content that is not tied to specific dates. It is a collaborative effort involving the Government Information Service, Government Press, and the Department of Information Technology at Government Buildings.

4.5. Government CIO [GCIO]

A uniform information technology strategy is being implemented among the many ministries and agencies that make up the Irish government. The execution of the eHealth Ireland Strategy is to be supervised by the Office of the Chief Information Officer (OCIO), which is part of the Health Service Executive (HSE). Under the Data Sharing Governance Framework, public service entities have access to the Data Sharing Framework, which allows them to exchange personal data with one another. The framework contains documents such as the Data Sharing Playbook and Guidelines, and it also offers direction on the most important procedures. In addition, a form for a sample Data Sharing Agreement has been made available for public service organizations to use.

4.6. E-Government Promotion [EPRO]

The epidemic caused by the COVID-19 virus has resulted in substantial changes in lifestyle as well as in the behaviors of consumers, emphasizing the need for government institutions to adopt digitization. An increase in the number of people using smartphones is being seen in Malaysia, with an anticipated total of over 33 million by the year 2024. Nevertheless, there are still barriers to the widespread use of digital technologies, such as a lack of digital literacy. The government of Malaysia is actively working to improve public access to digital solutions, increase staff technical proficiency, build digital infrastructure, and leverage cloud-based services. In the context of the digital economy, the goals of these activities are to provide efficient service delivery, cheap economic development, and rapid reaction.

4.7. E-Participation [EPAR]

The Irish government has made efforts to promote e-participation through various initiatives and platforms. One such initiative is the eParticipation Strategy, which was launched in 2017. This strategy

outlines the government's commitment to using digital tools and platforms to engage citizens and stakeholders in policy development and decision-making. The government has also established online platforms such as the Public Consultation Portal and the MyGovID platform to facilitate citizen engagement. These platforms allow citizens to access and participate in public consultations, submit feedback and suggestions, and stay informed about government policies and initiatives.

Furthermore, the government has been actively using social media platforms like Twitter and Facebook to engage with citizens and gather feedback on various issues. Government departments and agencies also have their own websites and online portals where citizens can access information, submit queries, and engage with government officials. In addition to government-led initiatives, there are also non-governmental organizations and civil society groups in Ireland that promote e-participation. These organizations work to raise awareness about the importance of citizen engagement, provide training and resources on e-participation tools, and advocate for policies that support digital democracy.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

With the goal of driving and enabling digital change throughout the Irish economy and society, Ireland has developed a national digital plan called "Harnessing Digital - The Digital Ireland Framework." Public service digitization, government operations digitization, and corporate transformation are the four pillars upon which this plan rests. This plan's lofty objectives are geared on facilitating the widespread use of cloud computing, artificial intelligence, and big data by Irish businesses of all sizes by the year 2030. Construction, advanced manufacturing, agriculture, healthcare, transportation, and financial technology are all highlighted as being of critical significance. Keeping Ireland's robust startup environment healthy is also important.

By making use of the information at their disposal, governments may promote transparency, encourage innovation, and provide the groundwork for data-driven economic growth. Efficient use of public funding and policy execution may be shown via proper data use. The Malaysian Administrative Modernization and Management Planning Unit (MAMPU) hosted a 48-hour Hackathon titled "Unleashing the Power of Open Data for Innovation." High school kids and adults alike were given the chance to use open data to address social issues at this event.

To further enlighten individuals on legislative procedures, parliamentary data, and representative statistics, the Sinar initiative has created an open database. In addition, new opportunities for

international cooperation in the transmission and use of open data in the Asia-Pacific area have arisen with the founding of the Asian Open Data Alliance.

4.9. Cybersecurity [CYB]

The National Cybersecurity Centre (NCSC) is an essential institution for ensuring the safety of sensitive data. Members are hand-picked from all 50 states' Computer Security Incident Response Teams (CSIRT-IE) to serve as the department's operational arm. The goal of this effort is to make the internet a more secure and reliable place where people can conduct business and social interactions without worrying about potential threats. Protecting digital assets and the infrastructure they depend on requires cooperation with other government agencies, important enterprises, and overseas partners.

Ireland's new national digital plan, Harnessing Digital: The Digital Ireland Framework, was unveiled in February of 2022. Its goal is to make Ireland a worldwide leader in digital innovation by driving and facilitating the country's economic and social transition to the digital realm. This all-encompassing framework places a premium on accessibility, safety, and security, and it is backed by solid administrative and legislative structures. Ireland stands to gain a great deal from adopting digital technology, including the ability to provide more remote and flexible job options, expanded access to public services, and improved chances for education and civic engagement.

The National Broadband Plan, Remote Workplace Hubs, and Broadband Connection Points are just a few of the government's measures aimed at bringing about universal access and realizing these advantages. All homes and companies in Ireland should be connected to a gigabit network by 2028, and by 2030, all inhabited regions should be covered by 5G. The goal is to have 80% of individuals possess at least fundamental digital abilities by the year 2030, and to do so requires a concerted effort throughout the educational spectrum.

Aiming for 90% of services to be accessed online by 2030, the plan also highlights the significance of inclusive digital public services. With the goal of 90% of SMEs having basic digital intensity by 2030, along with major use of cloud, AI, and big data technologies, subsidies and help are provided to enable small firms to embrace digital prospects. The safety of both individuals and enterprises depends on government and private sector investments in cybersecurity, such as those made to the National Cybersecurity Centre.

The digital strategy is in accordance with national targets indicated in the 2021 Economic Recovery Plan and Ireland's National Recovery and Resilience Plan, as well as EU priorities as part of the Digital Decade. In addition, it helps Ireland come closer to its climate goals, since the country's green and digital goals mutually support one another. Ireland's commitment to digital transformation was highlighted in a 2022 report on the status of Harnessing Digital - The Digital Ireland Framework.

4.10. The use of Emerging ICT [EMG]

New Research Priority Areas have been announced by the government for the years 2018–2023. To guarantee their continuous applicability, Ireland pledges to conduct frequent reviews of these crucial areas and make any required changes and revisions. Ireland must be ready to take advantage of global possibilities now and in the future by responding to changes in the global economy and global trends and challenges. Since 2012, the emphasis and fundamental principles have shifted to accommodate new realities.

Ireland created the European Blockchain Partnership, or EBSI, to create a standardization of blockchain services throughout the continent. Ireland contributed significantly to the Partnership's policy, technical, and use case workgroups, as well as the Self-Sovereign Identity case use workgroup. Ireland is a member of the Organization for Economic Cooperation and Development as well as the Blockchain International Association for Confidence Applications (INABTA). Ireland has joined the international conversation around blockchain technology by becoming a member of INABTA's government consultative board. Blockchain Ireland is a cooperative effort between the public and commercial sectors of Ireland's blockchain business.

To facilitate the electronic transmission of data necessary to implement EU Social Security Coordination Regulations, Member States must create a centralized network. The goal of this system is to make filing for benefits easier in conformity with EU regulations. The EESSI Access Point is live and functioning in Ireland at the present time. The Disruptive Technology Innovation Fund (DTIF) is allocating €500 million to disruptive technology R&D, marketing, and rollout as part of Project Ireland 2040. High-tech manufacturing and sustainable food production are seen as crucial to the success of this program.

Japan

1. General Information

Area: 377,930 km^2

Population: 123,294,513

Government Type: constitutional monarchy

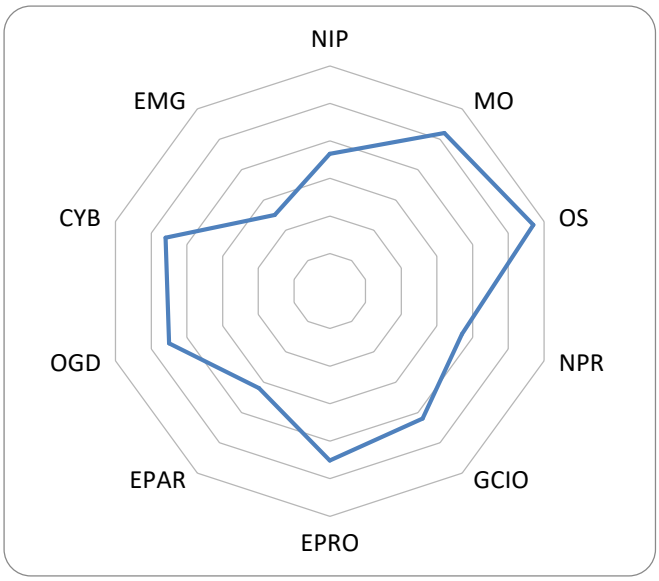
GDP: $42,916

Internet User: 82.91

Wired (Fixed Broadband User): 36.25

Wireless Broadband User: 227.11

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

Japan has been working hard to create its digital government to increase the effectiveness, openness, and accessibility of its government services. The country's eleventh in the Waseda rankings can be attributed to its substantial commitment and efforts in digital transformation. To achieve its objective of being the most advanced digital country by 2025, the government has prioritized the development of its digital government. Japan's push to establish its digital government includes a focus on expanding access to online services. The government is working to make more administrative processes digital and accessible online to cut down on the number of times which citizens have to physically visit

government offices. Services such as submitting e-tax, applying for social security, and registering a company start-up under this category.

Japan has created a national identification system called "My Number" to protect the privacy and security of its citizens' use of Internet services. This system is utilized for a wide variety of governmental transactions and involves the assignment of a unique 12-digit number to each citizen. It allows for safe and quick ID verification, expanding the availability of useful online resources. The use of data and analytics to enhance decision-making and policymaking is another facet of Japan's digital government growth. The government has been collecting and analyzing massive quantities of data to better understand societal and economic patterns, which in turn aids in the development of policy supported by evidence.

Japan has also made significant investments in the development of "smart cities" and "digital infrastructure." The government's goal is to use technology to build cities that are both sustainable and efficient. Smart energy management, smart transportation systems, and digital healthcare services are all examples of such programs. In addition to these initiatives, Japan has also been pushing for open data and private-public partnerships. The government has released an open data portal, making available a wealth of publicly available information useful in the pursuit of discovery, invention, and the creation of new services. The overarching goals of Japan's digital government development are to modernize government operations, increase participation from the citizens, and spur economic expansion. The government is working hard to make Japan a digital pioneer and create a society where everyone can make use of emerging technology.

3.2. New Trends

Japan must reorganize its industry structure so that it can modernize its operations, take advantage of emerging market trends, and fully adopt digital technology throughout its whole value chain. These shifts are motivated by four core ideas:

- An ambitious plan to more than triple the pool of digital talent is primarily focused on software developers, data engineers, data scientists, machine learning engineers, product managers, agile coaches, designers, and other new professions.
- Manufacturing (including automobiles), wholesale and retail, healthcare and financial services, and travel and tourism account for over half of Japan's GDP. Indicators of digital penetration,

such the number of digital manufacturing plants or the proportion of the market captured by online sales, are all in the single digits across various sectors. One hundred and more use cases have been shown to benefit from value chain expansion thanks to the adoption of cloud computing, machine learning, deep learning, e-commerce, the Internet of Things (IoT), 5G, and cybersecurity.

- The phrase "digital government" describes the federal government's strategy to upgrade its technological infrastructure over the long term to pave the way for the creation of cutting-edge applications. Because of this dramatic change, governments everywhere are implementing new digital applications to streamline the delivery of services to citizens and businesses, eliminating time-consuming procedures that previously required in-person meetings, paper, seals, faxing, and other relics of the industrial age.
- The economy of the nation will have to be revitalized immediately. The startup ecosystem must shift its current internal and hardware focus to aggressively tackle worldwide consumer challenges in software if it is to successfully complete its rejuvenation objective. Better circumstances and more rapid development are needed for startups, entrepreneurs, and talent.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Japan has invested much in upgrading its network infrastructure to fulfill the needs of a fully digital society. The nation understands that high-quality network connections are critical to its ability to foster innovation, spur economic development, and provide essential public services to its citizens. Japan places a premium on having ready access to fast internet as part of its network infrastructure. The government has lofty goals for broadband penetration and speed, with the end goal of connecting every home and company in the nation to the internet at gigabit speeds. Broadband Internet Access on the Go also counts.

Japan has spent a lot of money on laying fiber-optic cables to get where they want to go. Internet connections made possible by fiber-optic cables are fast, stable, and able to meet the ever-increasing data needs of today's programs and services. The government has been collaborating with major phone carriers to increase fiber-optic access in underserved regions. The country has been a leader in the development of both fiber-optic and 5G networks. The fifth generation (5G) of wireless technology

promises to be the fastest yet, with reduced latency and expanded capacity. In preparation for the commercial deployment of 5G networks, Japan has been undertaking trials and pilot projects to evaluate and demonstrate its capabilities.

4.2. Management Optimization [MO]

The Digital Agency's goal is to usher in a completely digital society where digital technologies are integrated into every facet of daily life and all levels of government and industry. The My Number social security and tax identification cards are being promoted by the agency to this end. During the current COVID-19 epidemic, these cards—which provide each person with a unique 12-digit identification number—are being advertised to get digital access to emergency government services. They are also being promoted as a complete tool for easing the burden of red tape and facilitating communication between various levels of government.

The cards have several uses, including as a form of identification for tax and social security reasons as well as in case of an emergency. They also have an IC chip with an electronic certificate of identity that may be used to gain entry to private company services. By the beginning of 2023, My Number cards will be able to be validated electronically, and cardholders will be able to apply for childcare and other municipal services online. In addition, the cards will likely begin sharing data with IDs like driver's licenses and residence documents sometime in 2024.

4.3. Online Service [OS]

The Digital Agency is responsible for establishing and maintaining the government's information technology framework. This encompasses both agency-wide and departmental-level protocols and software. The agency develops and maintains the national information system, the backbone around which other government agencies build their own informational infrastructure. The Government Cloud is an organization-wide solution that employs a zero-trust security model to further enhance data protection. The Government Solution Service provides default configurations for use by regional governments.

Each department is responsible for implementing and maintaining its own element of the system that was developed via interdepartmental cooperation. One such mechanism is the Immunization History Register. The Digital Agency recommends uniform norms to maintain data consistency and offers

technical advice. Each government agency is in charge of building and maintaining its own department-specific system.

Public health insurance cards in Japan are being replaced with digital ID cards that are connected to the My Number Card. Cardholders may have access to a wide range of online services, such as their health insurance and pension information, with the use of their card and a personal identification number (PIN). My Number uses a decentralized approach to data management to keep user data safe and secure. There has been considerable pushback against the widespread use of the My Number Card, mostly owing to fears of identity theft and invasion of privacy. Minister Kono's Digital Agency is pushing the usage of the My Number Card to hasten Japan's transition to digital services. By the end of 2023, almost all residents are expected to carry a My Number Card. However, there have been obstacles, such as a backlog of card applications, problems with the application procedure, and restricted access to the system. The government is still working to solve these problems, and it is still determined to replace traditional health insurance cards with electronic IDs.

4.4. National Portal [NPR]

Management and upkeep of the Japanese government's official website, e-Gov, is under the purview of the Ministry of Internal Affairs and Communications. Projects to strengthen online administrative functions, electronic information supply, work procedures, and system optimization are being aggressively promoted and implemented by the Japanese government. Users may find a variety of resources and connections here to help them improve their Japanese literacy skills.

The Japanese government is committed to advancing several initiatives, including the electronic delivery of government information, the streamlining of administrative procedures, the improvement of work processes and systems, the expansion of government procurement of information systems, and the establishment of information security measures via national portal.

4.5. Government CIO [GCIO]

With the launch of the Digital Agency, which was established in September 2021, the Chief Digital Officer (CDO) was established. Furthermore, the Digital Agency is increasing the number and quantity of human resources from private sectors. The role of the CDO is to assist the Digital Minister in decision-making and policy implementation and coordinate the agency's operations.

Based on the authority held by the Digital Agency, the CDO is expected to demonstrate leadership in comprehensive coordination through joint projects with each ministry. CDO is also expected to play a role in promoting administrative DX by leveraging his experience in the private sector.

4.6. E-Government Promotion [EPRO]

E-government projects are now being aggressively promoted by the Japanese government with the objectives of boosting information security, improving online administrative operations, and streamlining work methods and systems. In addition to this, they are focusing their attention on the electronic distribution of government information and the execution of initiatives targeted at enhancing the government's acquisition of information systems. The welfare of Japanese citizens and businesses is the major focus of the actions that are being taken by the government, and the fundamental purpose of these activities is to develop a digital ecosystem that is both more streamlined and safer.

4.7. E-Participation [EPAR]

To get more people involved in government decision-making, Japan is encouraging e-participation projects. Digital platforms and technology are being used by the government to increase public engagement in policy debates, solicit feedback, and incorporate citizen input into final decisions. These efforts are made to provide people a stronger say in the direction of public policy and services and to make government more open and accountable to the people it serves. To increase engagement from a larger range of individuals, the government is also aiming to increase the availability and use of digital platforms.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

Considering looming crises, including the "digital cliff" in 2025, an aging workforce, and the COVID-19 pandemic, businesses and governments are making hasty efforts to modernize. Japan has yet to fully digitalize its government, services, and digital public infrastructure, despite the rapid development of technologies such as artificial intelligence (AI), the Internet of Things (IoT), and the cloud. The government has lofty goals of bringing the virtual and the real together under the banner of Society 5.0. There have been more recent initiatives, such as policy changes and publicity. The government created the Digital Agency to help coordinate digital initiatives around the country.

The Japanese government backs a program called Open Data that promotes making publicly available information in machine-readable forms for commercial and other useful reasons. To improve people's

lives and encourage business, this initiative was created. The website of the Japanese government (https://www.data.go.jp/) has a searchable database with robust search capabilities, making it easier to locate the relevant data.

4.9. Cybersecurity [CYB]

In light of the proliferation and sophistication of cyberattacks, Japan has redoubled its efforts to ensure network safety. Such attacks pose a significant risk to the integrity of critical infrastructure like railways and data dependent IoT networks and systems. When compared to the United States and other nations, Japan's government now has a better idea of the scope of the potential issues it faces. Therefore, it has taken some efforts to bridge the gap.

The Ministry of Economy, Trade, and Industry (METI) in Japan predicted a shortage of 360,000 IT professionals by 2025, up from an initial projection of 220,000 in 2018. Due to a dearth of skilled engineers, cyber experts, and security managers, Japanese SMEs now have an opportunity for American firms offering end-to-end cybersecurity solutions.

Japan's cybersecurity policy is being developed by the government's leading organization, the National Center for Incident Readiness and policy for Cybersecurity (NISC). The National Infrastructure Security Center (NISC) aids all federal departments and agencies in developing and enforcing cybersecurity policies and procedures. As of that day in September 2021, NISC has published its Cybersecurity Strategy. The strategy endorsed by the government emphasizes the urgent need to improve cybersecurity across all sectors of Japanese society and technological development.

4.10. The use of Emerging ICT [EMG]

As for the usability of emerging ICT, Japan is one of the first countries to implement emerging technology like 5G. NTT Docomo has created a partnership to offer 5G goods. Japan has pledged $2 billion to support the development of 5G and subsequent technologies. The use of subatomic particles termed qubits in computing has enormous potential to improve digital processing speed.

In March 2021, Fujitsu and RIKEN begun using Fugaku, a supercomputer powered by artificial intelligence. Significant investment in green energy has resulted from Japan's pledge to become carbon neutral by 2050.

Principles and laws for human-centered artificial intelligence have been published by governments and organizations across the globe. The human-centered approach to artificial intelligence legislation will be discussed by digital ministers during the 2023 G7 conference in Japan. Japan's strategy, which seeks to maximize AI's positive effect while accounting for dangers, may provide light on international trends in AI regulation.

Germany

1. General Information

Area: 357,114 km^2

Population: 83,294,633

Government Type: republic

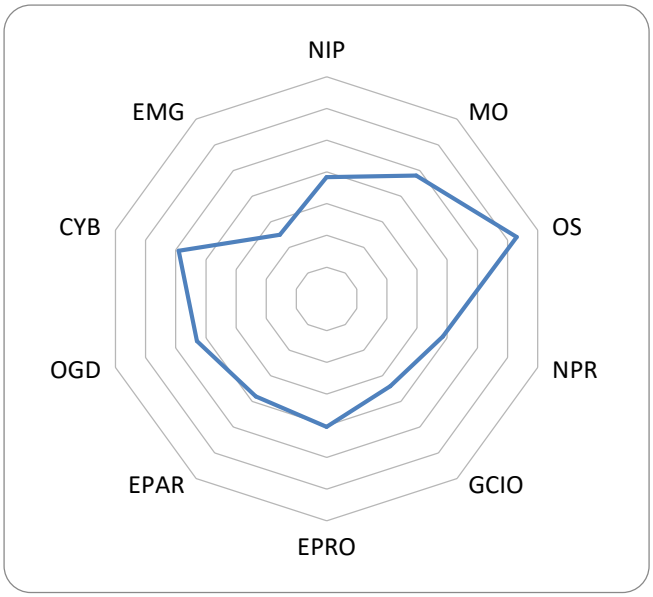
GDP: $54,803

Internet User: 91.43

Wired (Fixed Broadband User): 44.22

Wireless Broadband User: 94.39

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

Efforts of the German government to modernize government operations via the use of information and communication technology (ICT) are referred to as "digital government development." The establishment of an all-encompassing e-government infrastructure is a crucial plank in Germany's digital government growth. This involves building a reliable digital identification system that can be used across many platforms so that people may safely and easily use government websites. To facilitate the exchange and integration of data among government institutions, the government has been

attempting to build a uniform data platform. Following substantial investment in government digital transformation, Germany secured the 12th position in the Waseda rankings.

Open data and transparency are also being prioritized as part of Germany's digital government growth. Public sector data has been aggressively released by the government, allowing for its reuse and analysis by the public. This does several positive things for the economy, including fostering creativity and openness to criticism. To guarantee that its public workers have the expertise to make the most of digital technology, the German government has been funding training programs to improve their digital literacy. To that end, the government must implement training programs and provide resources to encourage the widespread use of digital platforms and technologies.

With the goal of increasing public participation in government and policymaking, Germany has been expanding its use of digital channels and platforms. The use of social media and mobile apps to spread information and collect public opinion, as well as online platforms for contributing comments and suggestion, are all part of this. The goal of Germany's digital government development is to modernize service delivery for the benefit of all citizens. The government's goal in adopting new digital technology is to increase openness, improve the quality of services, and encourage public participation in policymaking.

3.2. New Trends

This strategy tenet is in line with the larger objective of making the world a more technologically inclusive place. It acknowledges the need for digital literacy for not just economic but also civic and political engagement. The German government aims to encourage digital empowerment by providing the means for its inhabitants to fully use digital services, take part in democratic decision-making, and contribute to society's digital development.

The Digital Strategy 2025 demonstrates the German government's dedication to maximizing the benefits of digitalization for its inhabitants by placing a premium on the development of citizens' digital skills and the rollout of digital education. Individuals may participate in the digital transformation of their nation and adapt to the ever-evolving digital world by continually learning and honing their skills.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

To driving digitalization processes, the German government places a high priority on the cultivation of digital skills as well as the promotion of innovative technologies. The implementation of digital education at all stages of a person's life is one of the primary priorities of the Digital Strategy 2025. The continuous expansion of knowledge and the maturation of abilities that are appropriate for the digital age will be the result of this endeavor. Additionally, the government is giving assistance for the growth of broadband internet access via programs such as the Forderprogramm fur Breitbandausbau, which may provide financing of up to 30 million Euros for specific projects. The Federal Networks, also known as Netze des Bundes (NdB), are designed to improve the efficiency and safety of the federal government by replacing and upgrading existing networks. The information network (IVOV) is the end goal of the network strategy 2030, which attempts to achieve this by connecting the networks of the federal government with those of other public administrations.

4.2. Management Optimization [MO]

The German government has undertaken several different methods and projects to improve the effectiveness of the country's management procedures. One of the primary areas of concentration is digitization, with a particular emphasis on the improvement of network infrastructures and the enhancement of communication within the public administration. The NdB, which stands for "Netze des Bundes," is a private communication network that is based on IP and acts as an intranet for the several ministries that make up the federal government. It is an extremely important factor in ensuring the transmission of information is both safe and effective. In response to the growing danger posed by sophisticated forms of malware, such as Trojan software, the NdB satisfies the strictest security standards by implementing firewalls, encrypting all data transfer, and performing round-the-clock monitoring of users and connections.

Sponsorship of the NdB is provided by the Beauftragte für Informationstechnik der Bundesregierung (BfIT), while the Bundesanstalt für den Digitalfunk der Behörden und Organisationen mit Sicherheitsaufgaben (BDBOS) is in charge of the organization's day-to-day operations. In accordance with the network strategy 2030 for the public administration, the objective is to link the networks of the federal administration, which includes the federal Networks, with the networks of the public administration. Through the implementation of this integration, the goal is to create an information

network of the public administration (Informationsverbund der offentlichen Verwaltung, or IVOV), which will make it easier for departments to communicate with one another and operate together.

These attempts to optimize management in Germany reflect the realization that network infrastructures and IT processes are very important in contemporary administration. The goal of the government is to improve the efficacy, safety, and efficiency of the duties that fall within the purview of public administration by giving digitization a higher priority and working to build communication networks.

4.3. Online Service [OS]

By 2022, the employment in Germany's ICT industry is predicted to reach 1,124 million, making it one of the biggest in the world. According to Statista (2019), the United States is home to 95,808 different information technology companies. Market giants such as Microsoft, Apple, Dell, Adobe, IBM, Oracle, and SAP continue to benefit from the strong demand for American products and services. Small and medium-sized businesses (SMEs) with niche offerings abound in the market as well.

Revenue-wise in 2022, the IT-Services business brought in $45.3 billion, with the IT-Hardware and software industries contributing $34.9 billion and $34.1 billion, respectively. Consistent increase from 2007 when it was at USD 76.4 billion has led to projections of USD 114.3 billion in IT sector revenue in 2021. The income is expected to rise from 102.6 billion EUR in 2021 to 108.6 billion EUR the following year. Given Germany's status as a center for major ICT trade exhibits, the country provides a fantastic setting for American companies to network with their international counterparts. The worldwide clientele attracted to American exhibitors at trade events like Hannover Messe, IFA Berlin, IT-SA, Gamescom, and Embedded World has been proved effective.

4.4. National Portal [NPR]

Germany's many governmental agencies worked together to create a centralized online system to modernize administrative procedures and increase public access. Federal and state government websites collaborated to create this system, which makes government e-services as simple and safe to use as any other online account a citizen could have. The portal system not only facilitates more effective time management, but also helps save money. Users in Germany no longer must worry about which branch of government has jurisdiction over a certain issue according to a new website launched by the federal government in 2018.

Access administrative data from federal, state, and municipal governments in Germany via a single interface thanks to GovData, Germany's consolidated metadata platform. The major goal is to have all this information in one place so that it may be more easily accessed by the public and by companies. This portal's stated goal is to expand the availability of raw data that is machine-readable, in keeping with the Open Data philosophy.

The site collects metadata from a variety of sources, including the government. The Inspire Directive specifies standards that any data that may be presented on a map must meet, and this includes a substantial quantity of geodata. In 2022, GovData extended to include information from a wider range of sources, such as businesses, academic institutions, researchers, and organizations that sponsor scientific inquiry. The Robert Koch Institute is one scientific institution that has previously been merged with another.

4.5. Government CIO [GCIO]

A new federal agency was established because of the implementation of the Government IT-Steering Strategy on January 1, 2008. The Cabinet decided to give the Commissioner responsibility for overseeing the federal government's essential IT infrastructure, creating national IT architecture and standards, and formulating federal eGovernment and IT security policies. There is currently a Chief Information Officer (CIO) in each federal agency, and the CIO Conference, which includes all federal IT executives, is in charge of developing IT policy and legislation. They preside over the Chief Information Officers Conference and manage eGovernment projects on a national and state level.

Each government agency also has a Chief Information Officer (CIO). The CIO Board, made up of the heads of IT for each federal ministry, is the primary policymaking body for legislation and regulations pertaining to information technology throughout the whole federal government. The Commissioner oversees the Chief Information Officer Board and represents the federal government on the IT Planning Council, both of which are charged with guiding and directing eGovernment programs that cut across many departments and agencies.

4.6. E-Government Promotion [EPRO]

During a cabinet meeting on August 31, almost a year after the new administration's election, Germany's federal government is expected to approve the country's long-awaited digital strategy. Stakeholders in the industry have voiced their frustration with the strategy's ambiguity and the lengthy delay in its

distribution as of late. However, this version is far more accurate and thorough than earlier versions, underscoring the need of a widespread digital awakening in Germany.

High-speed data and terabit networks, secure electronic identities, and the adoption of standardized frameworks and criteria for interoperability and scalability are all reaffirmed as foundational elements of future digital initiatives in the strategy. Each ministry's top digital policy priorities are included in the updated draft as well. Detailed goals for each project are laid forth, and they span the areas of digital administration, mobility, defense, and climate preservation. Concerns that there wasn't a firm deadline have been allayed.

The digital ministry has promised further information on how they want to track the development of these specific programs. The digital strategy should provide a framework for all things digital, but its goals may (and should) evolve and become more severe over time. The European indicator that compares the digital performance of EU member states is called the Digital Economy and Society Index (DESI), and one of Germany's declared goals is to improve its current ranking.

4.7. E-Participation [EPAR]

The Berlin Declaration on Digital Society and Value-Based Digital Government was formally approved by ministers responsible for digital transformation in EU member states in December 2020. This proclamation addresses the social effects and potential benefits of digital transformation in Europe and establishes shared principles for moving forward. The participating nations have agreed to take concrete steps toward enabling value-based digital transformation by the year 2024. Among them include the encouragement of civil society engagement, the expansion of internet access, and the exercise of national autonomy.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

The German government's comprehensive Federal Digital Strategy (Digitalstrategie der Bundesregierung) was released in August 2022 by the Federal Ministry for Digital and Transport (BMDV). This plan is a continuation of the previous administration's Shaping Digitalisation (Digitalisierung gestalten) strategy, and it will provide the present Federal ministries with a framework for their digital policies and digitalisation initiatives. It lays forth lofty and quantifiable objectives for the Federal Government to pursue. Three essential initiatives for speeding up the digital transition are also included in the plan. Establishing digital identities not only for public administration services but

also for wider usage Developing consistent framework conditions and standards to promote maximum interoperability Expanding and standardizing network infrastructure to provide enhanced data supply. All the ministries' future and actions related to digital policy will be built upon the results of these projects. A thorough three-pillar strategy, including quantitative and qualitative aspects, is used to track the development of these projects.

The Open Data Strategy of the German Federal Government was adopted by the federal cabinet on July 6, 2021, setting the broad parameters of German data policy. This plan covers open data and lays out the government's goals in this area. There will be a total of 68 initiatives carried out by different federal ministries and bodies over the next five years as part of the Open Data Strategy's three main areas of activity. The quality and usefulness of the given data is intended to be improved through these efforts, which seek to increase data supply, nurture data skills, and create a data-driven culture inside the federal government. The availability of data is becoming an increasingly important economic issue, elevating the importance of the notion of open data on a worldwide scale. A new legislative framework for open administrative data was developed after a first modification was presented to the eGovernment Act (EGovG) on July 13, 2017, to reflect this reality. This paradigm established universal characteristics of open data, such as no cost, easy accessibility, and machine-readability.

At the same time, data privacy laws are enforced, making publically accessible information about individuals only when appropriate security measures have been taken. On July 23, 2021, a new Open Data Act went into effect, fine-tuning the duties of the federal government under Section 12a of the EGovG and greatly expanding the scope of authorities subject to these duties. The act's primary provisions include the establishment of open data coordinator positions inside federal agencies and the expansion of that mandate to include research data. GovData, a national metadata site, was set up so that users may easily access the broad variety of open data given by various authorities. This site provides a single location from which citizens may find and access open data published by a wide range of government agencies.

4.9. Cybersecurity [CYB]

The German government's Cybersecurity Strategy 2021-2026 focuses on implementing reforms in four main areas: society, private industry, government, and EU/international affairs. A total of 44 individual objectives have been set to realize the indicated methods. With these goals in mind, we are exploring

unexplored waters. The Federal Office of Information Security (BKA) and the Federal Office for the Protection of the Constitution (BKA) will work together to fight cybercrime. These departments will support one another as the backbone of the federal government's cybersecurity infrastructure, allowing for better interagency cooperation.

The safety of our country's digital revolution is ensured by our efforts to improve data management. Investing in essential technologies and working with relevant experts may help Germany's digital economy grow. Critical and emergent enabling technologies will be built with security in mind from the ground up. The Federal Government's long-term strategy to cybersecurity is laid out in the revised 2021 Cybersecurity Strategy, which builds on the 2016 Cybersecurity Strategy by outlining principles, focal areas, and overall objectives.

Germany's current Cybersecurity Strategy was approved by the government on September 8, 2021, and it has a validity period of five years. In 2023, we want to release a redesigned version. This revised approach improves much over its predecessor since it uses consistent, comprehensive principles across the whole paper. One of these principles stresses the need to improve the digital sovereignty of the state, economy, scientific community, and civil society to combat cybercrime. The policy provides a framework for the federal government to implement cybersecurity measures. The Agency for Innovation in Cybersecurity (Agentur für Innovation in der Cybersicherheit GmbH) was set up to protect national sovereignty in the digital realm. The main goal of the agency is to give out contracts for certain types of research projects that have the potential to significantly advance knowledge in the realm of cybersecurity and associated vital technologies. The state's demands for both internal and foreign security are being addressed through these initiatives. The agency is keen on investing in initiatives with the potential to significantly alter the market, such as those that include groundbreaking new technologies.

4.10. The use of Emerging ICT [EMG]

The Digital Agenda released by BMWK shows that ICT development is highly valued by German officials. This plan is the German government's road map for stimulating the economy and encouraging technical innovation. Community and business confidence, safety, and security are top priorities on the agenda. The infrastructure, economics, workplace, public administration, education, research, science, culture, and media are just a few of the many facets of society that are examined in this book.

Cybersecurity, the Internet of Things (IoT), Big Data, Health IT, Cloud Computing, ERP, Data Centers, Smart Social Business Platforms, Integrated Systems, Virtual Reality (VR), and Digital Factories are all hot topics in Germany.

Germany is the biggest software market in Europe and one of the top ICT markets worldwide. According to Statista, in 2022, Germany's IT sector would employ an estimated 1,124 million people at its 95,808 firms. Products and services made in the United States are in great demand across all industries, with leaders like as Microsoft, Apple, Dell, Adobe, IBM, Oracle, and SAP commanding sizable portions of their respective markets. In addition, there are a great deal of specialist SMEs available. Revenue in the various IT subsectors in 2022 were USD 45.3 billion for IT services, USD 34.9 billion for IT hardware, and USD 34.1 billion for software. From USD 76.4 billion in 2007 to an anticipated USD 114.3 billion in 2021, the IT industry's overall income has increased steadily. Revenue is forecast to increase to 108.6 billion Euros in 2022 from 102.6 billion Euros in 2021.

Numerous major ICT trade exhibitions are held in Germany, making it a great platform for American businesses to engage with international partners and customers. Buyers from all around the world may be found at trade shows such as Hannover Messe, IFA Berlin, IT-SA, Gamescom, and Embedded World. According to the BMWK's (Germany's Federal Ministry of Economic Affairs and Climate Action) Digital Agenda, information, and communication technology (ICT) is a top priority for the German government. The agenda highlights digital environments in society, including infrastructure, economics, workplaces, creative public administration, education, research, science, culture, media, security, protection, and business confidence. The policy's goals include strengthening cyber defenses, modernizing the German economy via digitalization, and expanding the country's internet infrastructure. Threats include, but are not limited to, the effects of the EU Digital Single Market, the GDPR, the E-privacy Regulation, and other recent advances in cybersecurity policy on the ICT industry.

Norway

1. General Information

Area: 323,802 km^2

Population: 5,474,360

Government Type: constitutional monarchy

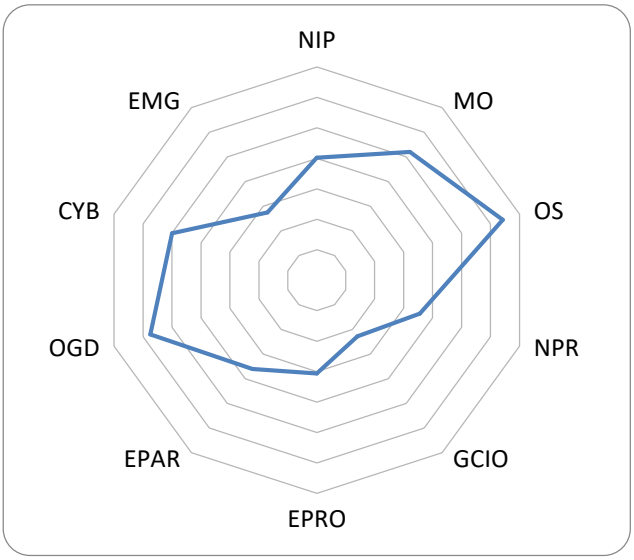
GDP: $100,420

Internet User: 97.00

Wired (Fixed Broadband User): 44.04

Wireless Broadband User: 103.71

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The Norwegian government has played an integral role in driving digital transformation initiatives. Due to significant funding for government digital transformation, Norway attained the 13th spot in the Waseda rankings. To enhance public services, foster innovation, and stimulate economic growth, the country is fully committed to embracing digital transformation. In 2016, they unveiled their Digitalization Strategy with the goal of making Norway a world leader in digital by 2025. The digital infrastructure, digital competency, and digital public services are the main priorities of the strategy. To better serve the people, the government has been attempting to digitize public services. E-voting, e-healthcare, and other similar projects fall under this category.

Furthermore, Norway has been pushing for the use of open data to encourage innovation and boost the economy. The Norwegian Open Data Portal was recently created by the government, giving programmers, academics, and businesses access to numerous publicly available data sets. The administration understands the significance of cybersecurity in the modern day, and it has taken measures to improve the country's cybersecurity capabilities. Among these are the creation of the National Cybersecurity Center and the introduction of safeguards for essential services.

To better the lives of its people, Norway has been working on "smart city" programs. Smart transportation systems, smart energy grids, and smart waste management solutions are just some of the examples that have been implemented in Oslo. To guarantee that residents are prepared to take part in the digital economy, the government has been investing in the development of digital skills. Programs to help adults learn to use digital technologies are included in this category, as are those that teach coding in schools. Norway is one of the countries investigating blockchain's potential across industries. Several government-sponsored pilot programs are currently putting blockchain technology to the test in operational settings, including land registry and supply chain management.

3.2. New Trends

The government of Norway has adopted several policies meant to accelerate the country's digital transition and improve Norway's digital infrastructure. With its new "digital first" policy, the government prioritizes making its digital services available to citizens and companies. A key goal of this plan is to streamline and simplify the delivery of services through digital mediums and enhance the user experience. Norway has placed a premium on open data efforts, with the aim of increasing public access to government data and fostering a more open and accountable administration. The government promotes innovation and the creation of new digital solutions by releasing previously restricted data sets to corporations, researchers, and ordinary residents.

Authorities have taken serious precautions to ensure the security of its digital infrastructure, its government systems, and the personal information of its residents. This involves things like spending money on cybersecurity tools, spreading information about the dangers of the internet, and working with foreign allies to stop cybercrime. The government has spent a lot of money building up the country's digital infrastructure (things like data centers and broadband networks) so that everyone has

access to fast, reliable internet. Digital services, innovation, and economic growth cannot succeed without this foundation.

To guarantee that residents are prepared to engage in the digital economy, the government has been investing in the development of digital skills. Programs to help adults learn to use digital technologies are included in this category, as are those that teach coding in schools. Norway is actively investigating the many possible uses for this cutting-edge innovation. Several government-sponsored pilot programs are currently putting blockchain technology to the test in operational settings, including land registry and supply chain management.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

The numerous accomplishments that Norway has attained in this field serve as evidence of the nation's steadfast commitment to the digitization of resources. The regulatory bodies conducted an extensive auction for the deployment of 5G technology and devised methods to mitigate the burden on Telenor's network. Telenor has established a goal to completely decommission its GSM and 3G networks and progressively reduce its PSTN equipment by the year 2025. The projects exemplify Norway's unwavering dedication to adopting cutting-edge digital technology and enhancing its telecommunications infrastructure in preparation for the future.

4.2. Management Optimization [MO]

The Digital Strategy for the Public Sector delineates the specific goals and domains of concentration pertaining to the digitization endeavors that will be pursued through the year 2025. The primary objective is to facilitate the government's adoption of a paperless and digital infrastructure, with the intention of enhancing service delivery and optimizing the effectiveness of shared IT solutions. The establishment of a digital environment necessitates the vital collaboration of the public and private sectors. Ensuring cybersecurity has emerged as a crucial concern, along with the strategic objectives outlined in the Norwegian National Cybersecurity Strategy. The primary goals for the year 2025 encompass the attainment of a reliable and open digital transformation, the enlargement of digital responsibilities, the promotion of online participation, the advancement of value generation for enterprises, the facilitation of cooperative digital services, and the provision of assistance for the integration of digital services within governmental entities.

4.3. Online Service [OS]

The Anskaffelser.no Portal for Public and Financial Management is operated by the Norwegian Agency, serving as a platform for many stakeholders involved in public procurement. The portal provides a comprehensive range of expertise, tools, and information to streamline procurement interactions with the public sector. Anskaffelser.no offers sophisticated and all-encompassing eProcurement and eCommerce services, providing guidance to stakeholders throughout the entirety of the procurement process, encompassing planning, competition, follow-up, and settlement. The portal also includes the eCommerce-focused website eHandel.no, which provides supplementary services and comprehensive information on electronic invoicing, new eCommerce platforms, and the broader field of eCommerce. The primary objective of these services is to optimize the process of acquiring comprehensive knowledge on eCommerce and offer recommendations on how these technologies can enhance the efficiency, simplicity, and security of purchase decisions. The main goal of eHandel.no is to provide suppliers to the public sector with a convenient and efficient platform for eProcurement activities that is both cost-effective and user-friendly.

4.4. National Portal [NPR]

The 'Norway Digital' geospatial infrastructure is supported by the GeoNorge Portal, which acts as the official national platform for the project. It is the most comprehensive open, standards-based eGovernment component available, and it is used daily throughout the whole of Norway. This portal serves as the major hub for many geospatial eServices, providing the availability of core geographic information as well as a diverse collection of thematic data. Different groups, such as public administration and environmental management organizations, can make good use of geospatial data by capitalizing on the resources made available by the portal. In addition, the infrastructure has a gateway that enables the information to be sent to external stakeholders and the commercial sector more easily. In addition, GeoNorge provides individuals with access to digital geographical data by means of a centralized platform referred to as Norway WEB digital download. This system utilizes a username and password authentication method, and it enables people to browse and download files that include elevation data, administrative borders, transformation formulae, and other issues that are linked, such as cultural heritage and herding. The system is designed to accommodate data at both the local and national levels, making it a complete resource for the public.

4.5. Government CIO [GCIO]

Within the realm of Norwegian public administration, the authority to designate personnel for the posts of Chief Information Officer or other analogous duties does not fall within their purview. At the federal level, the task of supervising these positions is often assigned to the individual serving as the chief information officer, who holds the position of the director of the Agency for Public Management and eGovernment. This practice guarantees the efficient administration and synchronization of information-related affairs within the governmental framework.

4.6. E-Government Promotion [EPRO]

An extensive Strategy for Electronic Identification (eID) has been released, and the Ministry of Local Government and Regional Development is happy to share the news. This policy expresses the overarching idea of protecting the individuality of every citizen of Norway. Providing an eID that is flexible enough to meet the demands of all people is a top priority, and this is emphasized in the One Digital Public Sector policy. This covers minors (children and teenagers) and non-Norwegian citizens (those without a Norwegian national identification number). It is crucial that people who are unable to participate digitally directly have the option of having a proxy participate on their behalf, which calls for the creation of digital authorizations and consent rules. throughout addition, the plan acknowledges the significance of easing the use of electronic employee IDs and has spoken with stakeholders to develop recommendations for eID deployment throughout government.

Norway's ambitious 2025 Geodata Strategy was released on November 1st, 2018, and it aims to meet the interests of a wide range of stakeholders, including government agencies, IT companies, businesses, and consumers. This plan seeks to take use of geographic information, which includes location objects, events, and circumstances, with the Norwegian Mapping Authority as the national spatial data coordinator. This precious resource, also known as geodata or location data, is essential for making well-informed decisions and generating new ideas.

The National Strategy for eHealth is another important project that aims to address the difficulties of a disjointed healthcare system. The plan is meant to deliver healthcare services that are effective, sustainable, and paperless from 2017 through 2022, with modifications in 2019. This strategy places an emphasis on the ease and security with which healthcare professionals can access patient information,

the availability of health data for quality improvement, health surveillance, management, and research, and the seamless accessibility of digital services for citizens.

4.7. E-Participation [EPAR]

The eGovernment infrastructure in Norway facilitates the exchange of data and promotes interoperability across different government institutions. The National Health Network (NHN) serves as a platform for the dissemination of health and social services data across five regional networks. The involvement of Norway in European projects such as the TESTA network service and the Electronic Sharing of Social Security Information (EESSI) serves to augment the sharing of data and bolster security measures across public administrations within Europe. The primary objective of the Programme for Digital Procurement is to achieve complete digitization of the procurement process, with the intention of optimizing efficiency for both corporate entities and public customers. This digital transformation is anticipated to yield resource conservation and enhanced transparency.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

Norway is the country earning the highest score of this indicator in the Waseda rankings. Norway is actively involved in open government data (OGD) initiatives. Open government data refers to the practice of making government data accessible and available to the public for free use and reuse. Norway's approach to OGD involves promoting transparency, accountability, and innovation. The government has established the data.norge.no portal, which serves as a central platform for accessing and sharing government data. The portal provides a wide range of datasets from various government agencies, allowing citizens, businesses, and researchers to utilize the data for analysis, research, and the development of innovative solutions. Norway's commitment to OGD aims to foster collaboration between the government and the public, driving economic growth, and societal development.

4.9. Cybersecurity [CYB]

Norway was among the countries with the highest scores in the Waseda rankings. A new National Cybersecurity Strategy has been issued in Norway with the goal of improving coordination between the public and commercial sectors, including municipalities, to address potential cybersecurity concerns. The plan has a primary emphasis on the following five key areas: preventative cybersecurity, addressing cyberattacks, fighting cybercrime, and battling cybercrime. The Digital Strategy for the Public Sector was introduced with the goals of achieving digitalization that is transparent and inclusive, encouraging

digital contact with the public sector, and promoting data exchange for user-friendly services. The Norwegian Digitalization Agency oversees the coordination of the plan.

4.10. The use of Emerging ICT [EMG]

Norway unveiled its National Artificial Intelligence Strategy, with the intention of updating it regularly to reflect developments in society and technology. The policy highlights Norway's dedication to becoming a leader in the development and use of AI while also protecting individual freedoms and rights. The government recognizes the growing value of data as a resource for corporations and society, therefore it is attempting to entice data centers and other data-related enterprises to set up shop in the nation. The government plans to use this economic potential heavily in their next initiatives. The Norway Common Digital Foundation produced a white paper on political discourse in the context of IoT.

To help public sector organizations overcome barriers to use of cloud services, the Ministry of Local Government and Modernisation released its Cloud Computing Strategy in 2016. A concept selection study for a national cloud is now underway, and the plan lays out criteria for safe and appropriate cloud computing usage. Norway's national eInfrastructure for high-throughput data and computing is managed by Sigma2 AS. They facilitate worldwide partnerships by providing high-performance computer and data storage services to Norwegian research and academic organizations. Beginning on January 1, 2022, Sigma2 will operate as a wholly owned subsidiary of the Norwegian Agency for Shared Services in Education and Research (Sikt).

Sweden

1. General Information

Area: 450,295 km^2

Population: 10,612,086

Government Type: constitutional monarchy

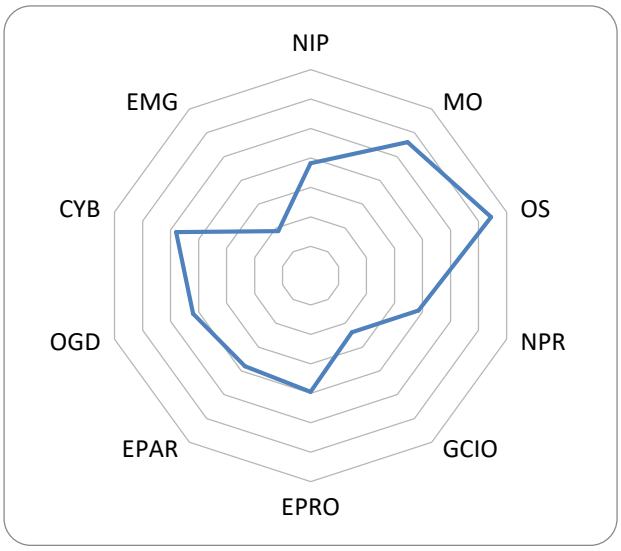
GDP: $63,123

Internet User: 88.31

Wired (Fixed Broadband User): 40.64

Wireless Broadband User: 126.62

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The recently established center-right government in Sweden has initiated a comprehensive infrastructure plan worth €1bn. The primary objective of this plan is to facilitate digital transformation and promote capital investment in several sectors, including public administration, business, and society. The primary objective of the four-year plan is to expedite the process of digital transformation in crucial sectors of government and public services, including education, transportation, healthcare, and national security. With extensive resources devoted to government digital transformation, Sweden emerged as the 14th position in the Waseda rankings.

The foundational structure for the project was created upon the assumption of power by Prime Minister Ulf Kristersson's newly formed administration on October 18, 2022. The implementation of the DTIP will be carried out in partnership with the Agency for Digital Government (ADG/Myndigheten för Digital Förvaltning), the governmental entity responsible for coordinating and facilitating the digital transformation of public administration in Sweden. The designated mandate of the ADG gives it the jurisdiction to supervise any significant digital infrastructure initiatives. Sweden's digital community has generally expressed a positive reception towards the government's dedication to promoting rapid change through the Digital change and Innovation Program (DTIP).

3.2. New Trends

The Swedish economy is now through a process of recovery subsequent to the adverse impact of the COVID-19 pandemic; nonetheless, it is important to acknowledge that potential risks and threats continue to exist. To stimulate employment and foster a sustainable recovery, it is imperative to proceed with a labor reform that enables adaptation to a swiftly evolving economic landscape while concurrently allocating resources towards the enhancement of digital competencies and infrastructure.

The Swedish government has established a comprehensive strategy for digital transformation, acknowledging the significance of digitalization. The objective of this strategy is to establish itself as the foremost authority in harnessing the opportunities presented by digital transformation on a global scale. The digitalization effort in Sweden has shown significant progress in previous years. Conversely, the process of digitizing government entities has just started in recent times. The acquisition of all the benefits of digitalization may pose challenges for any organization. When engaging in software development, the public sector has certain challenges. In the context of procuring specialist information technology services, a government agency may encounter a situation where it is the only purchaser inside the market for these services. This phenomenon may be attributed to the frequent insistence of government agencies on prohibiting the sharing of information by other entities. Furthermore, it is worth noting that there are instances when only a limited number of service providers in the market provide services expressly designed for the public sector. This restriction in options might constrain the procurement and sourcing processes. Prior studies have shown that there has been a notable focus on software process optimization and scalability inside Swedish Government Agencies (GovAgs) in recent years. Nevertheless, a comprehensive assessment of the status of implementation of the software projects undertaken by GovAgs is lacking.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Sweden has made significant investments in its digital government network infrastructure to ensure preparedness for various scenarios. Firstly, Sweden has a robust and reliable broadband network that covers almost the entire country. This network is crucial for providing internet access to citizens and enabling digital government services. The government has worked closely with telecommunications companies to expand and improve broadband coverage, especially in rural and remote areas. This ensures that all citizens have equal access to digital government services, regardless of their location.

Secondly, Sweden has implemented a secure and resilient network infrastructure to protect against cyber threats. The government has established the Swedish Civil Contingencies Agency (MSB) to oversee cybersecurity and provide guidance to government agencies and organizations. MSB works closely with other government agencies, private sector partners, and international organizations to share information and best practices in cybersecurity.

Additionally, Sweden has invested in advanced technology infrastructure to support digital government services. For example, the government has implemented a secure and efficient digital identity system called BankID. This system allows citizens to authenticate themselves online and access various government services securely. The government has also developed e-identification tools, such as Mobile BankID, which enables citizens to use their mobile phones for secure identification and access to digital services.

Moreover, Sweden has focused on interoperability and data sharing to enhance the efficiency and effectiveness of digital government services. The government has established the Swedish e-Government Delegation, which promotes collaboration and coordination among government agencies in the development and implementation of digital services. This ensures that different government systems can communicate and share data seamlessly, improving the overall user experience and reducing administrative burdens.

4.2. Management Optimization [MO]

The Swedish government aims to become a global leader in digital transformation by prioritizing economic growth, full employment, and long-term resilience. Key goals include improving digital literacy, increasing public trust in digital services, fostering innovation, and ensuring universal access

to digital opportunities. To enhance collaboration among government departments, the initiative "Putting the Citizen at the Center" was established. The availability of online services has benefited consumers and businesses, and efforts have been made to make them accessible, user-friendly, and secure. The integration of information management, data security, and automation has also improved government administration.

4.3. Online Service [OS]

The Swedish government has introduced a new national biometric electronic ID card, which does not replace paper IDs. This card is essential for entering the Schengen area and is required for various activities. Additionally, the ID card incorporates a traditional microchip.

In terms of e-procurement services, a digital procurement system has been developed by vendors specializing in different aspects of the process. Rather than creating a single online hub for government purchasing, the central e-procurement authority focuses on ensuring service quality. There are numerous independently operated websites, some of which specifically cater to government contracts.

The current electronic card in Sweden does not serve as a remote authentication eID. A study has been proposed to enhance it with a high-level eID, but no decision has been made. The government plans to conduct a specialized study to recommend the implementation of a highly secure State eID in Sweden. This study will also propose the issuance of a digital identity wallet in compliance with the upcoming EU regulation eIDAS II. The digital identity wallet will enable online and offline use, facilitating activities like banking and tax filing across the EU.

4.4. National Portal [NPR]

The Government Portal is the official website for the Swedish government and government offices. Its purpose is to provide structured access to documents and records, information on current government bills, initiatives, and ministerial activities, as well as insights into the decision-making process in Sweden. The website consists of four main sections:

- Government and government offices: This section offers up-to-date information categorized by Ministry, Minister, and subject area.

- Government policies: Here, you can find an overview of the policies applicable in Sweden, as well as related EU policies.

- Documents and publications: This section contains all information, materials, and publications available in English or other foreign languages. There is also an ordering service provided.

- How Sweden is governed: This section focuses on providing context around the work of the government and government offices. It explains the decision-making processes, the role of the EU, and other relevant matters.

4.5. Government CIO [GCIO]

Within each level of government, there exists a Chief Information Officer (CIO), although the specific titles and duties assigned to them may exhibit some degree of variation.

4.6. E-Government Promotion [EPRO]

The Swedish government aims to lead in digitization of the public sector. They have a plan called "Vision e-Health 2025" to achieve this. Sweden ranks tenth in digital maturity but is second in connectivity and internet usage among EU member states. Efforts to improve digitization have gained importance, with the government allocating 200 million crowns for this purpose. Collaboration among governments has established a platform for sharing best practices and promoting eGovernment. Municipalities have worked together on 30+ projects to provide basic functionality and standard design for eServices. This platform enables the active exchange of digitization and change management knowledge.

4.7. E-Participation [EPAR]

Sweden has embraced a vision for eHealth up to 2025, aiming to become the global leader in leveraging digitalization and eHealth to enhance people's health and welfare, fostering independence and participation in society. A strategy for the period 2020-2022 has been developed, focusing on priorities such as raising awareness, ensuring secure information, promoting knowledge, driving digital transformation, and fostering collaboration. Additionally, the government and SALAR are working on legal frameworks, terminology, and standards to ensure consistency.

Digitization holds immense potential for the future of social services, health, and medical care, enabling greater individual involvement, improved communication between individuals and service providers, and more efficient support systems for staff. Just as smartphones have revolutionized communication

and made information readily accessible at our fingertips, digitization in social services and healthcare can transform how individuals engage with their own well-being and interact with service providers.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

To become a world leader in realizing the benefits of digitalization, the Swedish government has released an all-encompassing plan for digital transformation. Sweden has proven itself to be a leader in the digital revolution. However, the government's efforts to digitize are still in their infancy, creating obstacles for businesses that want to reap the full benefits of digital transformation. There are fewer possibilities for suppliers who focus on public sector services, which limits the government's ability to source and acquire software.

Sweden's modern municipal government faces the challenge of choosing which data will provide the highest value to end users and best meet social demands, all while making all its data easily available. Many academic and technical reports on open government data (OGD), big data, and its effects on the economy and democracy have already been written. Data integrity and morality are common focal points of such investigations. Yet, there is a dearth of evidence-based policies aimed at easing the rollout of OGD initiatives at the local level.

Governments have always collected and analyzed data to enhance the quality of services they offer, but they must now consider how best to make that data available to the public. It is important to provide data in a variety of forms to meet the demands of users, however, limited agency resources are often mentioned as the primary barrier to publishing open government data (OGD).

4.9. Cybersecurity [CYB]

The Swedish government agencies are currently encountering notable difficulties in the realms of digital work, collaboration, and cybersecurity. Efforts are being made to achieve a harmonious equilibrium between privacy restrictions, safety laws, and productivity. The administration has demonstrated adaptability by leveraging pre-existing tools such as Skype/Teams for the purpose of facilitating remote work amidst the ongoing pandemic. The data storage infrastructure in Sweden has garnered the attention of multinational corporations, leading to the establishment of data centers within the nation's borders. According to an extensive analysis, it is argued that conventional approaches have become inadequate in ensuring efficacy, thus necessitating the evolution of the government's IT systems to safeguard both data and physical security.

4.10. The use of Emerging ICT [EMG]

Sweden has emerged as a prominent frontrunner in the utilization of digital technology to foster economic advancement and promote societal development. The nation places significant emphasis on the utilization of artificial intelligence (AI) and the Internet of Things (IoT) as means to tackle societal challenges, all the while maintaining a commitment to principles such as transparency and cooperation. Swedish small and medium-sized enterprises (SMEs) demonstrate exceptional performance in the realm of e-commerce and the expansion of online sales. The information and communication technology (ICT) industry plays a substantial role in Sweden's gross domestic product (GDP), with a considerable proportion of value added attributed to the production and development of computers and software. The digital technology sector is seeing fast expansion, resulting in a growing demand for international professionals to supplement the expertise of Swedish specialists.

The National Municipality Act in Sweden has been amended by the government, granting municipalities and regions the authority to outsource decision-making responsibilities to automated functions in specific circumstances. The government has additionally unveiled an internet Strategy aimed at attaining comprehensive internet coverage throughout Sweden by the year 2025. The coordination of a state aid program for broadband infrastructure investments has been undertaken by the Swedish Post and Telecom Authority (PTS). However, the deployment of fiber-optic infrastructure has experienced a deceleration in its progress.

Taiwan

1. General Information

Area: 36,193 km^2

Population: 23,923,276

Government Type: republic

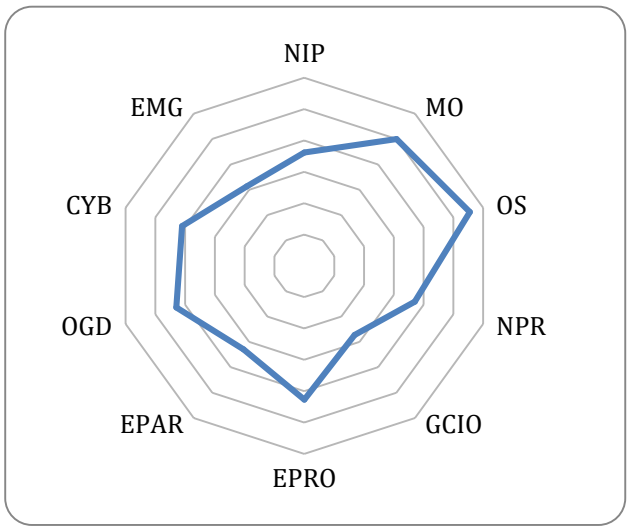
GDP: $ 37,307

Internet User:90.12

Wired (Fixed Broadband User): 26.59

Wireless Broadband User: 116.90

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

There exists a widely held worldwide perception that Taiwan demonstrates a remarkable level of technological prowess, industrial capabilities, and innovative practices within its governmental framework beyond what would typically be expected given its size and resources. The Taiwanese government has consistently recognized that the preservation of the nation's ongoing autonomy relies on the implementation of a more effective approach centered on economic growth, technological advancement, and adaptive institutional frameworks. In an endeavor to emulate the most favorable aspects of Western societies, the Taiwanese government actively pursued the establishment of a domestic industrial base throughout the 20th century, with the goal of creating a native "Silicon Valley"

equivalent. Paradoxically, these efforts have now surpassed those of the Western nations, resulting in the establishment of an administration and society characterized by a high level of trust and technological proficiency. This enables the use of the same open-mindedness and strategic cogitation, which are essential for foreign policy, to address internal issues. Through extensive investment in government digital transformation, Taiwan achieved 15th place in the Waseda rankings.

Taiwan promptly recognized and responded to the burgeoning pandemic, in part attributed to a high-ranking government health official who came across a post on Taiwan's preeminent online forum about the emergence of a new disease originating from China. In the context of Taiwan, this anecdote serves as a testament to the exceptional efficacy of Taiwan's response to the epidemic in comparison to that of several other countries. The country's effective management of the COVID-19 pandemic may be attributed to the synergistic collaboration between the government's proactive measures and the constructive engagement of civil society, therefore highlighting the significance of fruitful contacts between centralized state institutions and non-governmental actors.

3.2. New trends

The fast development of digital technology and its ambition to reform and empower all facets of human existence indicate that the next decade has significant potential for transformative change. The imperative of the energy transition lies in its capacity to effectively address the many challenges arising from anthropogenic activities, notably the pressing issue of climate change. The integration of technology into everyday life requires a collaborative effort between engineers and scientists. The integration of several sectors, including fundamental research, applied research, and industry, is important to address the rapid and profound social transformations effectively and promptly. The global pandemic has presented a significant challenge as it has brought about notable changes on the Internet of Things (IoT) domain by expediting the pace of digital transformation. Nevertheless, the current outbreak has provided Taiwan with an opportunity to demonstrate its great technologists and robust industrial chains. Over the course of the last year, Taiwan has effectively ensured the protection of public life and sustained industrial operations via a combination of governmental and private endeavors. There has been a discernible decrease in the incidence of cases attributable to the unwavering commitment of the community and the provision of aid from the international community.

The investigation of green energy has emerged as a significant concern in Taiwan. Prior to the year 2016, renewable energy sources constituted a relatively insignificant component within the broader context. The newly appointed government subsequently implemented a series of environmentally conscious initiatives, with the minister projecting that around 20 gigawatts (GW) of solar energy will be readily available by the year 2025. Although electric automobiles are now priced at a rather high level, their adoption is expected to make a substantial contribution to the ongoing energy transition. Electric mobility plays a vital role in facilitating the shift towards sustainable energy systems since it is expected to lead to an increased need for renewable power generation. This observation suggests that there is a growing need for adaptable electrical systems. The growing prominence of the smart grid and renewable energy necessitates the significant involvement of energy storage within the industry. With the decreasing cost of energy storage, several technologies are expected to be used in backup and time-shifting applications.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

In several areas, including public health and digital technology, Taiwan has shown its competence and expertise. The government's official motto is "Taiwan can assist," therefore Taiwan has been helping other countries deal with pandemics by sharing its knowledge and resources. This results in a great deal of international awareness about Taiwan. While the outbreak is a serious concern, it also provides Taiwan with an opportunity to highlight the quality of its technology experts and manufacturing infrastructure.

Precision healthcare, digital transformation, semiconductors, space, and 5G/6G Internet infrastructure are the six businesses that Taiwan will prioritize in the post-pandemic era. There is a strong focus on digital laws in Taiwan, and new technologies like blockchain and the Internet of Things (IoT) will be prioritized in the next years. Digital technology will play a crucial role in every facet of society, and everything will be linked. As a result of the pandemic, Taiwan has to speed up its already impressive digital transformation efforts. The enhancement of government digital infrastructure should be implemented progressively in accordance with prevailing trends in technological development.

To bolster the national digital transformation response strategy, it is imperative for the government to adapt to contemporary trends and proactively engage in cross-border integration. This entails

implementing measures pertaining to hardware aspects, such as network telecommunications and information computing, as well as regulatory adjustments and personal data protection, which predominantly fall under the software aspect. Considering global digital advancements, it is imperative for the government to closely monitor significant technological matters. By implementing policy initiatives, the government can effectively enhance and refine the national digital landscape. This can be achieved through initiatives such as the establishment of advanced mobile telecommunications infrastructure, comprehensive regulations pertaining to network and data oversight, and robust measures for safeguarding information security. This will facilitate the digital transformation of industries by implementing digital governance and ensuring that new digital technologies may consistently realize their full potential in the digital age.

4.2. Management Optimization [MO]

Smart government, data governance, and bolstering national development momentum are three worldwide themes that have emerged in the digital age. To strengthen government effectiveness and national security, link government services and needs of the public, and optimize decision-making quality, the "smart government" concept emphasizes the use of Taiwan's technological advantages with data as the backbone. In advanced countries, where e-government is more advanced, the role of ICT application in public governance has shifted from "assisting with management of public affairs" to "innovating public governance effectiveness" and is gradually shifting to "creating public service value" as the digital economy grows. The promotion of smart government has shifted its focus to using new technologies to improve government service operations, developing novel service patterns for the public, and meeting the needs of the public. Planning the national level transformation strategy for the growth of Taiwan's government, industry, talent pool, and society, the Executive Yuan unveiled the Digital Nation and Innovative Economic Development Program (DIGI+ 2017-2025) in 2017. To expedite the promotion of different responsive measures for digital transformation of government, the National Development Council (NDC hereafter) developed the Digital Government Program of Taiwan (2017-2020). emphasized digital rules and will spend the next several years concentrating on new technologies like blockchain and the Internet of Things (IoT). Digital technology will play a crucial role in every facet of society, and everything will be linked. As a result of the pandemic, Taiwan has to speed up its already impressive digital transformation efforts.

4.3. Online Service [OS]

For decades, Taiwan has shown its global leadership in developing and implementing e-government technologies that improve citizens' access to information, participation in government, and overall quality of life. The response to the COVID-19 pandemic in Taiwan, which heavily used these e-government services, is enough proof of this.

Taiwan stands out for its implementation of a government-wide plan to incorporate digital advancements into all sectors of governance. Because of its forward-thinking approach to information and communication technology, civic participation has expanded, and the traditional barrier between citizens and their government has been diminished. By allowing the government to tap into the dormant ICT skillsets of its citizens, Taiwan has created a more responsive, effective policy formulation and execution process that other societies with similar human resources may employ.

4.4. National Portal [NPR]

Administrative ease and improved service to the public. The smart government that operates as a one-stop shop for its citizens. With the completion of the online one-stop service for 147 company registration matters, entrepreneurs can move forward with their investments more quickly; with the one-stop birth registration service, parents can apply for labor insurance and national pension insurance childbirth payment at the same household registration office where they register their child's birth; and with the completion of the one-stop payment service, utility bills can be paid via mobile device. Agencies get help in providing digital services with the user in mind.

4.5. Government CIO [GCIO]

The Deputy Ministers and Chief Secretaries of several cabinet-level government agencies in Taiwan are all members of the GCIO of Taiwan. The Chief Information Officer of the Executive Yuan serves as the convener of the National Information and Communications Initiative Committee (NICI). At the ministerial level, the Chief Information Officer (CIO) is accountable for driving business process re-engineering, coordinating the use of business and information and communications technology (ICT) resources, and reporting directly to the minister.

4.6. E-Government Promotion [EPRO]

As the world enters the digital age, the trend among governments, including that of Taiwan, has been toward digital government, data governance, and boosting the drive for national progress. The term "digital government" is used to describe the potential for improved public services as a result of the

increased use of electronic records and other forms of digital technology. Using data as a basis, effectively deploying digital technologies, bolstering government efficiency and national security, and aligning government services with citizen requirements are all ways in which Taiwan's government works to improve the quality of governance decision-making. From early administration of public affairs to present-day creative governance efficiency, ICT has played an increasingly important role in Taiwanese public governance. The future focus will shift from growth to the creation of public service value.

Overall, the adoption rate of newly created digital services is a composite indication of how well they will function in practice. The percentage of the public who are making use of the program's new smart technology applications is one measure of the program's success. Three primary goals, "accelerated data release as a driver of data reuse," "utilization of livelihood data to develop a new policy vision," and "new era of connecting technological applications and innovative services," are used to provide a holistic evaluation of the program. Public service advantages are emphasized as the program promotes strategy based on the program's overarching goals in tandem with the smart government action plan and DIGI+ 2.0.

4.7. E-Participation [EPAR]

Integration of service functions, innovative smart services, open data transparency, and maximum added-value application are the three aims of the Smart Government Action Program. High-quality decision-making and connection to the governance network. But just four of the seven initiatives to promote accessible government data, public engagement and social innovation, integrated service functions, and intelligent service have been effectively implemented. Additional actions include "developing a regulatory adjustment platform," "deploying privacy protection monitoring," and "boost data security defense in depth." There should be more opportunities for sharing knowledge and working together in the public policymaking process.

The municipal government needs to make advantage of the online discussion board. Hualien and Hsinchu are only two of the special municipalities in Taiwan that have adopted it. Participation from the public led to the resolution of 55 people's livelihood issues, including the loosening of restrictions on single-use dinnerware, the expansion of access to fishing ports, and the simplification of application processes for mountain climbing.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

The government will persist in spearheading various agencies' use of data to optimize the interface between the government and the public, reduce redundant administrative procedures and inefficient resource allocation, and facilitate the provision of concrete government services to the populace. The imperative for the government lies in the necessity to develop government services with a comprehensive outlook, taking into account varied subject matters. Additionally, adherence to external stipulations necessitates the implementation of inter-agency integration of digital services. This integration is crucial for establishing a digital transformation model that prioritizes the satisfaction of citizens' expectations, hence driving service reform.

Despite Taiwan's non-inclusion in the worldwide Open Government Partnership, the Taiwanese government is actively engaged in the implementation of an open government and parliament initiative. This proposal entails the introduction of "participation officers" to enhance openness and transparency among various governmental entities. One notable element of Taiwan is its amazing nature. The robustness of civic hacking communities in Taiwan, shown by organizations like gov and other technology-focused groups, together with the government's openness to the engagement of civil society via such means, is a commendable characteristic of the nation. The most remarkable features of Taiwan do not pertain to digital advancements. Rather, it is noteworthy that a significant number of persons, along with concerted governmental endeavors, are dedicated to the progressive establishment of platforms for dialogue.

4.9. Cybersecurity [CYB]

Recent innovations in the digital economy have driven cross-generational, cross-border, cross-domain, and virtual-real changes in the global industrial environment. In addition, the next stage of promoting the national information security development plan must ensure digital security from the perspective of information security considering the advent of the digital economy and the Internet of Things (IoT) era. This calls for aligning the direction of information security and national security policies with the development of a healthy industrial environment, the acceleration of industrial innovation, the optimization of the industrial structure, and so on. To this end, the Executive Yuan's National Information and Communication Security Council proposed the "National Information and Communication Security Development Plan (106-109)," which would boost the growth of information

security autonomy while also improving protection mechanisms generally. Initiative on one's own part and the cultivation of leading information security experts.

4.10. The use of Emerging ICT [EMG]

Given how cutthroat competition is in the international market, Taiwan's attempts to bolster its information and communications technology (ICT) industry couldn't come at a better time. 1974 was the year when the island, which was just a marginal player in the information and communications technology industry at the time, got its start with the help of a major American electronics firm. Taiwan is creating some noteworthy turbulence in the region. Indeed, the country is a hive of innovation thanks to the industrial prowess of its people and the dogged determination of its government. Investors from both outside and at home discover a climate that is conducive to the growth of technological innovation.

According to OpenGov Asia, a recent example of this is the aim of a big manufacturer to make Taiwan a launching pad for revolutionary digital healthcare products in Asia. This ambition was recently brought to light by OpenGov Asia. Despite the various challenges, neither the country's skilled labor force nor its level of competitiveness ought to be a cause for concern.

Switzerland

1. General Information

Area: 41,284 km^2

Population: 8,796,669

Government Type: republic

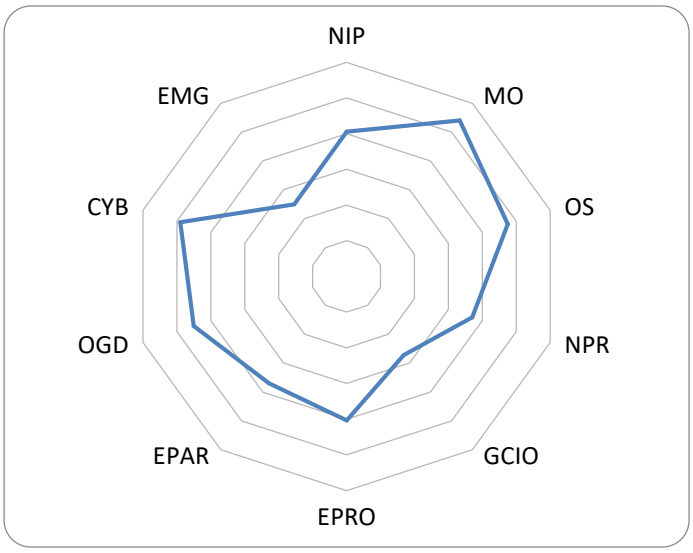
GDP: $100,970

Internet User: 95.57

Wired (Fixed Broadband User): 47.99

Wireless Broadband User: 100.61

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development:

The Swiss government has implemented a robust e-government strategy to enhance efficiency and effectiveness for governmental operations, economic activities, and the broader citizenry. Thanks to significant investment in government digital transformation, Switzerland secured the 16th spot in the Waseda rankings. E-governance offices are used by businesses to effectively carry out a diverse range of administrative responsibilities using online platforms. The ongoing epidemic has brought attention to the importance of digital communication channels, including websites, online storefronts, social media profiles, and customer relationship management (CRM) systems. The continued existence of organizations is contingent upon the ability of workers to have online access to critical documents, files,

databases, and schedules. In contemporary times, individuals can conveniently arrange their visits to various establishments, such as museums, mountain trains, fitness centers, or outdoor swimming pools, using Internet platforms. This practice serves the purpose of ensuring a desirable degree of social separation. Switzerland acknowledges the value of these systems in terms of their ability to provide valuable insights into operational processes and effectively mitigate the impact of seasonal changes in visitor numbers.

These interfaces alleviate their workload and allow them to allocate more time towards essential business activities. The previous practice of physically transferring written documents between government agencies prior to their delivery to government customers has been replaced by the need to electronically complete and send such documents. The e-government strategy adopted by Switzerland places a strong emphasis on enhancing the usability of administrative procedures. In the absence of any compatibility concerns, it is essential that information may seamlessly traverse from clients to the relevant offices and thereafter be archived. The establishment of universally accepted standards is crucial for effectively managing data and digital documents in a way that ensures reliability and organization.

The promotion of electronic transactions from the private sector is a shared objective by the federal government, cantons, and municipalities in Switzerland. Nevertheless, the primary objective of the federal government is to promote the digital communication and modernization of its internal agencies. Moreover, many interactions with the Swiss government, whether they are routine or intricate, may be conveniently conducted through online platforms. To achieve this purpose, it is essential to implement standardized techniques throughout all tiers of the federal government. Furthermore, it is essential that the planning software exhibits total openness and undergoes continual updates to facilitate users in effectively monitoring all activities. All individuals have an equal opportunity to access and employ the e-government services established by authorized authorities.

3.2. New Trends

Switzerland places a high priority on digital products, prioritizing their development and implementation for the benefit of its citizens. This approach might be characterized as adopting a "digital first" strategy. The use of digital transformation is strategically employed to maximize the

advantages it presents, ensuring long-term benefits for all stakeholders involved. Switzerland has a high degree of digital competitiveness and innovation within the European context.

The principle of 'digital first' is giving priority to digital solutions wherever feasible and practicable. In the event that it is deemed essential, alternative solutions that do not rely on digital technology are also provided. Hence, a differentiation is established between the concept of 'digital first' and the notion of 'digital only,' whereby the latter only depends on digital solutions.

The objective is to ensure that the whole population reaps the advantages of a sustainable and accountable digital transformation. The initiative is being propelled collaboratively by governmental entities at several federal tiers alongside partners from civil society, industry, academia, and politics.

Within the realm of focus themes, the Federal Council delineates two to three objectives annually to initiate digital transformation topics. The emphasis is accompanied by the implementation strategy, which offers a comprehensive outline of initiatives pertaining to digital transformation for the broader populace. In contrast to the themes that change on a yearly basis, the vision and domains have a consistent and enduring nature across a span of many years.

The Digital Switzerland Strategy serves as a comprehensive framework that encompasses the Federal Digitalization Strategy, the Swiss eGovernment Strategy, and many additional sector-specific policies. Additionally, the implementation of this measure aids Switzerland in attaining its climatic and environmental objectives, as well as aligning with the Sustainable Development Goals outlined in the United Nations 2030 Agenda. The implementation of measures related to digitalization is mostly the responsibility of expert bodies that are relevant to the field.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Switzerland was ranked first in the Waseda rankings in terms of Network Infrastructure Preparedness. The eGovernment Architecture establishes the necessary conditions that empower the Confederation, cantons, and municipalities to autonomously generate constituent elements that together contribute to the development of a functional eGovernment service. Furthermore, the system is readily available to customers and may be used with optimal effectiveness. The implementation plan encompasses a range of goals and metrics pertaining to the implementation of systems and organizations, including both pre-existing entities and those that are yet to be established. The objective is to guarantee that the measures

outlined in the implementation plan are effectively coordinated with the overarching architecture to promptly identify any interdependencies and interfaces.

The architectural components, systems, and domains that are necessary are now through a process of assessment and definition. It is important to present the dependencies and build an architectural perspective of the implementation plan projects. The architectural framework is cyclically changed and maintained in accordance with the prescribed guidelines of the Open Group Architecture Framework (TOGAF).

The 2020-2023 Implementation Plan is now in progress, with a specific emphasis on developing a target architecture for the current strategy period. This architecture will primarily include new features that are slated to be constructed and integrated into the overall design by the conclusion of 2023. The factors that comprise the implementation goals and have an impact on the eGovernment system or landscape (including systems, standards, ideas, architectures, etc.).

4.2. Management Optimization [MO]

The use of information and communication technology (ICT) is undergoing a transformation in both personal and professional settings. The utilization of emerging prospects is being used to facilitate the advancement of both society and the economy, leveraging existing procedures and methods of involvement. Transformation is a pervasive phenomenon that is taking place throughout several domains of society, including the realm of public administration as well. The provision of contemporary, service-oriented outcomes relies on the use of information and communications technologies. Switzerland's federal system often entails the involvement of many government entities in the processing of a single visit to the authorities. Additionally, it is common for organizations operating within the same state to provide similar services.

As a result, the process of digitizing administrative services necessitates close cooperation and concurrently provides substantial potential for mutual learning from past errors. The Swiss federal government, together with the cantons, has delineated the Swiss e-government plan for the period of 2020-2023. This plan outlines the shared digital goals and major areas of focus in the administration and regulation's digital transformation. To effectively manage the digital transformation, it is essential for the federal government, Cantons, and local authorities to collaborate and coordinate their efforts. Consequently, it is crucial to provide sufficient attention and resources to these domains.

4.3. Online Service [OS]

To help small and medium-sized enterprises in Switzerland save time and money on administrative tasks, the Swiss government has started rolling out new online services. The purpose of this work is to make the transition to e-government easier by facilitating the deployment of electronic governance, which includes the digitization of administrative operations that previously depended on paper-based methodologies.

The Swiss government has just unveiled a new administration platform called EasyGov.swiss. It provides a straightforward means through which proprietors of small and medium-sized enterprises (SMEs) may meet their administrative responsibilities. They are free to concentrate on running their businesses as intended. Customers may quickly and easily access a broad range of government-provided online services via EasyGov. One of these services is EasyGov, which is provided together with a number of others. By the end of 2023, the most common government processes will be available on the website EasyGov.swiss, allowing companies to complete them quickly and conveniently online. It is expected that this will occur in Switzerland.

4.4. National Portal [NPR]

The online platform ch.ch serves as the official national gateway to Switzerland. The website serves as the nation's digital representation and serves as the primary gateway for accessing online information from the federal government, cantons, and municipal authorities. It offers content in many languages, including French, German, Italian, Romansh, and English. The portal is organized into several categories depending on specific target groups, facilitating subject-specific access to a comprehensive range of information and services provided by various levels of government, all accessible via a unified interface. In addition to providing comprehensive information on important themes and current events, the platform also includes a directory of administrative bodies throughout Switzerland and a dedicated search function.

The primary component of ch.ch is its website. This platform provides users with access to information on political rights and the necessary qualifications for Swiss citizens. Additionally, ch.ch – publicjobs serves as the official national job site for those seeking employment within the public administration sector. The operation of the blog is overseen by the Kantonale Drucksachen- und Materialzentrale Zürich (KDMZ) on behalf of the Federal Chancellery, and it constitutes an integral component of the

ch.ch platform. The blog serves as a platform for users to engage in discussions pertaining to ch.ch. The evolving needs, expectations, and technological advancements necessitate that ch.ch be responsive to its consumers' demands. ch.ch utilizes many social media platforms, including Facebook, Twitter, and YouTube, as means of engaging with individuals who are active on these platforms. However, it is possible to access all the information and services offered on ch.ch independently by visiting the ch.ch website.

4.5. Government CIO [GCIO]

Switzerland has implemented a comprehensive framework and formed dedicated governmental entities to oversee the role of chief information officers (CIOs) at both the national and local levels. The phenomenon represents a simultaneous advancement and enhancement in the realm of digital governance. Within the field of education, there is currently a lack of specialized programs that cater exclusively to the training and development of those aspiring to become chief information officers (CIOs). MBA programs primarily emphasize the study of information technology and aim to cultivate a pool of exceptionally skilled professionals equipped with the necessary competencies to assume roles such as Chief Information Officer (CIO).

4.6. E-Government Promotion [EPRO]

At the end of 2019, the Federal Council and the cantons of Switzerland agreed on the Swiss eGovernment plan 2020-2023 and the 2020 Framework Agreement. Both laws are part of Switzerland's Public Law on eGovernment Cooperation. The strategy is developed using the six principles of the Tallinn Declaration as its foundation.

When applied to the present economic system, the phrase "Digital First" might serve as the new vision statement's title. The objective is to make most government services and information available online, with a special emphasis on making them mobile-friendly. To safeguard the right to informational self-determination, the group's objectives include increasing the reach of their digital service offering, making it available to everyone, and favoring the use of comprehensive electronic procedures. Here are the seven pillars upon which the plan to achieve the long-term strategy rests. focusing on the needs of the target demographic while disseminating information and services., bringing together and computerizing formerly separate tasks, creating consistent methods for handling data, putting a

premium on openness and honesty, encouraging open dialogue and collaboration, developing standards and interoperability, fostering innovation, and staying abreast of technological changes.

Interaction and participation; basic services and infrastructure; organization and legal framework; trust and knowledge are the cornerstones upon which activities are constructed.

4.7. E-Participation [EPAR]

The Swiss town of Uster, in the canton of Zurich, is building a new website as part of its digital strategy. To ensure broad acceptance and get the most benefits from its online services, it involves its stakeholders from the start. The public will be involved in a significant part of using digital participation choices in addition to traditional analog ways. Uster is also digging further into the best ways to combine analog and digital methods of interaction. The findings will be disseminated to similar local governments. Methods for user-centered design of digital channels and electronic involvement initiatives will be developed.

It has become more difficult to collect actual signatures for referendums and initiatives, especially considering the COVID-19 outbreak. E-collecting is a natural extension of the widespread use of digital tools in government and business. The initial study for the project "e-collecting for cantonal signature collections" will determine what conditions must be met to enable e-collecting in the canton. The SwissID's potential as a digital ID will be studied, among other things. The study will not only look at the technology involved but also at the administrative and regulatory requirements for e-collecting. To provide the groundwork for implementing e-collecting in Basel Landschaft and other cantons, this research is being conducted.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

Data from the public sector that is not restricted in any way is called "open government data" (OGD). The SFOE has adopted the OGD Strategy 2019-2023 and "open data by default." To make government data more transparent and accessible, the SFOE regularly updates the Swiss Open Government Data website (opendata.swiss). According to the program's description, it helps spread the word about eGovernance's value, helps shape the local regulatory framework, and equips participants with the hands-on experience they need to start offering e-Services to their communities.

More than 1,800 residents of Serbia have immediate and easy access to specific rights and services via the e-Government site thanks to a public communication campaign that included prominent displays

advertising eServices in major areas. The advantages of eServices and open data were shared with roughly a million individuals on social media.

Switzerland's federal government, cantons, and municipalities have formed Digital Public Services Switzerland (DPSS) to oversee and coordinate their respective digitization efforts. The coordinating body's mandate formally started on January 1, 2022. It was established and given mandates by the Confederation and the cantons via a "public-law framework agreement on Digital Public Services Switzerland." To accomplish the government's digital transformation, Switzerland's Digital Public Services run on a four-year strategic cycle. The strategy for gradual adoption also includes the operational steps. It describes the project's and service's major goals. The plan for carrying it out is revised annually. The Swiss government's Digital Public Services also serves as an impartial observer of internal processes.

4.9. Cybersecurity [CYB]

Russia's hostility against Ukraine is expected to have long-lasting repercussions for national and international security policy. The rising level of rivalry between world superpowers remains the primary factor determining Switzerland's security. The FIS's ability to foresee, identify, and assess risks and developments of strategic importance to Switzerland is crucial for preventing potential threats. The FIS Situation Report summarizes the year's most noteworthy intelligence events.

The Federal Council approved the National Strategy (NCS) for Cyberrisk Protection in Switzerland 2018–2022, which will be put into effect on April 18, 2018. Further decisions regarding the construction of the Competence Centre for Cybersecurity were made by the Federal Council on 15 May 2019 when it approved the Implementation Plan for the 2018-2022 National Strategy for the Protection of Switzerland against Cyber risks (NCS).

4.10. The use of Emerging ICT [EMG]

The previous Federal Information Technology (IT) Steering Unit, in collaboration with the departments and the Federal Chancellery, has approved the new 2020-2023 Federal Information and Communication Technology (ICT) Strategy. The primary objective of this initiative is to ensure the synchronization of federal information technology (IT) with the requirements of the business sector while concurrently providing assistance to administrative operations in their transition toward digitalization.

The Federal Council subsequently tasked the Federal Department of Home Affairs (namely, the Federal Statistical Office, FSO) and the Federal Chancellery (specifically, the Digital Transformation and ICT Steering Unit, DTI) with conducting a comprehensive study by mid-2021 and developing the specific framework for this network. The decision was made in August 2021 to ensure that the CNAI unit would be operating by the spring of 2022.

The interdepartmental working group on the Swiss National Strategy for Artificial Intelligence (CNAI) comprises members from various government entities, including the Federal Social Office (FSO), the Federal Chancellery, the Swiss Digital Organization (DVS) within the Federal Administration, the Coordinating Agency for Federal Geographic Information (GCG), and the Federal Department of Defense, Civil Protection and Sport (DDPS). The responsibility for the practical execution of the CNAI and the formation of the unit situated at the Federal Statistical Office is with them. The presence of this dynamic working group facilitated the expeditious attainment of outcomes of superior quality, hence enabling the commencement of activities by the CNAI at the beginning of 2022. The guiding principle of "think big, start small, start fast" was of paramount importance throughout the developmental process. Moving forward, the CNAI is poised to further its interdepartmental development in line with its guiding principle.

Australia

1. General Information

Area: 7,692,024 km^2

Population: 26,439,111

Government Type: constitutional monarchy

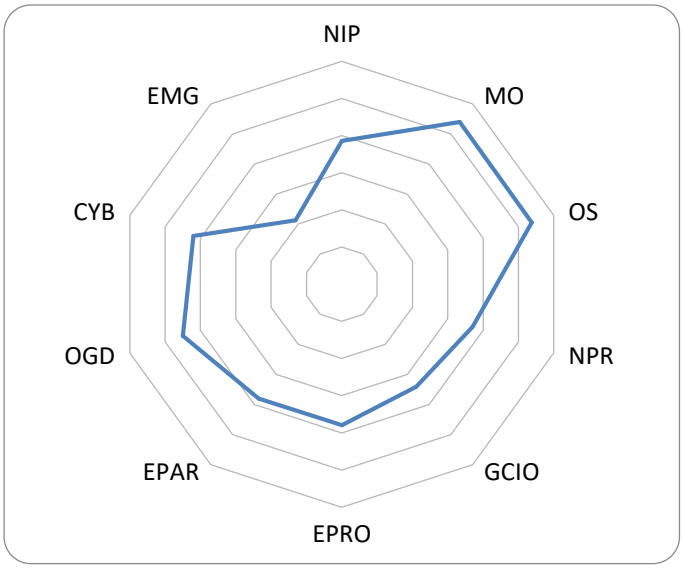
GDP: $69,155

Internet User: 96.24

Wired (Fixed Broadband User): 35.28

Wireless Broadband User: 122.66

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The Australian government has been challenged to make the country's economy and society digitally competitive by 2030. The Australian government suggested an investment plan of $1.2 billion to boost Australia's digital development and worldwide competitive position when it unveiled its digital economy strategy in 2021. The Australian government is actively supporting digital transformation in the private sector by reworking regulatory regulations and funding cybersecurity and technological education in the country.

There has been a dramatic movement toward digitization, with a surge in the number of Australian businesses embracing digital transformation programs to fuel expansion. With ongoing growth rates predicted at five to six percent over the next several years, Australia has recorded the fastest increase in IT expenditure over the previous decade. With substantial funding directed towards government digital transformation, Australia attained the 17th rank in the Waseda rankings.

Australia has shown significant advancements in prioritizing digital transformation as a fundamental component of its business models, indicating a positive trajectory in the country's digital ecosystem. However, it is important to note that there remain unfinished tasks that need attention and effort. To fully reap the advantages of transformation, it is essential for organizations to prioritize the mastery of their approach to this process.

3.2. New trends

The draft strategy for the data and digital vision of a world-leading APS by 2030 reaffirms the government's commitment to revolutionizing the use of government data and fostering digital innovation within the public sector. The current administration reevaluates the policies implemented by the preceding government. It aims to integrate digital and data plans into a unified and well-coordinated policy. Additionally, it actively solicits feedback to ensure the strategy is comprehensive and aligned with its vision. This initiative serves as a motivating appeal to the Australian Public Service (APS) to act.

The Draft Strategy articulates the Government's commitment to implementing a data and digital transformation inside the Australian Public Service (APS), building upon the ongoing efforts of past administrations to reform the APS and enhance the utilization of data and digital technology. The Draft Strategy integrates the discrete plans for digital and data that were previously implemented by the Government into a unified vision. The Draft Strategy outlines a vision to provide universal access to streamlined, secure, and interconnected public services for individuals and businesses by the year 2030. This will be accomplished via the use of cutting-edge data and digital technologies. The proposal includes a plan for implementation at a later stage.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Antiquated technologies are a fundamental factor in the sluggish pace of technological advancement in Australia and are a significant barrier for many organizations that are dependent on their inflexible infrastructure, particularly in the banking and healthcare industries.

Aging IT infrastructures do not have the essential defense measures to guard against the most recent wave of cyberattacks. In addition to presenting major security dangers, they lack the flexibility to interact (through API or microservice architectures) with contemporary technologies, which impedes innovation.

4.2. Management Optimization [MO]

Australia aspires to have one of the world's top three digital governments by 2025, which would be to the advantage of all Australians. The government's recommendations and guidelines help the APS employ its services for the greater good of citizens, companies, and the government itself.

- One method in which all government entities contribute to public welfare is via "service delivery," or the provision of tangible goods and services. Separate interactions are provided for each customer.
- New ideas and education - These groups provide leadership and support for fostering new ideas and lobbying for new government policies.
- There is an imposition of authority in the areas of regulation and enforcement. Rules, regulations, and laws that have an impact on users are upheld and enforced by them.

4.3. Online Service [OS]

In Australia, Online Services are now paid for exclusively via electronic means. Business opportunities, yearly procurement plans, and government contracts in Australia are mostly accessible via AusTender (www.tenders.gov.au). The Australian government plans to phase down australia.gov.au accounts in favor of the more user-friendly MyGov portal. Medicare, the Australia Taxation Office, a Personal Controlled eHealth Record, and Child Support are just some of the government services that may be accessed by enrolling for a MyGov account. The updated version of MyGov was more reliable in its data, easier to use, and quicker to respond on mobile devices.

People will be able to choose a secure and easy-to-use digital identity to access all digital government services" by 2025, under the government's Digital Transformation Strategy. The Trusted Digital

Identity Framework (TDIF) was created by the DTA, which gives it a role as well. A media article summarized the key aspects of Introducing Integrated e-government in Australia, released by the Australian Strategic Policy Institute, and the DTA's reaction to it. An evaluation of the TDIF's potential privacy risks was later summarized in the media.

4.4. National Portal [NPR]

The overall grade of the National Portal is determined by three key factors: information, technology, and operation. The website www.australia.gov.au serves as a centralized platform that consolidates various online information resources and services provided by many government organizations. Based on the analysis conducted using Google PageSpeedTM Insights, the website has commendable technical performance across several platforms, including desktop computers, laptops, tablets, and smartphones. Additionally, the website has a functionality that allows users to get email notifications for updates and integrates with other social media sites such as Facebook, Twitter, YouTube, and Flickr.

myGov is an efficient and reliable platform that provides users with convenient and protected access to a comprehensive range of government services via a centralized online portal. The platform provides customers with online access to a variety of government services. Individuals can establish connections with various government agencies, like as Medicare, Centrelink, and Child Support, among others. Additionally, they may

- receive secure communications via their myGov Inbox.
- revise personal information.
- ensure the confidentiality of personal data.
- gain remote access to internet accounts while abroad.
- establish connections with other governmental agencies.

4.5. Government CIO [GCIO]

The reconfiguration of Australia's extensive digital government in recent years has garnered attention for its ingenuity and leadership. Numerous accounts have emphasized the actions taken by chief information officers and other IT executives in response to the widespread impact of the worldwide COVID-19 outbreak. This year, several organizations are using collaboration, artificial intelligence and machine learning, data analytics, automation, and robotics technologies to effectively accomplish their

strategic goals. These technologies are being used to enhance the firms' offers to both internal and external customers. Various sectors are now facing very difficult economic circumstances, which are among the most tough they have encountered in many years. Notwithstanding this, the IT executives have shown authentic leadership and devised technological solutions that will assist their respective organizations in effectively tackling forthcoming business issues.

4.6. E-Government Promotion [EPRO]

The Australian federal government has modified its digital government strategy to make Australia one of the world's top three digital governments by 2025. The process has taken over a year, and the product is a new digital government policy that spans 28 pages. The plan has three priorities for the government's services to accomplish this mission. All government services will be accessible online, streamlined for ease of use, and centered on the needs of citizens and companies under this framework.

To aid federal agencies in developing digital capabilities, deploying technologies, and managing them, a new whole-of-government architecture has been developed. The architecture would also communicate to businesses the federal government's IT goals, such as the digital capabilities it hopes to provide in a reusable fashion. The architecture will be accompanied by a reuse policy and a database of existing components. Using these, government organizations may identify potential new or current platform reuse opportunities.

The Digital Transformation Agency (DTA) and the applicable department must approve an assurance strategy for all digital and IT projects as part of this new governance structure. The Minister has said that this provides the government with an essential institutional instrument for monitoring proposals for expensive or risky investments in digital and ICT-enabled sectors.

4.7. E-Participation [EPAR]

The pace at which citizens interact with their government has grown thanks to the widespread use of established e-Government channels. About two-thirds of Australians have interacted with the federal government through e-Government services in the last year. Australia's national site provides a great forum for citizens to participate in a variety of government-sponsored initiatives and other interactions. Consultation procedures backed by a wide range of technology and methods may provide people and communities a voice in shaping the policies and services that affect them.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

When it comes to the information technology (IT) side of the open government movement, open data is likely one of the most important and 'hot' contributing parts. Our most recent blog article, titled "The power of open data," analyzed the unfinished report on open data that was just made public. The National Map is an example of the use of open data, which has been put to good use by being superimposed on a map of Australia to show features such as caverns and natural vegetation, bridges, traffic incidents, and the boundaries of local governments. State governments have also shown support for the open data aspect of the open government movement. In a blog article titled "Open data in Victoria," the state government of Victoria was recently lauded for its support of open data. In addition to the ACT's policy on open data and dataset repositories, each of the other Australian states has its own.

Concurrently, Australia has developed the Digital Transformation Agenda to standardize the way in which public services are provided to citizens and encourage more use of digital tools. The Federal Government's Digital Transformation Agency is in charge of coordinating and facilitating this effort. In the agenda, the government lays out its intentions for communicating with and providing for the public. The goal of the initiative is to make it easier for government agencies to provide innovative online services that improve citizens' and users' interactions with the government.

The government's services will evolve because of the digital revolution. It will result in quicker policymaking and reduced bureaucracy. This implies that users can use data to improve people's lives and the economy. If the government is there when its citizens need it but stays out of the way, otherwise, they can go about their daily lives with minimum disruption. The important initiatives that will aid in the transition to digital during the next two years are laid out in a "roadmap" (timeline) across two pages. The DTA website's roadmap page includes additional information about projects and allows users to narrow their search based on one of three strategic goals.

4.9. Cybersecurity [CYB]

There is a critical shortage of qualified professionals to meet the rising demand brought on by Australia's rapid adoption of digital technologies. However, the fact is that Australia's talent supply chain is falling behind, especially in areas like the Internet of Things (IoT), cybersecurity (cyber), and cloud computing. And this is turning into a serious constraint on development. Tensions are rising throughout Australia's highly competitive market as businesses battle for personnel with the required technological skillsets to meet transformation ambitions.

Australia's political agenda is shifting to prioritize increasing diversity and access to digital education as a means of meeting these problems; if successful, this may lead to the country having more than 1.2 million technology professionals in its workforce by 2027. Companies are also investing in their current employees by giving training and encouraging non-digital staff to complete micro-certifications to acquire the fundamental knowledge and skills necessary to succeed in today's digital business models. Threats from cyberspace are increasing. As digital technologies evolve and become more complicated, the prevalence of cyberattacks increases, and the sophistication of these assaults grows daily.

4.10. The use of Emerging ICT [EMG]

Australia is increasingly interested in cutting-edge AI systems, which are being used to streamline operations, enrich interactions with customers, and ensure the reliable processing of massive data volumes. With an annual growth rate of 24.4% from 2020 to 2025, the IDC predicts that Australia's investment in AI systems will soar to $3.6 billion by 2025. The banking sector is predicted to have the highest AI investment in Australia, with new systems being implemented to combat fraud and improve threat intelligence and protection.

This increase is a result of the country's efforts to improve its integrated data and cybersecurity policies, which includes the retirement of antiquated systems that can't keep up with the dynamic nature of the modern industry. Increasing Contacts, the advent of 5G connection in Australia has hastened the development of the Internet of Things (IoT), which has played a significant role in innovation throughout Australia's government operations over the last few years, including agriculture, transportation, retail, education, and healthcare.

Finland

1. General Information

Area: 338,424 km^2

Population: 5,545,475

Government Type: republic

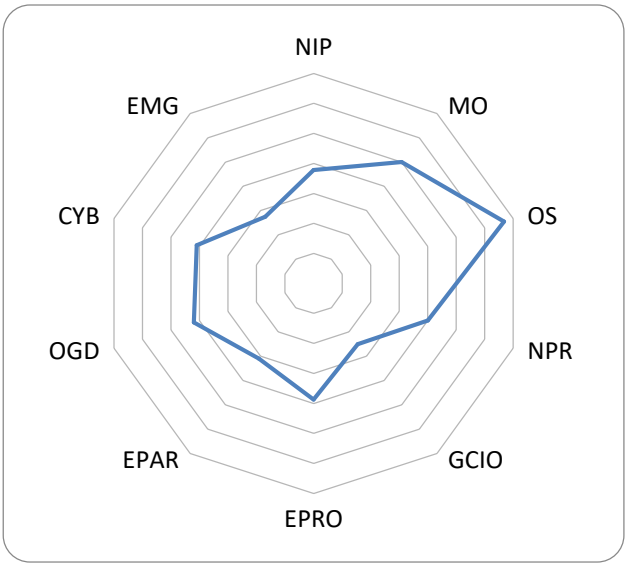
GDP: $56,713

Internet User: 92.81

Wired (Fixed Broadband User): 33.67

Wireless Broadband User: 157.15

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The digital governance system implemented in Finland is the most advanced in Europe. In addition to this, it is widely regarded as one of the most important worldwide leaders in its industry. Within the Finnish government, the use of information technology has been a standard practice for a very long time. With substantial funding directed towards government digital transformation, Finland attained the 18th rank in the Waseda rankings. The use of information and communications technology in governmental and administrative processes has been the subject of a steady stream of policies and initiatives which have been put into place. Because of the pandemic caused by the COVID-19 virus, the importance of data in the delivery of public services has been brought to light, and as a result,

government institutions are required to begin the process of digital transformation. Regarding the topic of digital transformation, Finland has achieved a noteworthy level of success across a broad range of evaluations conducted both globally and inside the European Union (EU). The considerable influence that digitization has had on economic development, the founding of new companies, social well-being, and the creation of job opportunities have been a driving force behind the prioritizing of digitization in this sector. Artificial intelligence (AI) and other forms of cutting-edge technology are being use by government agencies in Finland to speed up the process of modernizing support services and boost citizen satisfaction. The government acknowledges the need of making digital service delivery of public services a priority for the sake of future implementation. Those individuals who do not have access to digital resources may now get support because of collaborative efforts that have been established by the federal government and corporate enterprises. The government often participates in collaborative efforts with organizations operating in fields unrelated to their own.

The creation of more advanced services is being sped up by the government, which is doing so by developing ecosystems that are based on the life milestones of people as well as the operating cycles of businesses. There is a crucial role for both public and private businesses to play in the maintenance of these ecosystems. In addition, the government of Finland is now working on the creation of innovative ways to the delivery of services across many sectors, with a special emphasis on meeting the needs of businesses and citizens who come from other countries. Because of the consistent delivery of services that are of a high standard across Finland, including promptness, objectivity, and great quality, the many government agencies there have earned the confidence of the country's citizens. The government has faith in both the people of the country and the commercial enterprises that operate inside the country. The government of Finland is often praised for the noticeable lack of corruption that exists among its ranks.

3.2. New Trends

The objective of Finland is to establish itself as a prominent force in digital technology and support local enterprises in enhancing their global competitiveness by leveraging the digital economy. The formation of the Real-Time Economy project was motivated by this rationale. The responsibility for the execution of the program lies with the Finnish Patent and Registration Office, an organization dedicated to fostering and facilitating innovative ideas within the country of Finland. The use of digital technology across many societal domains has led to an amplification of voices in Finnish decision-making

processes, as seen by the rise of electronic voting and other participation services. The sectors of health care, education, security, land surveying, and social services in Finland have undergone significant enhancements aimed at fostering more openness, transparency, efficiency, and inclusivity. The Finnish government always seeks opportunities to enhance its service delivery while maintaining cost efficiency.

In the context of the post-pandemic recovery, the use of digital technologies, structured data, and processing has become integral to every transaction. In the context of a digital economy, it is observed that all services are mostly offered via online platforms, hence facilitating the sharing of data across these services. The company's business data is sent in real-time via a continuous electronic feed, accompanied by prompt notifications to the relevant authorities. The use of automated data processing might potentially provide time and cost savings for businesses. In contemporary business practices, organizations have come to acknowledge the strategic significance of data and actively pursue its acquisition. Government employees can provide more substantial aid as a result of using company data. The present study is a component of a broader initiative aimed at advancing the adoption of digitalization and the real-time economy on a national scale in Finland. The COVID-19 epidemic has heightened awareness on individuals' preparedness to adapt to technological changes.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

The Finnish regulators exhibit a predilection for a network development strategy that is propelled by competitive forces and heavily depends on fiber optic technologies. The facilitation of this project would be enhanced by the deployment of public monies to places now lacking coverage, together with the provision of help to local governments in establishing broadband networks. In regions characterized by insufficient financial incentives for firms to allocate resources towards the advancement of high-speed networks, Finland is offering assistance via the provision of subsidies to facilitate the installation of fiber networks. The Digital Infrastructure Plan of 2018 is in accordance with the objectives set out by the European Gigabit Society for the year 2025. The document delineates the objectives and tactics for the development of digital infrastructure in Finland until the year 2025. The aforementioned proposal has been formally disseminated within the Finnish environment.

The Finnish Recovery and Resilience Plan (RRP) designates a financial allocation of fifty million Euros for the purpose of enhancing infrastructure. The proposal outlines an investment assistance plan with

the objective of improving the quality and availability of high-speed connectivity networks in locations where market mechanisms are insufficient in delivering these connections. Broadband service providers will get financial assistance via the allocation of funds. The program aims to provide high-speed Internet connections, ensuring a minimum bandwidth of 100 megabits per second.

4.2. Management Optimization [MO]

The Ministry of Transport and Communications delineated objectives for the expansion of Finland's digital infrastructure by 2025 and devised corresponding strategies in its October 2018 release of the Digital Infrastructure Plan. By the year 2025, it is imperative that every household inside the United States be equipped with a minimum connection speed of 100 Mbps. If provided with the opportunity, it is possible to enhance the bandwidth to 1 Gbps. The implementation of streamlined laws pertaining to the placement of telecommunications cables would facilitate the more efficient and economical establishment of optical fiber networks. Concurrently with the enactment of the Highways Act, efforts will be made to establish a procedure for acquiring licenses for cable installation.

According to the Programme of Prime Minister Sanna Marin, the present government has identified digitization as a crucial aim. Based on the outlined strategy, it is anticipated that the public sector will be responsible for delivering digital services to both citizens and enterprises by the year 2023. The digitalization of the public and commercial sectors necessitates the implementation of open government data, the establishment and maintenance of digital identities, and the development of cybersecurity capabilities. The AuroraAI initiative was established with the aim of enhancing the efficacy of individual-service interactions via the use of national artificial intelligence technology.

4.3. Online Service [OS]

The National Public Procurement Strategy comprises a set of eight strategic common goals and 25 corresponding targets, which serve as the means for executing these goals. The primary focus of strategic development is on the realm of strategic management and the improvement of procurement capabilities. Information management and effect assessment serve as complementary components that provide assistance to the strategic management process. The essence of development activity is in the acquisition of functioning and high-quality goods and services. This approach guarantees the active involvement of all relevant parties, sustains a dynamic market, and facilitates the promotion of

innovation through public procurement. The development of these factors may enable public procurement to attain economic, social, and ecological sustainability.

As of the spring of 2022, the approach was found to be on schedule and advancing according to the predetermined plan. A comprehensive set of over 30 initiatives has been either successfully executed or is now underway. The aforementioned measures encompass a diverse array of domains, including the promotion of environmentally friendly and low-carbon purchasing practices, the enhancement of information management and digitalization efforts, the encouragement of innovative approaches to public procurement, the facilitation of employment opportunities through procurement, the augmentation of procurement expertise, and the consideration of the involvement of small- and medium-sized enterprises (SMEs) as well as human rights in procurement procedures.

A total of about 500 individuals engaged in public and municipal procurement, in addition to representatives from tender firms, researchers, and specialists from many organizations, are actively involved in eight theme groups. These groupings are focused on eight shared strategic objectives. The theme groups exhibit inclusivity by welcoming people from many backgrounds, and the representation of stakeholders continues to grow significantly.

4.4. National Portal [NPR]

The primary stakeholders involved in the eID ecosystem in Finland include the Ministry of Transport and Communications, which holds responsibility for legislation pertaining to eID and trust services. Traficom is responsible for overseeing eID providers, while the Ministry of Finance is tasked with guiding the Digital and Population Data Services Agency and establishing eID policy guidelines for the public sector. The Digital and Population Data Services Agency manages various aspects of the eID ecosystem, such as the authentication and trust services (eIDAS) node, the public sector eID portal (Suomi.fi eIdentification), eID cards issued to the health and social sectors, and the national eID card. Additionally, there are 15 private sector identity providers, including banks and mobile operators, that play a role in the eID ecosystem.

In the year 2023, the primary method of authentication used for public sector eGovernment services was mostly facilitated by electronically issued identification credentials provided by banks, accounting for around 90% of the cases. The use of national electronic identification (eID) cards for the purpose of online authentication is restricted to a mere 2%, with the remaining 8% being accounted for by eIDs

that are provided by mobile carriers. Finland is one of top countries in the Waseda rankings getting the highest scores for this indicator.

4.5. Government CIO [GCIO]

The commencement of the period that Jarkko Levasma (MSc) will serve as the Head of Government Information under the Minister of Finance begins on August 1, 2021, and continues until July 31, 2026. There is a possibility that each government agency and department will have a Chief Information Officer, who will have a job title and set of duties that are distinct from those of their contemporaries in other agencies and departments. It is not needed by law for any government ministry or agency to have a Chief Information Officer (CIO), since this position is filled by the institution's policies and practices instead of an actual person.

Especially at the ministerial level, the functions, and duties of the chief information officer (CIO) are undergoing change. They once served as the head of the information technology department for your company. As a result of the Government ICT Center Valtori taking over responsibility for infrastructure services, the CIO's role has shifted toward being more strategic and less operational. The key focus of this role will be the development of an information and communications technology (ICT) strategy as well as a plan for information management and cybersecurity.

4.6. E-Government Promotion [EPRO]

Using the same radio technology as Tetra, Virve provides a safe and secure environment for administrative offices. It's a vital resource for law enforcement and security personnel, increasing their understanding of the situation and easing the way they can work together. To improve cooperation between various businesses, Virve is a powerful tool. It is hoped that in the future, the Next Generation Virve 2.0 will make it easier for authorities and other stakeholders to work together and share information. The increasing transmission of media material to users across broadband networks, such as films, photos, and data, is expected to lead to an improvement in service quality by the year 2022. Finland and Estonia want to improve their X-Road 7 data-sharing system in the 2020-21 school year. This website is managed by the Nordic Institute for Interoperability Solutions (NIIS).

The foundational elements of the Fourth Finnish Open Government Action Plan (2019-2023) are shared values, long-term security, and sustainable development. The Open Government Strategy's framework of broad long-term aims and objectives will serve as the basis for action plan formation. This allows

the possibility of a Transparency Register, which has several benefits. These pledges will be assessed at many points during the plan's lifecycle, including during implementation and after it has been put into action.

4.7. E-Participation [EPAR]

The Strategy for Public Governance and Services, part of Finnish Prime Minister Sanna Marin's Government Programme, was revealed in December 2020. From 2020 through 2030, this strategy will guide and promote the public sector's regeneration. This program's overarching goal is to make the governance of the whole country, in both official languages, more efficient. It also seeks to increase digital accessibility and advocate for the broad use of plain English in government operations. Consistent and determined execution of the plan's governance renewal will improve the effectiveness of everyday services, provide legal stability in society, and open exciting new opportunities for businesses and local communities. Multiple tiers of government, local governments, non-government organizations, academics, and other experts all have input on the goals and strategies for administrative reform. The purpose of this group endeavor was to formulate shared visions and strategies for public administration in the next decade. Collaboration between the State, municipalities, and potential welfare areas has been greatly improved thanks to the participation of numerous stakeholders in the strategy's development. It has also facilitated communication between the government and the public, helping everyone understand why public governance development is important and where it's headed.

Networking projects, events, and skill-building activities were all included in the Strategy for Public Governance Renewal's implementation measures for 2021-22. These actions were planned to help the strategy come to fruition and encourage productive dialogue between various parties. The primary goal was to improve the knowledge base via in-depth research and analysis and to promote competence renewal through training and education initiatives. Although the period of centrally controlled implementation ended in late 2022, implementation is still proceeding across many sectors and levels of government. The strategy's design, implementation, and results will be evaluated in depth beginning in March 2023 and continuing through the spring of 2024.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

The Open Government Action Plan is a strategic initiative aimed at promoting transparency, accountability, and citizen participation in government activities. The fourth iteration of the Finnish

Open Government Action Plan (2019-2023) places emphasis on the principles of openness and inclusivity across three distinct dimensions: (i) the recognition of openness as a value that is collectively embraced; (ii) the establishment of a robust legislative framework that supports openness; and (iii) the ongoing advancement and enhancement of openness. The three themes were thereafter transformed into the ensuing commitments for the period of execution.

The proposed measures include the integration of sustainable openness into all government actions and development measures, the implementation of an Open Government Strategy to establish long-term goals and guide future action plans, the establishment of a Transparency Register to provide citizens with information on parties attempting to influence decision-making, a commitment to open data and the implementation of measures to support it, and the improvement of dialogue skills and utilization within the public sector. The monitoring and evaluation of these commitments will be conducted during the execution of the plan and after its completion.

4.9. Cybersecurity [CYB]

The Finnish government issued a government resolution to publish the revised national Cybersecurity Strategy. The comprehensive security strategy was formulated by the Security Committee of Finland, aiding the Finnish government and Ministries in topics pertaining to security. In greater depth, the Committee actively oversees the Finnish security landscape and societal progress while also taking proactive measures to coordinate the formulation of comprehensive security strategies.

Cybersecurity Strategy draws its foundation from the overarching concepts outlined in Finland's 2013 Cybersecurity Strategy. The inclusion of strategy and its subsequent implementation are integral components of the overall execution of the EU Cybersecurity Strategy.

The plan outlines the primary national goals for the advancement of the cyberenvironment and the protection of associated critical operations. The primary areas of concentration included in this study are as follows: (i) fostering international collaboration; (ii) enhancing the coordination of cybersecurity management, planning, and readiness; and (iii) fostering the development of cybersecurity competence.

The government implemented a Cybersecurity Development Programme. This document presents a comprehensive and strategic roadmap for the long-term advancement of cybersecurity across several industries, spanning the timeframe of 2021 to 2030. In pursuit of its objectives, the program encompasses four key themes: high-level proficiency, extensive cooperation, a robust domestic

cybersecurity sector, and efficient national cybersecurity capacities. Furthermore, starting in January 2023, the Ministry of Transport and Communications started the process of incorporating the requirements outlined in Directive (EU) 2022/2555, which pertains to the implementation of measures aimed at achieving a robust level of cybersecurity across the European Union. This directive is often referred to as the NIS 2 Directive. The Ministry intends to undertake the nationwide implementation in a comprehensive collaboration with other governmental entities.

4.10. The use of Emerging ICT [EMG]

The appointment of a steering committee by the Minister of Economic Affairs, Mika Lintilä, aims to facilitate the expeditious integration of artificial intelligence (AI) and foster advancements in the fourth industrial revolution inside Finland. The group has been tasked with preparing an action plan to achieve these objectives. During its first release, the software was designated as Artificial Intelligence 4.0. The primary goal of the Artificial Intelligence 4.0 Programme is to guarantee that by the year 2030, the assets of the Finnish industry exhibit sustainability, the ability to adapt and innovate, technical superiority, and the provision of solutions that facilitate the expansion of the carbon footprint. With this objective in mind, the intention is to encourage digital investments that enhance productivity and sustainability, broaden the manufacturing industry and service ecosystems through novel value generation and collaborations, and advance Finland's objectives in initiatives aimed at reinforcing Europe's open strategic autonomy.

The interim report provided by the steering committee delineated five areas of difficulty. The group proposed a vision with the aim of positioning Finland as a leading participant in the dual transition, including both digital and green transformations. The steering group's conclusive report in December 2022 affirmed the overarching vision and delineated three specific domains for advancement: (i) enhancing advanced research in pivotal technologies alongside development endeavors and investments; (ii) augmenting the integration of digital capabilities and technologies that expedite the dual transition within industrial small and medium-sized enterprises (SMEs); and (iii) positioning Finland as a global leader in the twin transition. A comprehensive action plan consisting of 11 initiatives, together with corresponding monitoring indicators, was established. Furthermore, the steering committee put up the suggestion of establishing a roundtable including all relevant stakeholders. This roundtable would assume the responsibility of driving forward the action plan at a strategic level after the conclusion of the program.

The Digital Infrastructure Strategy 2025, released by the Ministry of Transport and Communications, outlines Finland's objective of being a global leader in communications networks. The plan outlines a set of goals for the advancement of Finland's digital infrastructure by the year 2025, along with the corresponding approaches for attaining these goals. The stated aims include the facilitation of wireless connections, the establishment of fixed connections, and the integration of supplementary technologies to enhance the data communications infrastructure.

Thailand

1. General Information

Area: 513,120 km^2

Population: 71,801,279

Government Type: constitutional monarchy

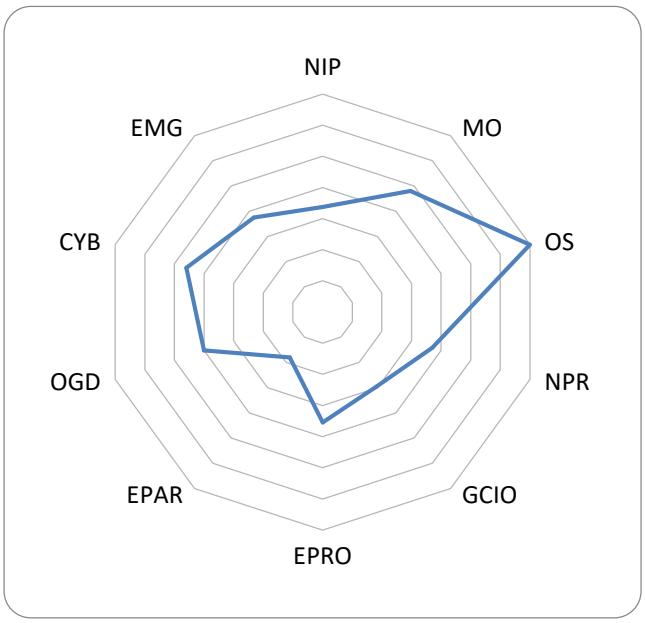
GDP: $7,749

Internet User: 85.27

Wired (Fixed Broadband User): 17.35

Wireless Broadband User: 111.93

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The Thai government is heavily engaged in the pursuit of digital transformation. With a significant emphasis on government digital transformation, Thailand emerged as the 19th-ranked institution in the Waseda rankings. In response to the growing digitalization of society, the Thai government is undertaking a comprehensive reassessment of its policies and services to effectively address the evolving needs and expectations of its populace. The process of digital transformation within the Thai government entails the adoption of open and interconnected government innovations. This encompasses

the enhancement of the quality of public policies and services, the improvement of the state's efficiency and effectiveness, and the cultivation of stronger links with citizens.

The Thai government seeks to enhance operational efficiency and improve service accessibility to its citizens through the integration of digital technologies and innovative solutions. This encompasses the implementation of digital technologies in the provision of public services, such as the establishment of online platforms for government transactions, the introduction of e-governance initiatives, and the utilization of digital communication channels to enhance citizen involvement.

The government's endeavors in digital transformation also involve enhancing data management practices and leveraging data analytics for the purpose of making well-informed policy determinations. Through the utilization of data, the Thai government has the potential to acquire significant insights and enhance the efficacy of its programs and services.

3.2. New Trends

As Thailand moves toward Thailand 4.0, here's how the government is growing the country's digital landscape and how local digital sector firms are helping achieve its digital ambitions. The National Digital Economy and Society Commission (ONDE) recently announced eight 2023 initiatives to advance Thailand's digital development and improve its basis. ONDE secretary-general Puchaphong Nodthaisong said these eight measures are suitable with Thailand's and the world's technology and economic developments. These will also affect future development trends to prepare Thailand for Phase 3: Full Digital Transformation in 2027 and Phase 4: Global Digital Leadership.

- The government agency curriculum accreditation management and follow-up initiative are the first. This will allow government personnel to take 70 digital education courses.

- Second is the 2023 Thailand Digital Outlook Study Project. The government is working on digital development for the economy and society, and this initiative will provide data support. ONDE will evaluate Thailand's digital transformation using OECD principles.

- The third project aims to improve digital economy assessment in line with economic structural changes.

- The fourth phase is to improve digital economy determination based on fundamental economic changes. This project aims to increase local community internet access and digital literacy to provide people with greater options to make money through technology.

- The fifth project promotes the 5G ecosystem for commercial use. A draft guideline encouraging the second phase of 5G technology in Thailand's core industries is being developed.

- The sixth project strengthens the Digital Security and Infrastructure Service Development Project and Government Data Center and Cloud Service. The ONDE plans to upgrade GDCC services from IaaS to PaaS and SaaS by 2023.

- The seventh initiative promotes the transfer of national cultural treasures as digital content in the second phase of the Digital Cultural Heritage program. This generates soft power for local economic benefit.

- Finally, the Digital Economy and Society Fund is developing a program to promote, encourage, and award research grants for innovation and digital transformation. The project uses digital technology to strengthen Thailand's economy and society.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Thailand has been actively investing in improving its network infrastructure to support digitalization initiatives. The government has implemented various projects and policies to enhance broadband connectivity and expand internet access across the country. This includes the development of high-speed internet networks, such as fiber-optic networks, to provide reliable and fast internet connectivity to both urban and rural areas. The government has also taken steps to promote the development of 5G networks in Thailand. 5G technology offers faster speeds, lower latency, and greater capacity, which are essential for supporting advanced digital technologies and applications. The deployment of 5G networks will enable the implementation of innovative solutions, such as Internet of Things (IoT) devices and smart city initiatives.

Overall, the Thai government recognizes the importance of network infrastructure preparedness in supporting its digitalization efforts. By investing in and improving network infrastructure, Thailand aims to create a robust and reliable digital ecosystem that can effectively support the delivery of digital services and drive economic growth.

The new economic model in Thailand has also put an emphasis on "smart cities." One hundred of the nation's cities would be designated as "smart cities" by 2022. The suggestions should include an

investment infrastructure and development strategy, smart city solutions, and a sustainable living model. Chonburi was chosen as a test bed for the government's smart city initiative. Pattaya's home province is undergoing a transformation as cutting-edge technology, renewable energy, energy-efficient infrastructure, and environmentally responsible practices are introduced.

4.2. Management Optimization [MO]

Thailand has been widely regarded as a leading example of successful digital transformation due to its substantial investments in information and communication technology (ICT) infrastructure and digital technologies. The nation has progressively emerged as the primary digital center for the Association of Southeast Asian Nations (ASEAN). The Board of Investment in Thailand has recently implemented measures to facilitate the country's rapid digital advancement. As part of these efforts, the government has introduced fresh incentives aimed at bolstering high-tech firms and several other sectors.

During the ASEAN Business and Investment Summit, Thai Prime Minister Prayut Chan-o-cha urged members of the regional bloc to actively engage in digital collaboration. The speaker emphasized the need to promote initiatives aimed at enhancing the integration of digital business within the environment. To achieve this objective, it is widely recognized that expenditures in the enhancement of digital infrastructure are crucial measures.

During a mobile forum held in Thailand in October, Deputy Prime Minister Prawit Wongsuwan emphasized the Thai government's commitment to prioritizing the development of digital infrastructure. He asserted that such infrastructure serves as a fundamental catalyst for propelling the nation toward a digital economy. The government has enacted laws aimed at facilitating the advancement of infrastructure and driving Thailand towards the goals of Thailand 4.0, a strategic initiative focused on fostering investment in digital and telecommunication infrastructures.

4.3. Online Service [OS]

The utilization of e-payment services has experienced considerable growth in Thailand, prompting enterprises to obtain an e-payment license to provide these services. The Minister of Finance's authorization of this license is dependent on the Bank of Thailand's endorsement, which ensures that only competent and trustworthy service providers are granted e-payment permits. In Thailand, there exists a classification for some services known as e-payment services, which necessitates that providers obtain a license specifically for conducting e-payment activities.

An e-payment license grants organizations the legal authority to operate and offer these services to the broader population. The issuance of this license is carried out by the Minister of Finance in accordance with the advice put out by the Bank of Thailand. The purpose of this measure is to regulate and enforce the provision of payment services exclusively by reliable and skilled service providers operating within the national jurisdiction.

4.4. National Portal [NPR]

An internet gateway refers to a centralized access point that enables consumers to conveniently access various services without the need to navigate many websites. The website Thaigove.net has effectively enhanced the standard of online communication between the government and its constituents. The website provides a diverse array of electronic services and comprehensive news coverage by establishing connections to all the websites managed by the federal government. The implementation of e-government in Thailand has empowered citizens with the convenience of accessing government services at their own discretion, regardless of time and location. The integration of the portal site with all federal government organizations has facilitated the online payment of taxes and license renewal for individuals.

The Digital Government Development Agency (Public Organization), also known as S.P.O., has established a facility called "data.go.th" with the aim of serving as a centralized hub for accessing open government data in the country. This initiative is designed to provide citizens with convenient and expeditious access to government information at any given time. The data is presented in a file format that is capable of being visually rendered. Preliminary Data Sample The utilization of visual data display, also known as visualization and the implementation of automated application programming interfaces (APIs) for datasets intended for publication. In addition, one has the capability to effectively oversee both data sets and metadata.

4.5. Government CIO [GCIO]

Administrative bureaucracy, Chief Information Officers (CIOs) are appointed at all levels of government, including the provincial level. CIO groups in Thailand, such the CIO Association of Thailand and the International Academy of CIOs, have a visionary outlook. CIOs and other IT professionals from both the public and private sectors are represented at meetings held by both groups. The D-Government Academy, which is a part of the EGA, works with other groups to host seminars

and conferences for chief information officers. Partnerships allow for these activities to take place. Chief information officers (CIOs) of the Thai government have directed the agencies' moves toward digitalization under the Digital Thailand umbrella. Every year since 2013, the government has held interim ICT training courses for CEOs to close the knowledge gap between the CEO and CIO in this area.

4.6. E-Government Promotion [EPRO]

The national development strategy of Thailand, known as "Thailand 4.0," seeks to enhance the integration of digital technology inside small and medium-sized enterprises (SMEs), industrial corporations, and organizations operating in the service sector. The implementation of the Digital Government Administration and Services Law, which advocates for the utilization of digital government architecture and a centralized database of government agencies, is being led by the Digital Government Development Agency (DGA). The DGA is now engaged in the development of many service applications aimed at enhancing the capacity of the public sector. These applications encompass a wide range of sectors, such as education, healthcare, agriculture, transparency, and public services. The objective is to enhance Thailand's e-government ranking to the second position within the ASEAN region while also extending the range of services to encompass labor, environment, justice, and tourism sectors. The DGA has previously introduced applications such as Thang Rat and ThailandPlus and is currently engaged in the development of many projects, including digital diplomas, a government information exchange platform, and a comprehensive digital service for business licensing.

4.7. E-Participation [EPAR]

As part of its digital government plans, Thailand is actively pushing e-participation. The DGA, or Digital Government Agency, is developing apps and platforms to improve government transparency and citizen engagement. The goals of these projects are to make government more open, to get more people involved, and to make government services easier to access. Thang Rat, ThailandPlus, and Mor Chana are just some of the DGA-created apps that let the public access government services, stay up to date on COVID-19, and travel safely. The DGA is also working with other government agencies to increase the availability of e-government services in key policy areas, including the judicial system, healthcare, agriculture, small and medium-sized enterprise support, and education. A high degree of

satisfaction among those who utilize digital government services is a priority, as is improving Thailand's e-government ranking such that it ranks second in ASEAN.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

Thailand participates in the Open Government Partnership (OGP), a global movement that encourages openness, citizen engagement, and government accountability. Since joining the OGP in 2017, Thailand has pledged to do more to foster civic engagement and better the lives of its citizens. Thailand has launched several programs as part of its OGP pledges. Some examples are:

- Access to numerous government datasets in Thailand is now available through a newly developed open data portal. The goal of this program is to make government data more open and usable by the public, private sector, and academic communities.

- Second, to collect public opinion and suggestions on government policies and services, the Thai government has created citizen feedback platforms. Using tools like internet forums and town hall meetings, the people can have their say in government decisions.

- Third, the Thai government has instituted anti-corruption measures to increase public trust in government agencies. This includes creating a hotline for reporting instances of corruption and taking steps to improve the openness of government contracting.

- Public Procurement Reform: Thailand has promised to make its public procurement procedures more open and effective. This includes things like encouraging honest competition among bidders and introducing electronic procurement processes.

The goal of these actions is to make Thai politics more transparent and responsible. The administration is committed to fulfilling its OGP pledges and is actively working to implement more changes and foster engagement with civil society organizations and the public.

4.9. Cybersecurity [CYB]

The Digital Government Development Agency (DGA) and Thailand Digital Government Academy (TDGA) are now training cybersecurity awareness. This collaborative endeavor aims to improve participants' understanding of cybersecurity laws, rules, and announcements. The training also promotes information system security. Cyberattacks are becoming more common, affecting numerous sectors, according to Cybersecurity Department Director Panithan Khennanuay. As companies go digital, they

become increasingly vulnerable to cyberattacks. Data breaches, hacking attempts, ransomware attacks, and other harmful actions can endanger sensitive data and impair key services.

The DGA and TDGA collaboration emphasized the need to train individuals and enterprises with the knowledge and skills to protect their digital assets as cybersecurity risks evolve. The training program empowers participants to detect and mitigate cyber hazards, improving public and private sector cybersecurity. Cyber dangers are constantly changing; therefore, organizations and the public must be trained to identify and address security concerns. It involves knowing the current cyber risks, practicing cybersecurity hygiene, and following secure digital behavioral best practices.

Citizens and employees should also know cybersecurity laws, rules, and norms. These precautions must be followed to safeguard vital infrastructure and sensitive data.

The DGA-TDGA collaboration aims to teach people how to guard against cyber threats and foster a cybersecurity mindset. A societal shift toward cybersecurity awareness can make the internet safer for everyone.

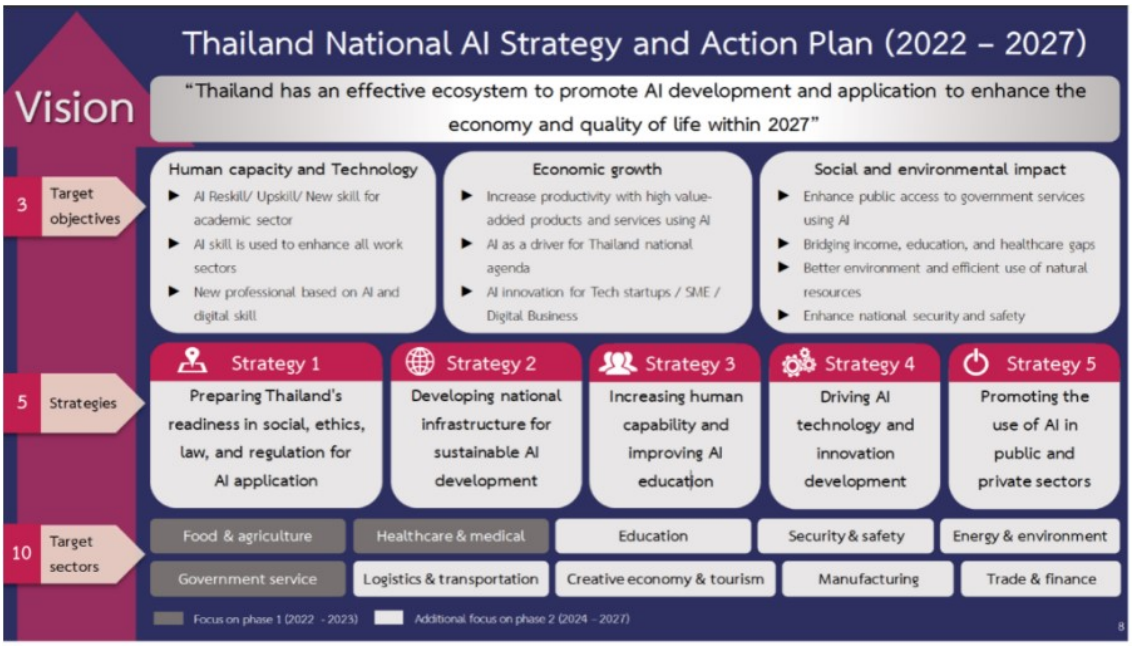
Thailand is investing in worker and citizen education to defend against cyberattacks. These actions will enable the country to fully utilize digital technologies while protecting its digital assets and interests. Cybersecurity is a shared responsibility, not just a technical issue. Mr. Khomkrit stressed the need for cross-sector coordination, proactive danger detection, and continual education and awareness. We believe Thailand can establish a strong cybersecurity ecosystem with the collaboration of organizations, government agencies, and individuals. This ecosystem will preserve essential infrastructure and boost digital innovation, trust, and economic growth."

4.10. The use of Emerging ICT [EMG]

Being among the four top countries in using of emerging ICT, the government of Thailand acknowledges the role that new ICT plays in spurring innovation, boosting the economy, and enhancing public services. They have been pushing for new forms of information and communication technology (ICT) to be implemented in many fields. the Thai government is pushing for the use of cutting-edge information and communication technologies (ICTs), cloud infrastructures, artificial intelligence (AI), and big data (big data) to boost productivity, efficiency, and economic growth. To take advantage of the opportunities presented by new technologies and to encourage their wider adoption across a variety of industries, they continue to invest in the necessary infrastructure, regulations, and programs.

To increase productivity, cut down on expenses, and broaden access to government services, the Thai government has been pushing for widespread use of cloud computing. Everything from data storage and processing to application hosting and interagency collaboration may and does take place in the cloud.

Thailand has recognized the potential of artificial intelligence (AI) to revolutionize many industries, including healthcare, agriculture, manufacturing, and public service. Establishing AI research facilities, supporting AI education and training, and encouraging collaboration between the public and commercial sectors to develop AI solutions are all examples of government measures to advance AI capabilities.



The Thai government has also come to appreciate the benefits of big data for making decisions based on facts and enhancing public services. They have programs in place to gather, examine, and use big data from public and private institutions and individuals alike. Urban planners, transportation experts, and medical professionals can all benefit from utilizing big data analytics.

Saudi Arabia

1. General Information

Area: 2,149,690 km^2

Population: 36,947,025

Government Type: absolute monarchy

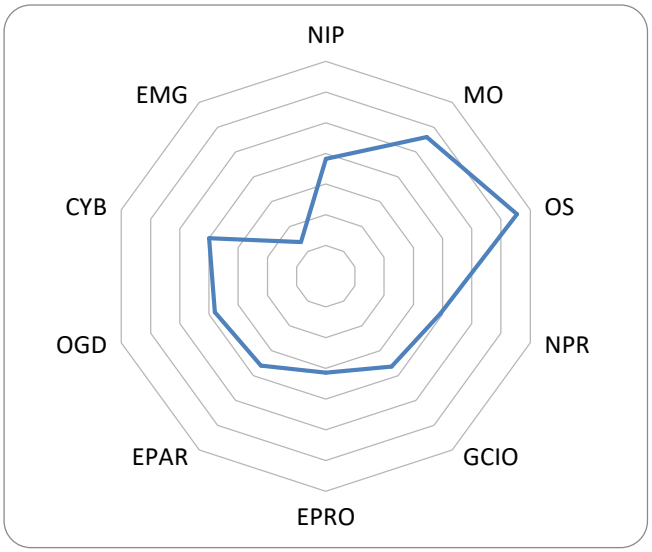
GDP: $27,659

Internet User: 100.00

Wired (Fixed Broadband User): 29.45

Wireless Broadband User: 119.54

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The Saudi Arabian government has been actively working towards digital transformation development in recent years. This is part of the country's Vision 2030 initiative, which aims to diversify the economy and reduce dependency on oil. The Saudi Arabian government's digital transformation development is aimed at improving the efficiency and accessibility of public services, enhancing the quality of life for citizens, and diversifying the economy. The government has been actively investing in digital infrastructure and technologies to achieve these goals and is committed to continuing its efforts in this area.

One of the key aspects of this digital transformation is the development of e-government services. The Saudi government has been working on creating online platforms and portals to provide various services to citizens and businesses. This includes services related to healthcare, education, employment, and business registration, among others. The goal is to make these services easily accessible and efficient, reducing the need for physical paperwork and in-person visits to government offices.

Another important aspect of the digital transformation is the development of smart cities. The Saudi government has been investing in the development of smart infrastructure and digital technologies to improve the quality of life for citizens and enhance the efficiency of public services. This includes the use of advanced technologies such as artificial intelligence, the Internet of Things, and big data analytics to optimize energy consumption, traffic management, waste management, and public safety. The Saudi government has been actively encouraging the growth of the digital economy. This includes supporting startups and entrepreneurs in the technology sector, as well as attracting foreign investments in digital industries. The aim is to create a thriving digital ecosystem that can contribute to job creation, economic growth, and innovation. With considerable resources devoted to government digital transformation, Saudi Arabia was ranked as the 20th place in the Waseda rankings.

3.2. New Trends

The Smart Government Strategy delineates the overarching objectives, immediate benchmarks, and intermediary measures for the Saudi Arabian government throughout the period of 2020-2024. The fundamental emphasis of strategic planning is in the Sustainable Development Goals (SDGs) and the Saudi Vision 2030. Based on the Smart Government Strategy, it is projected that by 2024, the government of the Kingdom will undergo enhancements in terms of responsiveness, efficiency, and innovation. Consequently, this will lead to the development of novel integrated Smart Government experiences that effectively cater to the requirements of its beneficiaries. The government possesses a multitude of purposes, encompassing the subsequent:

1. Ensuring the continual provision of excellent, intelligent services.
2. Accelerating digital transformation can be achieved through the strategic utilization of network of partners.
3. Optimizing the exploitation of community resources to increase the provision of public services.

The implementation strategy will ensure the attainment of the Kingdom's goals through the establishment of a Smart Government that effectively addresses the needs of its populace, including citizens, residents, and visitors.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

The Saudi Arabian government has been actively working on enhancing its network infrastructure preparedness. This is a crucial aspect of the country's digitalization and transformation efforts. The government has recognized the importance of having a robust and reliable network infrastructure to support the growing demand for digital services and connectivity. To achieve this, the government has been investing in the development and expansion of its network infrastructure.

One of the key initiatives in this area is the deployment of high-speed broadband networks across the country. This includes the implementation of fiber optic networks to provide faster and more reliable internet access to both urban and rural areas. The government has also been working on improving the coverage and capacity of mobile networks to ensure seamless connectivity. Additionally, the government has been focusing on enhancing cybersecurity measures to protect its network infrastructure from potential threats. This includes the development of advanced cybersecurity technologies and the establishment of dedicated cybersecurity agencies to monitor and respond to cyber threats. The government has been promoting collaboration with private sector companies to leverage their expertise and resources in network infrastructure development. This includes partnerships with telecom operators and technology companies to accelerate the deployment of advanced network technologies.

4.2. Management Optimization [MO]

The Public Investment Fund (PIF) is a critical factor in Saudi Arabia's ongoing economic modernization. Its major mission is to make long-term investments with the hopes of maximizing sustainable profits, establishing itself as a go-to investment partner for global possibilities, and bolstering Saudi Arabia's economic growth and diversification. With the help of strategic alliances and activities that are in line with the aims of Saudi Vision 2030, PIF is constantly adding to its foreign asset portfolio. The Public Investment Fund (PIF) has implemented the Investment Management System to keep tabs on all its holdings, both domestically and internationally.

The Zakat, Tax, and Customs Authority (ZATCA) is in charge of taxation and customs duties collection, with the goal of achieving maximum taxpayer compliance in accordance with established standards. In addition, ZATCA oversees and coordinates all port and customs-related activities to ensure the highest levels of regulatory conformity, operational efficiency, and international competitiveness. The goal of this project is to elevate the Kingdom to the status of a major international logistics hub, boosting commerce and protecting the country's safety in the process. Two major infrastructure projects have been initiated to realize these goals:

With the use of the Central Information System for Zakat, Tax, and Customs, government agencies will be able to streamline their tax and customs clearance processes by accessing all relevant information in a centralized location. At the same time, the system unifies numerous tax, customs, and zakat-related online services, making it easier than ever for individuals and businesses to file their tax returns, report their zakat contributions, and request other government services. Zakat is an online system that aims to standardize and streamline the Zakat process. It makes it easy for individuals and organizations to make their zakat payments electronically and to the intended recipients. The Saudi government's dedication to economic growth, compliance, and streamlined processes for citizens and enterprises is on display through PIF and ZATCA. Saudi Arabia hopes to improve its economic competitiveness and establish itself as a worldwide investment destination using technology and strategic alliances.

4.3. Online Service [OS]

The Saudi government recognizes the importance of digital services and has prioritized the development of a reliable digital identity system. The National Information Center and the Ministry of the Interior have worked together to create a universal sign-on system that allows citizens and residents of Saudi Arabia to establish their own digital identities. With this digital identity, they can access more than 700 MY.GOV.SA services, as well as those offered by other government portals and third-party providers, including financial institutions and telecommunications companies. The National Information Center has a webpage where people may learn more about getting an electronic citizen ID and how to use it.

Strategic Objective 1.1 of the Smart Government Strategy, "Improving customer satisfaction through improved smart government services," makes note of the significance of the national digital identity, given its potential and significance. The major objective is to increase citizens' confidence in government services by providing a safe way to handle their personal information. This method

improves the safety and accessibility of digital services while also opening the door to their enrichment and automation through the sharing of citizen-provided data via a unified digital identity across government departments. The plan details two distinct actions that will be taken to implement and complete this Strategic Objective.

4.4. National Portal [NPR]

The primary objective of the National Portal initiative is to optimize the user experience on the MY.GOV.SA website through various means. These include enhancing the quality of the content displayed, expanding the range of functionalities available, and offering multiple channels that align with the overarching goal of establishing MY.GOV.SA as the principal platform for accessing government information and conducting transactions.

The establishment of national identity and trustworthiness is facilitated through the utilization of the national information and unified access system's single sign-on portal in conjunction with the Absher system. This digital identity framework adheres to the guidelines set forth by the Ministry of Interior and is developed in collaboration with the National Information Center's initiatives pertaining to electronic signature and identity, encompassing both human and non-human identities. This effort aims to integrate identification capabilities and trustworthiness into mainstream practices, establish ways for citizens to exercise control over their data, and standardize approaches to identity and government access.

4.5. Government CIO [GCIO]

The CIO Portal is an extensive and interactive electronic portal specifically tailored for executives in government ICT. The fundamental goal of this initiative is to provide a customized and outstanding user experience that addresses their individual needs and preferences. The development of this portal aims to provide users with a comprehensive array of services and functionalities that are specifically customized to align with their respective roles and responsibilities.

The Yesser Program (https://www.my.gov.sa/wps/portal/snp/content/yesser/) ,an integral element of the CIO Portal, facilitates the adoption and utilization of diverse national services and applications by users. Through the utilization of the Yesser Program's capabilities, Saudi Arabia can augment and broaden its digital transformation endeavors. This program assumes a pivotal role in facilitating the widespread acceptance and implementation of digital technologies and services throughout the nation,

ultimately resulting in heightened efficacy, productivity, and ingenuity within the public domain. Government IT executives are provided with the chance to actively participate in Saudi Arabia's digital transformation path through the CIO Portal and the Yesser Program. This enables them to play a crucial role in ensuring that the nation maintains its position at the forefront of technical breakthroughs and digital innovation.

4.6. E-Government Promotion [EPRO]

The Inclusive Government Program has been initiated by the Digital Government Authority (DGA) in Saudi Arabia with the aim of delivering comprehensive digital services throughout the government sector. The objective is to facilitate the exchange of data among government entities, promoting cohesion and accelerating the government's sustainable digitalization process.

The primary objective of this government project is to enhance the overall digital experience for end users by implementing standardization measures on important platforms and applications. The primary objective of the Inclusive Government Program is to provide beneficiaries with a cohesive digital experience. This is achieved through the creation and management of comprehensive government platforms that leverage technologies enabling the seamless development, exchange, and integration of services. This approach eliminates the need for repetitive processes such as redesigning, testing, and implementation.

The recent announcement by the Digital Government Authority (DGA) of Saudi Arabia regarding its digital government policy signifies a noteworthy advancement in addressing the requirements of stakeholders and expediting the enduring digital transformation of the public sector in accordance with the objectives outlined in Vision 2030.

4.7. E-Participation [EPAR]

Especially for those with disabilities, women, young people, the elderly, and foreigners, the Saudi government has made significant progress toward its aim of universal internet access. The goal of Saudi Arabia's Vision 2030 is to bring all citizens into the information age. To further ensure that everyone, especially the underprivileged, has access to digital resources, the National Transformation Program lays out several crucial objectives.

However, the ICT Sector Strategy places a premium on increasing access for women to careers in the sector. Nationwide open data and citizen engagement projects. One more advantage of e-engagement

is that it helps people fulfill national expectations for E-participation. The Open Data program seeks to increase the quantity and quality of publicly available data that may be used by anybody for anything, from improving society to furthering research to manufacturing new products.

The Participatory Citizenship E-Engagement promotes and implements government-wide e-consultation capabilities to increase citizens' input in policymaking and service improvement, hence improving Watani and Ma3an's existing survey and polling abilities.

The 2nd LEAP in Feb.2023 was extremely successful as IT Expo in the region to involve many citizens and start-up firms.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

To increase efficiency and quality, the government of the Kingdom of Saudi Arabia (KSA) has adopted the worldwide trend of digital transformation in government and institutions. The long-term goal of this five-year strategy is to completely revamp how the government serves the public and how people interact with it digitally. The Government Leadership Award was given by the International Telecommunications Union to the Kingdom of Saudi Arabia for its forward-thinking policies and laws that support the growth of the digital economy, inspire investment and new ideas, and aid in the attainment of the SDGs.

All national data in the Kingdom of Saudi Arabia is under the purview of the Saudi Data and Artificial Intelligence Authority (SDAIA). SDAIA has produced the Open Data Strategy and Framework for National Data Governance in preparation for future national legislation on data classification, data sharing, data privacy, freedom of information, open data, and more. The Open Data Repository was established as a consolidated storage facility for the massive amounts of information accessible via the National Open Data Portal. To facilitate public access, this repository provides a centralized catalog of datasets made available by government entities. Dataset inventories must be kept current by all government agencies in accordance with the Data Quality Guideline's recommended metadata standards.

To ensure that its citizens have access to government information, the Kingdom has enacted rules and legislation consistent with the principle of transparency. The Saudi Data and Artificial Intelligence Authority is the country's primary data watchdog and the source behind the kingdom's extensive data governance infrastructure. Considering pending legislation, this framework sets forth appropriate policies and laws for data classification, sharing, privacy, freedom of information, open data, and more.

A set of interim regulations for open data have been put in place to give public entities a legal footing on which to publish data and information of any kind, regardless of its origin, and to specify their responsibilities in doing so. The Saudi Data and Artificial Intelligence Authority, the National Data Management Office, the National Information Center, and any other government agencies involved in open data plan development, definition, publication, and maintenance, as well as performance and compliance tracking, are all given specific responsibilities under these rules.

4.9. Cybersecurity [CYB]

The National Cybersecurity Authority has released a document titled "Cybersecurity Guidelines for the Internet of Things" and is seeking feedback from the public. The last day to provide comments is Thursday, 15 Safar 1445 AH (August 31, 2023, AD). The authority is taking this step as part of its mandate to establish cybersecurity-related policies, governance processes, frameworks, standards, regulations, and recommendations for the Kingdom. To ensure conformity, these rules are communicated with the appropriate authorities and updated on a regular basis.

The goal of these Internet of Things cybersecurity guidelines is to encourage manufacturers and service providers to adopt and implement industry-standard cybersecurity procedures when working with IoT devices. The goal is to systematically manage the cybersecurity risks of the Internet of Things and protect entities' interests as new technologies emerge. This method conforms to the regulations, rules, and laws in place.

The four primary parts of the rules, all of which are available for inspection by the public at this time, are "Cybersecurity Governance," "Cybersecurity Enhancement," "Cybersecurity Resilience," and "Cybersecurity Related to External Parties and Cloud Computing." Developed from extensive research into existing international cybersecurity principles and controls, they include 27 subcomponents and 80 guidelines. The cyber dangers and hazards that are now present in the Kingdom's IoT technology landscape were also examined.

4.10. The use of Emerging ICT [EMG]

Saudi Arabia is demonstrating notable advancements in the realm of digital economy through its use of various technologies such as artificial intelligence (AI), Internet of Things (IoT), blockchain, big data, robotics, machine learning, and 5G. The nation has successfully deployed Internet of Things (IoT) solutions across various sectors, including education, energy, healthcare, smart cities, and

manufacturing. As a result, these implementations have yielded enhanced productivity, heightened security measures, and effective cost management. The Smart Government Strategy places emphasis on the utilization of emerging technologies such as robotics, the Internet of Things (IoT), blockchain, big data, and artificial intelligence (AI) to accomplish the objectives outlined in Vision 2030. The proposed initiatives encompass the establishment of a center of excellence dedicated to data insights, the promotion of open innovation, the cultivation of a digital workforce, and the reinforcement of the local private sector. The endeavors are directed towards propelling the government's digital transformation and bolstering the Kingdom's stature as a prominent global frontrunner in artificial intelligence and technology.

United Arab Emirates

1. General Information

Area: 83,600 km^2

Population: 9,516,871

Government Type: constitutional monarchy

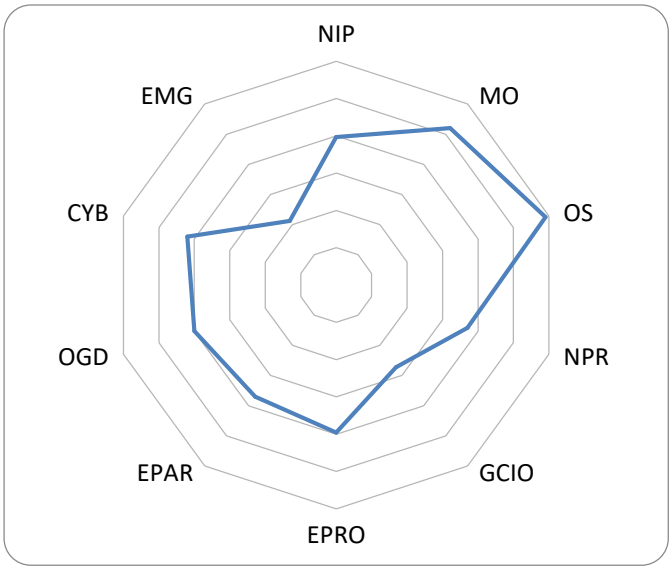
GDP: $53,193

Internet User: 100.00

Wired (Fixed Broadband User): 38.15

Wireless Broadband User: 241.18

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The UAE government has been actively working towards digital transformation development in recent years. The Smart Dubai initiative aims to transform Dubai into a smart city and improve the quality of life for residents and visitors. It focuses on using technology and data to enhance government services, infrastructure, and sustainability. In 2017, the UAE government launched the UAE Strategy for Artificial Intelligence (AI), which aims to make the UAE a global leader in AI by 2031. The strategy focuses on developing AI capabilities across various sectors, including healthcare, transportation, education, and government services. By making substantial investments in government digital transformation, the UAE secured the 21st position in the Waseda rankings.

The UAE government has been actively digitizing its services to provide convenient and efficient access to government services for citizens and businesses. Initiatives such as the UAE Pass, a digital identity platform, and the Government app, which provides access to various government services, are examples of these efforts. The UAE government has been exploring the use of blockchain technology in various sectors, including finance, healthcare, and government services. The Dubai Blockchain Strategy aims to make Dubai the first blockchain-powered government by 2020. The UAE government has been investing in e-government development to streamline processes and improve service delivery. The government has launched various online portals and platforms to enable digital transactions, such as the e-Dirham system for online payments and the e-Licensing system for business licensing.

With the increasing focus on digital transformation, the UAE government has also prioritized cybersecurity. The UAE Cybersecurity Strategy aims to safeguard the country's digital infrastructure and protect against cyber threats. Overall, the UAE government's digital transformation development efforts aim to enhance efficiency, transparency, and the overall quality of services provided to citizens and businesses.

3.2. New Trends

The primary objective of the "Digital Economy Strategy," implemented in April 2022, is to enhance the digital economy's role in the United Arab Emirates' gross domestic product (GDP) within the next ten years. The target is to elevate its contribution from 9.7 percent in April 2022 to 19.4 percent. Moreover, the objective is to bolster the United Arab Emirates' standing as a prominent center for the digital economy at both regional and global levels.

The proposed strategy aims to delineate the key areas of focus within the digital economy, with a specific emphasis on post-pandemic recuperation. Furthermore, it seeks to foster collaboration and engagement from various economic sectors to provide necessary support. The organization will consistently evaluate its development by employing a standardized technique to monitor its metrics. The initiative comprises over 30 discrete projects and programs that focus on six unique industries and five emerging areas of development. To effectively execute its efforts across many economic sectors and promote the objectives of its strategy, the government of the United Arab Emirates (UAE) has established a Council for Digital Economy.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

The UAE government has been actively working on enhancing its network infrastructure preparedness for digital government initiatives. This includes ensuring the availability of robust and reliable network infrastructure to support the increasing demand for digital services and connectivity. The government has invested in the development and expansion of high-speed broadband networks across the country. This includes the deployment of fiber-optic networks, 5G technology, and the establishment of data centers to support the storage and processing of digital government data.

In addition, the government has focused on strengthening cybersecurity measures to protect the network infrastructure from cyber threats. This includes implementing advanced security systems, conducting regular audits, and collaborating with international partners to share best practices in cybersecurity. UAE has been promoting collaboration with telecom operators and other stakeholders to ensure the seamless integration of network infrastructure for digital government services. This includes working on interoperability standards and protocols to enable efficient data exchange and communication between government entities and citizens.

4.2. Management Optimization [MO]

The UAE's newly formed council for digital transformation will increase cooperation between government agencies and hasten the development of more useful digital resources. Its mission is to prepare federal policies for digital transformation and to build government policies for digital transformation, including reviewing and following through on relevant strategies, initiatives, and activities to aid in the transition.

In addition to this duty, the committee will be responsible for providing counsel on strategic initiatives related to the computerization of government agencies' services, enterprises, and operations. The committee's membership includes representatives from the Ministry of Finance, the UAE Chief of Government Services, the Federal Authority for Government Human Resources, the Government's Chief of Cybersecurity, and the Telecommunications and Digital Government Regulatory Authority (TDRA). The Ministry of Economy announced that the United Arab Emirates would open a "Chainalysis Centre of Excellence" to help government personnel learn more about blockchain technology. The use of digital assets and other technologies that will define the future economy can be done safely on this decentralized platform.

4.3. Online Service [OS]

Digital payments are processed through Abu Dhabi Pay, which is part of the Abu Dhabi government services ecosystem. Its main goal is to make it easier and more standardized for Abu Dhabi residents to pay for all government services online through a single portal, improving efficiency, security, and convenience. Multiple settlements can be made with a single payment, and the platform handles payment processing, reconciliation, and settlement as well as complete reports and audits.

Portals, mobile apps, cash deposit machines, and point-of-sale (POS) devices are just some of the ways in which users can access their Abu Dhabi Pay accounts. E-checks, e-wallets (Apple Pay, Payit, PayBy), credit cards, cash, and more are all viable options for users to make purchases. Users can access the TAMM website, the app (available on the App Store and Google Play), or both to make payments for Abu Dhabi government services. After that, they can select the desired service, proceed through the required processes, and pay whatever they like.

In the United Arab Emirates, you can make payments to most government agencies online. Through the official websites or government-run portals, customers can submit service requests and make payments electronically. Bills like those for utilities and traffic fines fall under this category.

In line with the UAE's smart ambitions, the government has created several mobile applications for payment of government services. These programs include many types of payment into their systems or provide unique payment capabilities. Bills and service fees can be paid from the ease of one's own home. You may download all these programs from Apple's iTunes store. The DubaiNow app is a good illustration; it provides access to more than 30 different public and commercial organizations in Dubai. Users can do things like renewing vehicle registrations, applying for residence, paying bills, paying traffic fines, recharging Salik and Nol cards, and more. ePayment for public services is also being made easier with the introduction of electronic payment systems. These procedures use a wide range of resources and strategies to guarantee quick and easy financial dealings. Citizens of the United Arab Emirates (UAE) have several options for making digital payments to the government that prioritize convenience and security.

4.4. National Portal [NPR]

U.ae, formerly known as government.ae, serves as the authoritative online platform for the Government of the United Arab Emirates. It was established in May 2011 under the auspices of His Highness Sheikh

Mohammed bin Rashid Al Maktoum, the Vice-President, and Prime Minister of the United Arab Emirates, as well as the Ruler of Dubai. The main aim of the portal is to function as a cohesive platform that provides convenient accessibility to all governmental services. The site serves as a comprehensive repository of information pertaining to both federal and municipal government institutions, encompassing a wide range of services catered towards citizens, visitors, businesses, and the government itself.

The primary objective of eGovernment is to augment the competitiveness of the United Arab Emirates and provide high-quality multi-channel services that are in accordance with user preferences, achieved through effective implementation of eGovernance and eParticipation. The portal serves as the authoritative digital representation of the Government of the United Arab Emirates. The utilization of the extra Arabic domain (.emarat) serves to underscore the significance of ensuring that eTransformation is in harmony with the national culture and identity while also catering to a varied array of users within the United Arab Emirates.

4.5. Government CIO [GCIO]

The individual currently occupying the position of Chief Information Officer (CIO) in the United Arab Emirates (UAE) is His Excellency Hamad Obaid Al Mansoori. In addition to his role as CIO, he also assumes the position of Head of the UAE Digital Government, where he is tasked with overseeing the implementation and progress of various digital transformation endeavors inside the nation. The esteemed individual, His Excellency Al Mansoori, has been entrusted with the significant responsibility of overseeing the digital government in the United Arab Emirates (TDRA). In June 2021, His Excellency Hamad Obaid Al Mansoori assumed the role of Director-General of the Dubai Digital Authority, thereby consolidating his leadership in spearheading digital progress in Dubai and other regions.

4.6. E-Government Promotion [EPRO]

The government of the United Arab Emirates (UAE) has undertaken a range of initiatives and endeavors aimed at fostering the adoption and advancement of e-government. The primary objective of these initiatives and projects is to optimize the effectiveness, availability, and caliber of governmental services by leveraging digital technologies, hence facilitating the comprehensive digital transformation of the United Arab Emirates government.

The UAE PASS is a robust digital identity platform that enables individuals who are citizens or residents of the United Arab Emirates to conveniently access a range of government services through a unified login system. The simplification of the authentication process and the subsequent enhancement in convenience in accessing government services are seen.

The Smart Dubai program is a comprehensive endeavor with the objective of converting Dubai into a smart city. The portfolio encompasses a range of initiatives, including the Dubai Now application, which offers a consolidated platform for accessing governmental services, and the Dubai Blockchain Strategy, which seeks to harness blockchain technology to enhance the security and efficiency of government transactions.

The Digital UAE program is a nationwide initiative aimed at expediting the digitalization of government services. The efforts encompassed within this framework consist of the Digital Government Services Platform, which serves as a consolidated platform for the provision of government services, and the UAE Government Data Exchange, which promotes the exchange of data among various government agencies.

The objective of the National Innovation Strategy is to cultivate innovation and creativity within the United Arab Emirates (UAE). The efforts encompassed within this framework consist of the Mohammed bin Rashid Innovation Fund, which offers financial support for pioneering endeavors, and the Dubai Future Accelerators, which facilitates collaboration between governmental institutions and innovative entrepreneurs to address significant concerns.

The UAE government has implemented a Cloud-First Policy, wherein government institutions are encouraged to prioritize the procurement of IT services that are based on cloud technology. This initiative advocates for the adoption of scalable and cost-effective cloud technologies throughout government operations.

4.7. E-Participation [EPAR]

The United Arab Emirates government has prioritized the inclusion of all its residents in the development of public services and future initiatives through a strong emphasis on participation and the utilization of existing technologies and information and communication technologies (ICTs). The United Arab Emirates has recently initiated the provision of a complimentary online course on eParticipation. The objective of the course is to promote civic engagement and transparency in

governance. The incorporation of eParticipation strategies is crucial for achieving effective participation in decision-making processes. Consequently, the primary objective of this course is to provide comprehensive education to all members of the community regarding the importance of public engagement.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

The United Arab Emirates (UAE) has implemented various initiatives aimed at enhancing digital transformation (DX) and promoting the accessibility of government data (OGD) inside the nation. The National Strategy for Artificial Intelligence (AI) was initiated by the United Arab Emirates (UAE) with the objective of establishing the nation as a prominent global frontrunner in the implementation and utilization of AI technology. The approach centers on the utilization of artificial intelligence (AI) technologies to augment government services, promote efficiency, and foster innovation across diverse sectors. The Dubai Data Initiative has been implemented in Dubai with the objective of positioning the city as a global leader in terms of intelligence and well-being. The primary emphasis is placed on the dissemination of government data to the public, fostering the use of data-centric decision-making processes, and fostering partnerships among governmental bodies, private enterprises, and the community.

The Smart Dubai Data Policy encompasses a wide-ranging framework that facilitates the dissemination and exploitation of governmental data, hence fostering a culture of data sharing and utilization. The statement underscores the significance of safeguarding data privacy and security, as well as promoting interoperability, to foster the advancement of data-driven innovation and the creation of intelligent urban solutions. The UAE government has just introduced the UAE Open Data Portal, a platform that grants users access to a diverse array of official datasets. This platform enables individuals, enterprises, scholars, and programmers to investigate, evaluate, and employ the data for many objectives, hence promoting creativity and openness.

The UAE government has prioritized the enhancement of digital skills among its inhabitants through a range of programs and initiatives. One notable example of such initiatives is the Mohammed bin Rashid Al Maktoum Global Initiatives, which provides a range of educational programs and courses focused on enhancing digital competencies and staying abreast of evolving technology. The projects exemplify the United Arab Emirates' dedication to digital transformation and the utilization of open government

data. The objective is to establish a government that is both technologically savvy and transparent, utilizing data to foster innovation, enhance efficiency, and provide superior public services.

4.9. Cybersecurity [CYB]

Building a trustworthy and secure cyberinfrastructure that promotes economic development and aids UAE citizens in realizing their ambitions is the overarching purpose of the United Arab Emirates' National Cybersecurity Strategy. In 2019, a revised version of the plan was published by the Telecommunications Regulatory Authority (TRA), the government agency responsible for the country's information and communications technology (ICT) industry and digital transformation. The plan relies on numerous procedures and pillars meant to encourage the growth of start-ups in the UAE to engage the entire cybersecurity ecosystem there.

To make the United Arab Emirates' digital infrastructure more secure, as well as to improve citizens' access to information and communication, MOHRE implements the country's National Cybersecurity Strategy. It is ISO27001-certified for the security of personal customer information. As a worldwide benchmark, it supports MOHRE in spotting risks and creating countermeasures, keeping MOHRE's financial records, proprietary information, and client details safe.

In addition, a TDRA was signed between MOHRE and the Telecommunications and Digital Government Regulatory Authority. The Computer Emergency Response Team will be helping the United Arab Emirates tighten its information security policies, protect its critical information and communications technology infrastructure from cyberattacks, and create a culture in which cybercrime is not tolerated as part of the agreement.

4.10. The use of Emerging ICT [EMG]

With an anticipated investment of over a billion dollars by 2026, the United Arab Emirates is set to emerge as one of the most notable data center centers in the region. Two new Microsoft Azure cloud regions were launched in the United Arab Emirates in 2019, and Amazon Web Services has announced plans to launch a data center region there in 2021. This forthcoming region will have three separate zones of availability. Oracle plans to open a second cloud region in Abu Dhabi by November 2021, following the success of its first cloud region in Dubai. Etisalat and G42 Cloud, both of which are under government control, also have sizable data centers.

The government of the United Arab Emirates (UAE) has made significant investments in cloud computing, bolstered by progressive legal frameworks for businesses and a solid underlying infrastructure. Because of this, the ICT sector is projected to expand rapidly over the next few years. Public cloud hosting in the United Arab Emirates has developed highly specialized solutions to meet information and resource shortfalls. These growth rates are amazing, but there is still a lot of unrealized potential that the American manufacturing sector could help develop.

France

1. General Information

Area: 551,695 km^2

Population: 64,756,584

Government Type: republic

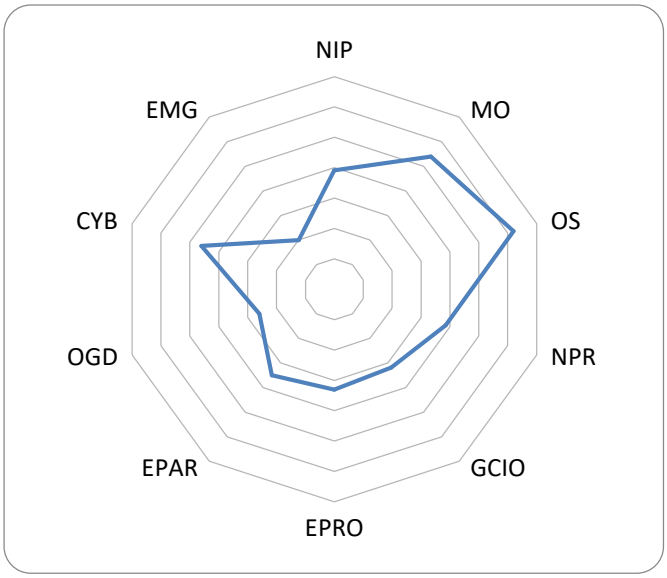
GDP: $47,659

Internet User: 86.10

Wired (Fixed Broadband User): 48.76

Wireless Broadband User: 100.41

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

Modernizing the public service in France necessitates transforming intricate and inflexible processes in a nation with a bureaucratic heritage to progress toward a more contemporary and adaptable administration. The digital transformation plan of the French government had its origins in the early 2000s. One of the first disruptions in the industry occurred with the establishment of the service-public.fr website in 2000. This platform facilitated people's online access to practical materials pertaining to the execution of their administrative processes. By investing significantly in government digital transformation, France earned the 22nd position in the Waseda rankings.

Following the first phase of online information dissemination, a further stage in digitalizing public services occurred, characterized by the substantial elimination of physical documentation in crucial administrative processes. This transition was facilitated by implementing three distinct action plans in 1998, 2004, and 2008. Subsequently, in 2013, France implemented many measures aimed at streamlining administrative processes as part of the legislative framework known as the "law enabling the Government to simplify relations between the administration and the citizens." Hence, it was imperative, given the findings of the 2014 Global Competitiveness Report published by the World Economic Forum, that France's position in terms of administrative load was notably unfavorable, ranking 121st out of 144 nations globally.

The concept of administrative simplification has a significant position and serves as the third focal point in the French digital transformation of public services. The implementation of a digital administration extends beyond the mere replication of traditional processes in an online environment. It instead focuses on enhancing the overall citizen experience. The government is actively pursuing efforts to enhance its operational effectiveness via modernization. However, the primary focus is reconfiguring the dynamic between residents and the public service.

3.2. New Trends

The global pandemic has led to the rapid deployment of several large-scale digital technologies, setting the foundation for future advancements in digital administration. France intends to allocate an additional EUR 1.8 billion towards improving essential digital technologies, including cybersecurity, quantum processing, and cloud computing. The objective behind this investment is to foster innovation and promote wider use of these domains in alignment with the aims set out by the European Union. France will engage in two global public-private innovation centers (IPCEIs) concentrating on microelectronics, communications, and cloud and edge computing.

The advancement of computerization in educational and training systems is expected to see a notable acceleration within the following years. By the year 2022, an estimated 1.4 million college students and 45,000 K-12 classes are projected to have access to hybrid education, which incorporates state-of-the-art digital technology. The provision of opportunities for students and workers to engage in digital skills training programs is a fundamental component of the investment in skills. The implementation of

France Num France, a government initiative designed to facilitate the digital transformation of 200,000 small and medium-sized enterprises (SMEs), is forthcoming.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Significant advancements have been made by the French government and populace in their endeavors to invest in the process of digital transformation inside France. The responsibility for implementing activities and distributing press releases to support the transition from copper to fiber infrastructure lies with the ARCEP. SpaceX is poised to provide a service that would enable residents of France to get internet connectivity. Furthermore, the responsibility of overseeing the establishment and expansion of fiber optic networks lies with Orange Concessions, which collaborates with local governmental bodies to accomplish this task. To secure funding for implementing 5G technology, Iliad has opted to sell a piece of the land constituting its French tower to generate money. It is worth mentioning that the decommissioning of the Public Switched Telephone Network (PSTN) is scheduled to commence in 2023. Additionally, regulatory bodies have granted approval for initiating 5G testing inside the 26GHz spectrum.

4.2. Management Optimization [MO]

To achieve the goals of bringing the French government into the twenty-first century, Prime Minister Édouard Philippe instituted a plan known as Public Action 2022. The project's primary goals are the provision of public services, the maintenance of a vigorous workforce, and the administration of financial affairs. In October 2018, a meeting of an Inter-ministerial Committee on Public Transformation was held to develop a comprehensive National Strategy for the Transformation of Public Action. The committee's charge was to provide recommendations on how to improve the delivery of public services. It is now possible to methodically examine and record the progress that has been made with the program by using the metrics that have been outlined in the framework that has been provided. As a direct result of this, inhabitants of France will have the capacity to see and monitor development over the course of a period. The viability of reforms depends upon their conformity to the population's needs. Adopting complete and comprehensive openness in all aspects of financial disbursements is the unmistakable indication of a successful transformation.

4.3. Online Service [OS]

Numerous French government websites conspicuously feature the FranceConnect logo, including impots.gouv.fr (dedicated to tax-related issues), AMELI (responsible for social security issues), La Poste (overseeing postal services), and MobileConnect et moi. The FranceConnect login pages feature the graphical representation of the FranceConnect logo. Customers can now complete all their online transactions via Impots.gouv.fr, as the website recently implemented an improved connectivity protocol.

Under the brand name PayFiP, the General Directorate of Public Finance (DGFiP) has recently instituted advanced, secure, and up-to-date online payment services for public entities and consumers. The primary goal of the PayFiP initiative was to expedite the payment of municipal and other public sector invoices using bank deposits.

4.4. National Portal [NPR]

The establishment of an application programming interface (API) gateway for Digital Affairs (DINUM) has been undertaken by the Interministerial Directorate. In the process of developing a new strategy or teleservice, it is common for administrations to utilize multiple APIs sourced from various origins. The "Signup" application, developed by DINUM, aims to alleviate the challenges faced by data providers during the authorization process. Providers' marketing of application programming interfaces (APIs) can be facilitated through a catalog. In France, ongoing initiatives are focused on two key areas: centralizing personal data held by various administrations and enhancing online procedures for administrative service providers. These efforts aim to streamline processes and improve efficiency in managing personal data. Specifically, administrations such as the National Family Allowance Fund and the Directorate General of Public Finance are working towards centralization, while administrative departments and cities are being supported in developing more efficient online procedures. These endeavors reflect a broader commitment to modernize administrative services and optimize data management practices.

The Interministerial Directorate is currently developing the FranceConnect Platform for Digital Affairs. To facilitate the provision of online public services, it is essential for suppliers of such services to maintain a single account and a single point of contact. This streamlined approach allows for efficient and effective delivery of services to the public. By consolidating all necessary information and communication channels into one central location, suppliers can ensure a seamless user experience and

simplify their administrative processes. This not only benefits the service providers themselves but also enhances accessibility and convenience for the public. As part of the FranceConnect initiative, the existing user accounts will be integrated into the system instead of creating new public identity providers. This decision aims to leverage the capabilities of FranceConnect and avoid establishing additional identity providers.

4.5. Government CIO [GCIO]

Several well-established agencies, such as the Council for the Modernization of Public Policies (CMPP) and the Directorate-General for State Modernization, are responsible for formulating and coordinating the various policies and activities related to e-government (DGME). It is the responsibility of the council and directorates to monitor the e-Government responsibilities of their relevant industry and departments. The Interdepartmental Agency for Digital Projects (Direction in termsinistérielle du numérique and the system of information and communication of the State) is the organization that serves in all three capacities; it is the Chief Information Officer of the Government, the Chief Digital Officer of the Government, and a member of the Cabinet's Data Management Committee. All these roles report directly to the Government's Chief Information Officer.

4.6. E-Government Promotion [EPRO]

The Interministerial Network of the State refers to the collaborative network established among several government ministries at the state level.

The Réseau Interministériel de l'État (RIE), also known as the Interministerial Network of the State, functions as a collaborative network facilitating the flow of data both inside and across several Ministries. This project has significant importance in the process of modernizing the State's information system and, therefore, enhancing public activity in France. Its primary objective is to facilitate and safeguard data interchange between various administrative bodies, thus contributing to the advancement of eGovernment initiatives. As of the commencement of the year 2023, around 14,000 sites were networked, catering to an estimated user base of 1,000,000 individuals. The network is enhanced with secure internet surfing capabilities.

The primary objectives of the RIE encompass the following aspects: - Facilitating the simplification and streamlining of information exchange among Ministries and departmental entities, thereby enhancing the efficiency of services provided to agents and users. - Ensuring the security of the State's

information system and bolstering global IT security measures in response to the increasing prevalence of cyber-attacks. The physical network is a collection of around 200 virtual ministerial networks that are coupled via a secure and redundant platform. The Network backbone has been strategically engineered to offer robust support for eGovernment IT systems, irrespective of the operational status of the Internet. It is important to note that in France, internet connectivity is mostly facilitated by private telecommunications carriers. Communication between France's mainland and its overseas territories in America, the Pacific, and the Indian oceans is facilitated using secure and encrypted government-level lines. Additionally, efforts are made to optimize the infrastructure to provide unified service catalogs and achieve cost reduction through mutualization.

4.7. E-Participation [EPAR]

Establishing an inter-ministerial network inside the government facilitates the seamless data exchange across and within several ministries. This crucial element of the continuous endeavor to modernize the information system of the state, and therefore, public initiatives in France, facilitates the movement of data inside the eGovernment, rendering it more streamlined and dependable. The French military is now preparing for deployment, with a specific objective of establishing connections with 14,000 locations by the year 2022. As of January 1, 2020, they have successfully established relationships with over 13,000 stations. By 2022, it is anticipated that the Network will include enhanced functionalities, enabling a more secure surfing experience for internet users.

The Secure Interministerial Intranet for Governmental Synergies has facilitated confidential discussions and information sharing among government officials since November 2007. The National Agency for System and Network Security assumes the crucial role of safeguarding the nation's digital infrastructure from cybercrime and other attacks. The TESTA initiative facilitated digital communication among the agencies, institutions, and member states of the European Union.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

Initiating the French National Plan for Digital Inclusion by the State Secretary for Digital may be strategic. This effort helps France build a secure, privacy- and autonomy-preserving digital society. The proposal aims to link one-third of France to the Internet within ten years. The Agency expects 4.52 million more French people to have basic digital skills. The French National Plan for Digital Inclusion

aims to help 80 percent of Europeans learn critical digital skills in the next decade, in accordance with the European Commission's Digital Decade for 2030.

The legal framework for non-commercial usage of public sector information encourages data reuse. This rule allows wider access and use of information. State and municipal governments may benefit from this method. Online digital cultural financing is exempt when a government agency must give up its resources to offer unrestricted access. The French government's open data portal is data.gouv.fr. The website provides government, business, individual, and non-profit data access. Data.gouv.fr lets anybody submit datasets, discuss them, and promote reuse.

DINU has been studying the usability and user experience of Romania's 250 most popular public services since June. The project's main duties include prioritizing the product roadmap for the services and working with other government agencies. The French Interministerial Directorate for Digital Affairs (DINUM) exclusively evaluates user experience based on responsiveness. User happiness, efficiency, and efficacy are also considered. The data is renewed quarterly as open data, guaranteeing website visitors may access it.

4.9. Cybersecurity [CYB]

The French government has implemented a policy aimed at augmenting the country's global reputation in the field of digital security and nurturing a more robust "ecosystem" capable of identifying and mitigating cyber threats effectively. This policy is governed by an underlying set of goals. Among these are the development of innovative cybersecurity solutions for sovereign entities and the improvement of connections between various stakeholders. In the French cybersecurity sector, a number of goals have been established with the intent of achieving them by 2025. The accomplishments include a notable increase of 20% in patents resulting from R&D efforts, a considerable turnover of €25 billion, and the establishment of three highly successful and valuable companies, often referred to as "unicorns," within the industry.

Foreign competitors with larger research and development (R&D), marketing budgets, and a need for qualified personnel threaten French cybersecurity companies. Despite their inventiveness and knowledge, French cybersecurity firms need help to contend in this global market. The recent developments indicate a palpable future for all French cybersecurity industry participants. In addition, these solutions offer French businesses, government agencies, and municipalities the chance to improve

their security by adopting tried-and-true French solutions that have undergone rigorous testing, verification of their resilience, and source code audits. Stormshield will be among the companies participating in the upcoming French Cyber Campus event. The approach serves as a profound reminder that our responsibility extends far beyond the security of digital assets to protect tangible property, people, and institutions. Recent attacks have demonstrated that Information Technology (IT) and Operational Technology (OT) are now integral components requiring the highest level of economic, social, technological, and human protection.

Nonetheless, the European Union is formulating cybercrime mitigation and resilience strategies. The goal is to ensure that all EU citizens, businesses, and governments can securely utilize digital services and solutions. In the recently implemented certification system for the European Union, certified and qualified French products are regarded as entirely lawful. Stormshield participates actively in the collaborative measures of the ENISA working group to contribute to developing new certification standards.

4.10. The use of Emerging ICT [EMG]

The fundamental elements of the National Artificial Intelligence Research Strategy are now accessible to the public. By the end of 2022, the strategy will have received a total investment of 665,000,000 Euros. This research offers crucial background information for the ongoing development of artificial intelligence (AI). Because of the efforts of its mathematical and computational institutions, France has climbed to the forefront of the international competition in mathematics and computing. This achievement was achieved in France.

After the publication of the National Strategy for Artificial Intelligence, two requests for expressions of interest have been made public by the Interministerial Directorate for Digital Affairs (DINUM) and the Interministerial Directorate for Public Transformation (DITP). Intergovernmental organizations are represented here by these two different groupings. An impartial panel of judges selected the other administrations' submissions that they felt had the most potential. These administrations included the federal and state governments as well as non-profit organizations. After narrowing their focus to the most promising concepts, the AI Lab, supported by DINUM and DITP, spent the next ten months analyzing and developing those concepts.

Italy

1. General Information

Area: 301,336 km^2

Population: 58,870,762

Government Type: republic

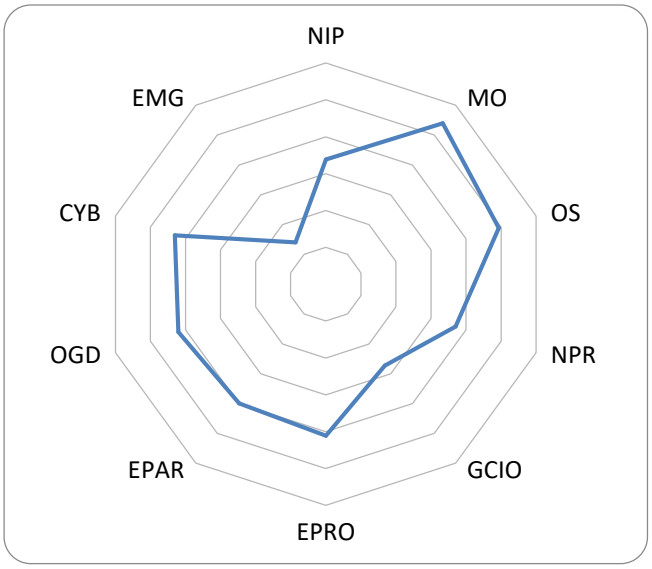
GDP: $36,850

Internet User: 70.48

Wired (Fixed Broadband User): 29.98

Wireless Broadband User: 93.17

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The promotion of people's digital abilities and the establishment of broad and comprehensive digital literacy efforts are crucial in facilitating the digitalization of governmental services and infrastructure, which made the country placed in the 24th position in the Waseda rankings. Anticipated developments include increased allocation of resources towards conventional investments in educational programs, platforms, and infrastructure, with the aim of comprehensively addressing the educational requirements of the populace. In addition to these initiatives, the implementation of the Digital Civil Service, a program involving young volunteers, and the provision of Digital Facilitation Services would facilitate

the acquisition of vital digital competencies by three million individuals, therefore addressing the existing disparity in digital skills.

Italy has seen a significant impact from the COVID-19 pandemic, with a considerable number of fatalities, nearing one thousand, making it the most impacted nation in Europe. The Ministry of Technological Innovation and Digitization (MID) in Italy, in collaboration with the country's digital agency (AGID), has recently introduced a website that aims to present a comprehensive overview of the diverse initiatives implemented by operators, companies, and associations throughout the nation. These initiatives are designed to alleviate the adverse effects of the coronavirus emergency on the general population of Italy. Citizens can register for several benefits, including free digital newspapers, enhanced internet connectivity, and access to e-learning platforms, via the government's Digital Solidarity site. Business entities have the option to enroll to provide these advantages to the public without any cost. Italy has just launched an initiative aimed at urging internet companies and publishers to provide complimentary services that enable remote work and study while also improving the overall well-being of its 60 million inhabitants amidst the ongoing shutdown.

3.2. New Trends

After a new government was elected and a Minister for Technological Innovation and Digital Transition was appointed in 2021, a new version of the Italia Digitale 2026 plan was published. For the MITD Strategy Italia Digitale 2026 to be a success, it must focus on the two intervention areas outlined in the National Recovery and Resilience Plan (NRRP)'s "Mission 1: Digitalization, Innovation, Competitiveness, Culture, and Tourism." The following are examples of intervention areas:

1. Creating Superfast Networks that Can Handle Huge Traffic

2. The Government's Efforts to Adapt to the Information Age

Italia Digitale 2026 has budgeted 13.45 billion euros to fund the eight projects that make up these two programs. In October of 2021 (for the years 2021-2023), the Department of Digital Transformation and AgID released a revised version of their Three-Year Plan for Information and Communications Technology in Government. This new strategy is an important instrument for advancing digital transformation in government agencies throughout the nation. This plan is the natural next step after the first three, with an emphasis on putting those plans' suggestions into action while keeping tabs on the results. The updated plan also includes novel suggestions for the National Recovery and Resilience

Plan (PNRR) and the management of digital transformation goals across all levels of government. The strategy has three main objectives: encouraging an ethical and inclusive development process, spreading new digital technologies across Italy's productive ecosystem, and developing a digital society that emphasizes digital services for persons and enterprises. The provision of public services is also encouraged to become more standardized, innovative, and experimental.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

By keeping all the Public Administration's systems, databases, and applications in safe, cutting-edge data centers, the digital investment guarantees the highest level of dependability and quality control. With these funds, we may either build a state-of-the-art, cloud-based national hybrid infrastructure or validate competing public clouds as safe and scalable. Datasets and applications used by the Italian government will be migrated after the project is finished to improve the security, dependability, efficiency, and processing power of data centers throughout the country.

The 5G Italy plan was developed to efficiently respond to government programs that want to set up networks that can provide cutting-edge, high-capacity mobile services. This proposal complies with State assistance rules and is complementary to the current national 5G network development plan and the coverage duties of mobile radio providers. The goal is to encourage the creation of 5G mobile networks that completely satisfy mobile connection needs, opening the door to the many use cases envisioned by the ITU. The acronyms eMBB, mMTC, and URLLC stand for improved Mobile Broadband, massive Machine Type Communication, and Ultra-Reliable Low Latency Communication, respectively. Two separate but complementary methods are used to accomplish this objective. To begin, mobile base stations in locations where operators have not yet planned fiber backhauling by 2026 will have fiber optic backhauling installed. Second, in places where the mapping exercise predicts downlink speeds by 2026 to be below 30 Mbps during peak hours, new network infrastructures will be created to offer mobile radio services with adequate performance.

SPC Network, Italy's IP national network, uses multi-provider services to link the various central administrative organizations in Italy. All participating network operators use the same AgID-defined pricing list for network services and connect via a single, centralized peering point. Several local administration authorities have voluntarily connected to the SPC Network despite the fact that only

central administration organizations are required to do so. When it comes to digitally communicating with other EU organizations, institutions, and Member States, Italy relies heavily on the Trans European Services for Telematics between Administrations (TESTA) network. This system ensures that all digital communications inside Europe are safe and reliable.

4.2. Management Optimization [MO]

The purpose of the Three-Year Plan for IT in the Public Administration is to establish investment goals for information and communication technology that are congruent with government directives and European objectives. It suggests a paradigm of management that is founded on forward-thinking technology, flexible management, and transparent governance. The strategy prioritizes the promotion of digital transformation, the placement of people and enterprises at the heart of digital service delivery, the promotion of ethical and inclusive growth, and the dissemination of new digital technologies across the Italian productive ecosystem. The National Recovery and Resilience Plan (NRRP) goals were included in the plan when it was modified under the direction of the Agency for Digital Italy (AgID), which is also in charge of the plan.

4.3. Online Service [OS]

Administrative database architecture and integration provide the backbone of government digitization, with the goal of saving citizens and companies time and money. Digital identity and digital domicile will grow in popularity as databases become more interoperable. Through a centralized catalog of Application Programming Interfaces (APIs) shared between federal, state, and local governments, the National Digital Data Platform (PDND) will facilitate the creation of a unified "digital profile" in accordance with the Once-Only principle, thereby guaranteeing the interoperability of information in the public sector. In accordance with EU privacy regulations, the published APIs (eServices) will be made accessible for approved use by public and commercial entities, standardizing service procedures throughout all EU member states. Schema.gov.it, part of the National Data Catalogue for Semantic Interoperability (NDC), will improve eServices' syntactic and semantic compatibility.

The goals of the new national eProcurement system are to consider the new system's complexity, the requirements of the Procurement Code, and the objectives of the NRRP. It is predicated on a body of law, such as EU rules, NRRP benchmarks, and the soon-to-be-enacted amendment of the Italian Procurement Code. The reform mandates the adaptation of eProcurement platforms and encourages the

digitalization of the public contract cycle by establishing new digital procedures. In accordance with the new regulatory framework, the underlying technology will provide fully digital procurement process management. The renewal of procedures and IT infrastructure will be accompanied by upskilling and training efforts for contracting agencies. The reform also requires the competent contracting authority to make purchases beyond a specific threshold and promotes the use of existing buying and negotiating instruments.

4.4. National Portal [NPR]

The acronym ANPR stands for the Italian National Registry of the Resident Population. This registry is a database that collects demographic information on all Italian residents, even those who are residing outside of Italy. Residents of all Italian municipalities are now able to visit the ANPR site to examine and verify the personal information that has been recorded about them in the ANPR database. The purpose of the National Registry Programme is to establish connections across the different national databases to make it possible for public authorities to recycle or trade information with the agreement of users.

The use of electronic filing (eFiling) is made mandatory for prosecutors and judges by Decree No. 13/2023, while Law No. 79/2022 brings modifications to the recruiting procedure for the civil service, including the use of the inPA portal for recruitment purposes. Both pieces of legislation were passed in 2022. On its website, Green Procurement offers free counseling and a variety of informational resources pertaining to green procurement.

4.5. Government CIO [GCIO]

The responsibilities of the Chief Information Officer and the General Counsel are poorly defined. There are no laws or standards governing the chief information officer's role in Italy. In Digital Italy, AGID serves as the major governing authority and is completely autonomous from the Prime Minister's Office. The AGID team offers support and advice to a wide range of public sector organizations and the Italian government. The AGID director made a passing reference to the GCIO role in his speech.

4.6. E-Government Promotion [EPRO]

To maintain compatibility with foundational registries, all levels of government in Italy use the same National Digital Data Platform (Piattaforma Digitale Nazionale Dati - PDND), a centralized library of APIs.

To ensure compliance with EU privacy legislation, both public and private organizations may use the permitted and certified APIs (e-services) that have been made available. All these e-services may communicate with one another in terms of syntax and semantics according to the National Data Catalogue for Semantic Interoperability (NDC). Since June of 2022, the PDND has been available online. While only cities may post to the site at first, regions and autonomous provinces joined the PDND that same December. Digital Public Administration 2026 states that citizens "registered with the central access point to request resources for digital transformation." This means that regions and autonomous provinces may now publish new APIs in the PDND catalog to allow other administrations to access and use their data. There are now 139 entities that are part of the PDND. This number includes eight national governments, 115 local governments, and sixteen Public Service Managing Authorities.

It is anticipated that the project will run from the second quarter of 2021 through the second quarter of 2026. The project has a total budget of EUR 526 million, of which EUR 526 million will be used to promote interoperability services in large central and local public administrations. Bilateral agreements based on defined requirements and targeted requests for information promote this kind of advertising. Several Italian government agencies, such as the INPS, the ANAC (National Anti-corruption Authority), the MUR (Ministry of University and Research), and the Unioncamere (Italian Union of Chambers of Commerce), have inked bilateral agreements with the United States.

4.7. E-Participation [EPAR]

Italy, together with Singapore and Denmark, was the top three countries with the highest scores of this indicator. Public services, digital infrastructure, and public-private partnerships were all given a boost in the introduction of the 2025 National Innovation Plan. The project's overarching objective is to meet the issues posed by the human element of the fourth industrial revolution while also encouraging the development of high-tech businesses such as robots, smart mobility, artificial intelligence, and cybersecurity.

Interoperability between public and information systems throughout the European Union is a top priority for the Agency for Digital Italy. The Agency's goal is to guarantee the technical consistency of public information systems that are useful to both users and companies by assuring their smooth integration throughout Europe. The Agency also promotes Italian involvement in digital projects at the national and European levels. As well as fostering alignment of activities and optimizing resources, the

new measures, including open government culture, corruption prevention, simplification, digital services, digital citizenship, and skills, demonstrate the maturity of current government procedures.

The third Action Plan strives to increase government investment transparency via the expansion and strengthening of programs such as Soldipubbici, OpenCoesione, ItaliaSicura, and Opencantieri. Corruption prevention and digital rights protection are two areas where local governments play an important role.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

The Italian government has developed a cutting-edge online platform called Digital PA 2026 (PA digitale 2026). They may now handle all NRRP (National Recovery and Resilience Plan) funded projects, as well as submit bids for them. The system is meant to streamline the process of keeping tabs on RFPs and performing automatic technical and formal reviews of projects. Digital PA 2026 can do this by importing data from other sources and performing automated verification. To help Italian government agencies on their way to delivering all mandatory services digitally by 2026, Digital PA 2026 facilitates their use of NRRP funds for digital transformation. More than 80% of all public agencies are now represented on the platform, which boasts more than 18,000. In addition, over 65,000 responses have been submitted to 26 public bids made possible by the platform.

Italy announced its 5th National Action Plan for Open Government in February 2022. As a result of a collaborative effort between the government and the people, this revised plan incorporates their top objectives. The plan's nine pledges cover a wide range of open government initiatives, such as creating a strategy and framework for open government, combating corruption, encouraging citizen participation, reaching out to women and young people, and fostering technological advancements.

While initiatives like integrity and transparency networks, protections for whistleblowers, and advocacy for open standards were developed in previous action plans and will continue to be relevant in the fifth national action plan, the new initiatives included there did not arise directly from the fourth national action plan's pledges.

4.9. Cybersecurity [CYB]

The National Agency for Cybersecurity (Agenzia per la cybersicurezza nazionale) was officially established with the passing of Decree No. 82 on June 14, 2021. This organization has been given the responsibility of protecting the nation's cyber interests, with an emphasis on strengthening cyber

defenses. The Agency has full authority over all financial decisions, including the formulation of its budget, the establishment of its regulatory framework, the design of its administrative and organizational structure, and the maintenance of its accounting standards. Visit https://www.acn.gov.it/ for further details.

Decree No. 82 also resulted in the creation of the Inter-ministerial Committee on Cybersecurity, or the Comitato interministeriale per la cybersicurezza, with the aim of further strengthening cybersecurity measures. To keep the country's digital security intact, this committee is an essential advisory body that is tasked with offering expert advice, proposing policy changes, and debating cybersecurity issues.

The DTD (Digital Transformation Department) and the National Agency for Cybersecurity released Cloud Italia, the Italian Cloud Strategy, in September 2021. This all-encompassing plan details the measures that must be taken for public agencies, down to the municipal level, to make a seamless transition to cloud-based infrastructure. The lofty objective is to have 75% of Italian government agencies completely connected to the cloud by 2026. The approach aims to solve persistent problems in the Italian government by promoting the use of data processing infrastructures that are all the above. At the heart of the plan is determining whether public, hybrid, or private cloud deployment is the best option for protecting the different kinds of public data and services.

4.10. The use of Emerging ICT [EMG]

The Italian government has unveiled its Artificial Intelligence (AI) Strategic Program for the years 2022–2024. The goals of the initiative are to increase the availability of PhDs and recruit top academics, to improve the environment for AI study, and to increase the usage of AI in business and government. The National Strategic Pole (PSN) is a dependable infrastructure that will be built in Italy to centralize all government agencies' data centers and information technology systems. This strategy was unveiled in September 2021 as part of Italy's Cloud Strategy. By 2026, it is expected that 75% of Italian government agencies will have used cloud computing. The Agency for National Cybersecurity's categorization of data and the movement of data and services to the cloud are two other pillars of the Cloud Italia Strategy, which also relies on the PSN.

With the goal of providing a competitive, regulatory framework, increasing investments in blockchain and related technologies, fostering interaction with the public administration, promoting European and international cooperation, and easing the transition to circular economy models, the United States is in

the process of developing a National Strategy on Blockchain and Distributed Ledger. Blockchain initiatives, such as those aimed at bolstering musical content and copyright protection, are being implemented thanks to the 'House of the Emerging Technologies' program, which was created by the Italian Ministry for Industries and Made in Italy. The audiovisual sector has held workshops to educate professionals on blockchain technology and Non-fungible Tokens (NFTs). Italian businesses will be given a helping hand in creating blockchain-based Metaverse apps via the preparation of funding requests.

Iceland

1. General Information

Area: 103,000 km^2

Population: 375,318

Government Type: republic

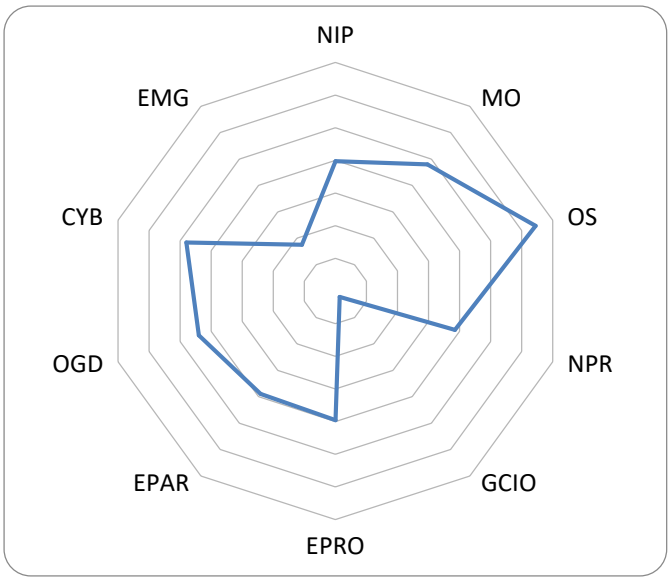
GDP: $78,536

Internet User: 99.69

Wired (Fixed Broadband User): 38.65

Wireless Broadband User: 119.47

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

When it comes to developing new ways to enhance public services and encourage citizen engagement, Iceland has been in the forefront. This year, the country was placed in the 25th position in the Waseda rankings. To better serve its citizens, the government has gone digital, taking advantage of the country's widespread access to the internet and robust technical infrastructure. The sland.is program is a cornerstone of Iceland's digital government growth. Citizens may access several different online government services via one centralized location at island.is. It's a safe and convenient way to do

business with the government, whether you need to apply for a passport, update your driver's license, or sign up for healthcare.

In addition to making government services more accessible, Iceland has prioritized expanding online opportunities for citizens to weigh in on policy matters. The Better Reykjavk platform is only one example of the many e-democracy tools that have been introduced in Iceland to give residents a voice in policy decisions that impact their neighborhoods. The platform has been effective in attracting the attention of the public and giving them a voice in policymaking. Data-driven governance is also highly valued in Iceland, where analytics are used to better influence policy decisions and enhance service delivery. To maintain the safety and accessibility of sensitive government information, the nation has set up the Data Embassy, a secure data center in a different country. This method not only makes it easier to share information and work with foreign partners, but it also improves data security.

Iceland has also achieved great strides in digital identification. Citizens may now use their safe and unique digital identities to access internet services thanks to the country's national digital identification system, dubbed the jóskrá. This digital identification system has been crucial in streamlining government operations and cutting down on red tape. The goal of digitizing Iceland's government has been to boost productivity in areas such as public service delivery, citizen engagement, and resource allocation. When it comes to digital transformation and making government more accessible and responsive, the country has set an example for other countries to follow.

3.2. New Trends

Plans for Iceland's further advancement of its digital government is ambitious. One of Iceland's main goals is to enhance the quality of the digital services it offers to its citizens by increasing the number of these services and making them easier to use. This involves reducing red tape, increasing the number of online government services, and guaranteeing compatibility amongst all available channels. With the use of data analytics and artificial intelligence, Iceland hopes to better inform policy decisions and enhance service delivery. The government's goal in collecting and analyzing data is to improve decision-making, spot trends, and learn more about its constituents.

Iceland understands the need of strong cybersecurity measures and data protection as the use of digital government services becomes more widespread. The government intends to reduce cyber risks and secure people' data by continually improving its cybersecurity infrastructure, investing in cutting-edge

technology, and strengthening relationships with foreign organizations. The country is dedicated to promoting digital inclusion and accessibility by making government services available online to all residents. Individuals who may encounter challenges to digital inclusion, such as the elderly or those with disabilities, will get training and assistance from the government to close any digital gap that may exist.

To improve the openness, safety, and efficacy of many government operations, Iceland is looking at blockchain technology. Blockchain applications like property registration and supply chain management are being actively researched and tested by the government to increase trust and expedite processes. Persistent citizen participation: Iceland's goal is to increase digital channels for public input into government decision-making. The administration intends to increase current e-democracy platforms and investigate new technologies that encourage people participation in policymaking. Improvements in service delivery, adoption of cutting-edge tech, security, accessibility, and public participation are at the heart of Iceland's vision for the future of its digital government. Iceland's goal is to build a government that is responsive, efficient, and citizen-centric by being technologically cutting-edge.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Investments in Iceland's network infrastructure have ensured the country is ready for the digital era. The country's digital government projects and other connection and communication features rely heavily on the state-of-the-art network infrastructure that supports them. The availability of fast internet is an important part of Iceland's readiness for the future of its network infrastructure. There is a very high proportion of the population that has access to high-speed, reliable internet connections, giving the nation one of the highest internet penetration rates in the world. Citizen access to online government services, participation in e-democracy platforms, and other digital activities are facilitated by the ubiquitous nature of internet connection.

Iceland has also made significant investments in building up its advanced communications infrastructure. High-speed, consistently available communication services are available across the country thanks to a nationwide fiber optic network. Supporting digital government services and easing communication between government departments and people is impossible without this network

infrastructure. Iceland has made investments in data centers and cloud infrastructure in addition to its telecommunications network. To guarantee the accessibility and safety of vital government data, the nation has created secure and cutting-edge data centers, such as the Data Embassy. Supporting the digital government ecosystem, these data centers provide streamlined data storage, processing, and sharing.

Moreover, Iceland has taken action to guarantee the robustness and redundancy of its networks. Multiple ISPs and redundant systems have been set up around the nation to ensure that network uptime is maximized, and interruptions are kept to a minimum. The protection of network infrastructure from cyberattacks and natural catastrophes necessitates this level of readiness. The adequacy of Iceland's network infrastructure shows the country's dedication to digital transformation and the value it places on safe and secure connections. The nation has created a solid groundwork for its digital government growth and overall connectivity requirements with its investments in high-speed internet, telecommunications, data centers, and network redundancy.

4.2. Management Optimization [MO]

To increase patents and trademarks in the information and communications technology (ICT) sector and boost technology exports, Iceland must increase its inventive capabilities. The substantial significance played by the tourism sector in the Icelandic economy, despite its relatively low technological intensity and the presence of small and medium-sized firms (SMEs), who are less eager to innovate than bigger equivalents, are to blame. Increasing innovation, especially in the ICT-enabled (digital) sector, is essential in today's increasingly digitalized world to maintain a varied economy and guarantee dependable performance.

Iceland will need to give strong support for commercial R&D in the future if it is to build on its previous accomplishments. It is critical that we maximize the benefits of technological progress. GDP growth in sectors with high and medium levels of digital intensity is below the OECD average. Consequently, Iceland must zero in on innovation sweet spots, embracing cutting-edge technologies to fuel growth. This can only be accomplished by strengthening the private sector's enabling foundation for innovation. Furthering digital governance is a chance for the public sector to create a good societal effect. Having ready access to a pool of brilliant people is vital for fostering greater innovation and maintaining competitiveness in the digital era. To maximize the effect of scientific findings, improved

communication between the research community and the corporate sector is crucial. Building on a solid basis of international cooperation in research may considerably enhance the dissemination of information. The government's innovation strategy tackles many of these issues already, but more change is needed to ensure steady improvement.

4.3. Online Service [OS]

By using its national electronic identification infrastructure, Iceland is contributing to the Nordic-Baltic cooperation effort known as NOBID. The project's goal is to make it possible to use national eID cards to get access to digital services regardless of location or border. Sweden and Norway both employ a technology called TendSign for electronic procurement, whereas Rikiskaup in Iceland has established an XML-based electronic ordering system. In the context of the IcePro forum, the Financial Management Authority works in conjunction with the Confederation of Icelandic Enterprises to cooperate on the discussion of electronic commerce technology. The eIDAS Regulation has been enacted into Icelandic legislation thanks to Iceland's transposition of the regulation, which guarantees the safety of electronic identity and transactions.

4.4. National Portal [NPR]

In Iceland, residents may access their personal data and use self-service tools safely and conveniently via the Island.is site. The portal provides a plethora of services, and effective search tools make it simple for users to get the information they want. It's also a toolkit, including features like universal two-factor authentication and digital delivery and distribution of documents. The Open Data Portal's goal is to increase the availability of open data by implementing data interchange layers and an API gateway service portal, while the Governmental Portal connects visitors to all Icelandic ministries. A national open data plan is now being developed by the government.

4.5. Government CIO [GCIO]

Because there is no specific role for a Chief Information Officer (CIO) in Iceland, the Ministry of the Interior is in responsibility of overseeing the all-encompassing development of information technology throughout the nation. This is since there is no specialized CIO job in Iceland. As a result of Nordal Lof's recent promotion to the position of Minister of the Interior, she is now in charge of advancing Iceland's information and communications technology (ICT) infrastructure and electronic services, guaranteeing their ongoing growth and improvement.

4.6. E-Government Promotion [EPRO]

Iceland has undergone many external shocks, highlighting the necessity to diversify its economy. This effort should focus on competitiveness, innovation, and resource reallocation. Relaxing company rules and removing constraints on new and young enterprises may boost efficiency and development. There is space to increase digital penetration in manufacturing processes and raise the economy's innovation potential by supporting R&D and making it simpler for small enterprises to get financing. R&D investment is rising, which is positive. Innovation requires improving educational outcomes and addressing labor market skill gaps.

Iceland's coalition government, which entered power in October 2021, emphasizes digital transformation and data use:

• The government wants Iceland to lead digital services globally. Digital solutions are used to streamline public governance, enhance (digital) public services, boost transparency, and access to information.

• Public data processing, storage, mediation, usage, and reuse will be improved and made more accessible via coordinated initiatives.

• Digital Iceland's key digital goods, offered to governmental institutions and individuals and the commercial sector through Island.is, will be prioritized.

• The administration plans to employ innovation more to tackle public sector problems. Public authorities will collaborate with start-ups to identify and develop cost-effective solutions to the sector's problems. The government's 2023-2028 medium-term budget plan details specific initiatives. These acts are linked to this chapter's strategy and policies.

4.7. E-Participation [EPAR]

A key step forward was taken when, in the spring of 2012, the government gave its assent to the Information Act, and on January 1 of the following year, it became fully operational. It is of the utmost significance to preserve essential rights, such as the access to information and the ability to express oneself freely. It is equally important for the people and the media to have the power to function as a check and balance on the authority of the government. This piece of law applies to private companies that operate within the federal government's purview and covers all activities that are carried out by the federal government. With the passage of Act 140/2012, the scope of the Information Act was enlarged

to encompass municipalities with a population of one thousand people or less. This ensures greater access to information and more openness on the municipal level. The government acknowledges the relevance of this law in protecting democratic ideals and contributing to the development of an educated society.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

People living in the modern day may take use of a wide variety of private companies enhanced digital offerings. It is critical for leaders to improve their digital government transformation efforts to guarantee that governments can recruit the competent personnel essential to sustain effective digital government operations. Digital Iceland has been a leading force in recent years, propelling this shift through supporting the work of Icelandic institutions. Putting money into digital projects has enhanced government services and increased revenue. The Icelandic government is dedicated to fostering a culture where citizens primarily interact with government agencies via digital channels. Digital Iceland is a government-wide effort administered by the Ministry of Finance and Economic Affairs, with this goal at its center.

Iceland is lagging farther behind other developed countries in terms of open data access. Iceland has not yet formed a formal strategy in this area. Data consumption and value creation from using the OPingogn.is Service Portal is poorly understood. The distribution of open data for implementation does not, however, encounter any legal barriers in Iceland at the present time. Straumurinn (X-Road), a data interchange layer, and Data Pool, an API gateway service portal, will be built to streamline communication between customers and businesses. The government's efforts in this area will be front and center in the national strategy for creating open government data. Safekeeping, processing, and mediation of public sector data necessitate data classification. It's also a big deal for facilitating the efficient sharing of information across governments, businesses, and individuals. The publication of the categorization in 2022 has implications for the government's use of cloud services in both obvious and subtle ways.

4.9. Cybersecurity [CYB]

The Cybersecurity Act No. 78/2019 was passed in June by the Icelandic Parliament with the backing of the NIS. As of September 1, 2020, this new law will replace Iceland's existing cybersecurity law, which was enacted in 2015. The Cybersecurity Council wanted to make sure the new Cybersecurity

Strategy and Action Plan was successful, so it looked for a legal foundation for it. The first Icelandic cybersecurity strategy, covering the years 2015–2026, was presented to the government and parliament in 2015. The policy and accompanying action plan are under the purview of the Cybersecurity Council (CSC), which provides a useful forum for communication and coordination among government officials and ministers with responsibility for cybersecurity.

The program also formed the Cybersecurity Forum to further encourage cooperation between the public and business sectors. New rules place more stringent requirements on Iceland's cybersecurity, communications, postal services, and registration initiatives. With the present cybersecurity plan in place only until 2033, the government wanted to come up with a new plan to protect its digital infrastructure. The Cybersecurity Council, charged with carrying out the strategy and action plan, was established after a legislative resolution with strict deadlines was passed. This program is unrivaled in its ability to foster collaboration and information sharing across departments and agencies in the face of cyber threats. The Cybersecurity Forum is an independent organization that helps public and commercial entities work together to address cybersecurity issues.

The government released a new national Cybersecurity Strategy in February 2022, and it covers the years 2022 through 2037. The plan's key goals are to improve cybersecurity expertise and infrastructure deployment and to establish a secure digital space. Public education, training, research, development, and international collaboration shall be emphasized to bolster knowledge and skills. The capacity to prevent, react to, and mitigate the effects of cyberattacks may be enhanced using state-of-the-art technology and solutions. Strong law enforcement and a legislative framework consistent with international norms, with an emphasis on safeguarding minors online, are necessary for ensuring a secure online environment. The policy will also improve the capacity to react to security threats and boost defensive capabilities, as well as strengthen security planning, risk analysis, and the resilience of key infrastructure. An accompanying action plan was unveiled in the first half of 2022 to support the strategy. To realize the strategy's goals, the Ministry of Higher Education, Science, and Innovation will work with other relevant ministries and stakeholders to develop action plans. Additionally, the ministry will track and report on the overall development of the action plan's implementation.

4.10. The use of Emerging ICT [EMG]

The study shows that Iceland is prepared to deal with AI research, development, and deployment. The government should establish an AI strategy that safeguards citizens' civil liberties and advances the

economy. The government should operate in accordance with these principles to maximize its effectiveness in serving the people: The development and deployment of AI should promote fairness and openness in communication and decision-making while supporting societal concepts like human rights and democracy. The accountability and reliability of AI-integrated systems are dependent on inspectors keeping a close eye on them. This is very necessary for the development, maintenance, and administration of such structures.

To establish Iceland as a worldwide leader in the supply of digital services, the government unveiled the Cloud Computing Strategy on June 27 of that year, 2022. The strategy's primary goal is to standardize the adoption and use of cloud-based services across government agencies. Coordination is essential for efficiency and security as more and more government agencies use cloud-based services. The need for speedy and reliable digital services is on the rise, and cloud solutions that speed up the supply of infrastructure and IT support are helping to meet this need. Artificial intelligence and more in-depth data analysis are only two examples of the possibilities made possible by cloud services. A Dynamic Purchasing System (DPS) was launched by the Central Public Procurement Agency in early 2022 to facilitate the purchase of cloud services.

The Prime Minister established a committee to oversee the government's digital transformation, and that group reported its progress and made recommendations in February 2019. The paper praised Iceland for its confidence in government authorities and its technologically proficient institutions, two factors that are beneficial to AI research and development. Respect for moral values, fairness in communication and decision-making, promotion of responsible and trustworthy AI solutions, and security in AI systems should all inform the government's development of an AI policy that protects the rights and freedoms of citizens. The proposal for 2022's budget allocates funds to local volunteers to create an Icelandic translation of the AI course offered at the University of Helsinki.

In addition, with the blessing of the country's leader, Iceland has formed a partnership with OpenAI to use GPT-4 to safeguard the Icelandic language and transform a defensive stance into an innovative one. The goal of this collaboration is to increase GPT-4's functionality and develop tools that can be used to ensure the survival of other languages with little available resources.

Indonesia

1. General Information

Area: 1,904,569 km^2

Population: 277,534,122

Government Type: republic

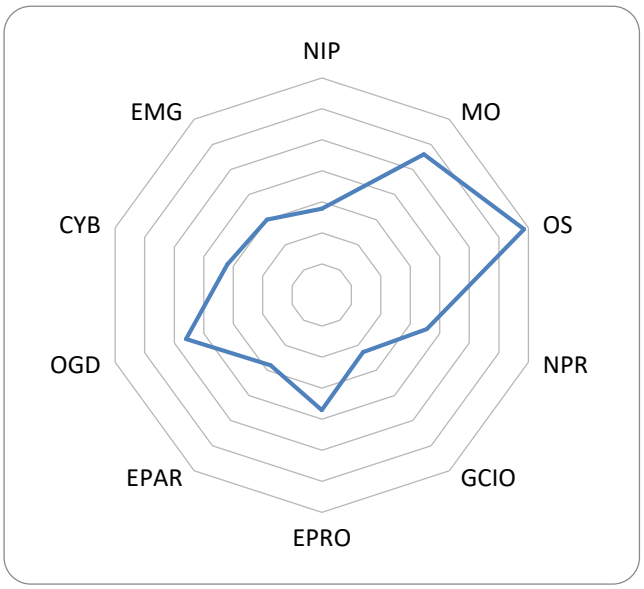
GDP: $5,083

Internet User: 62.10

Wired (Fixed Broadband User): 4.54

Wireless Broadband User: 114.81

2. Digital Government Overview in Country



3. Digital Government Development and new trends

3.1. The development

The government of Indonesia has launched a number of digital platforms and apps to increase the ease with which its citizens may access government services. And this year, the country was ranked 23rd in the rankings. The e-Tax system, for instance, facilitates the electronic filing of tax returns by people, while the e-Court system provides for the electronic administration of court cases and the electronic retrieval of court records. In addition, the e-budgeting system has been released, which will allow citizens to track government spending and allocations in real-time.

The government of Indonesia has taken a number of steps to improve government effectiveness. The government has implemented the e-procurement system to cut down on waste and corruption in the procurement process. The e-licensing system streamlines the licensing process by letting firms apply for licenses online. The e-office system, which facilitates digital document management and cooperation between government departments, has also been deployed by the government.

The government of Indonesia has developed many online venues to increase public engagement. Citizens may have their petitions heard and answered by the government thanks to the e-petition system. Citizens may lodge complaints and monitor their processing using the e-complaint system. The government has also launched the e-participation platform, which serves as a forum for residents to weigh in on policy decisions through online polls and focus groups.

Despite these attempts, digital government growth in Indonesia still faces obstacles. There is a need for capacity development among government personnel, and there is restricted internet connection in certain locations. However, the Indonesian government is still dedicated to developing digital government development to boost good governance and public service delivery.

3.2. New Trends

Plans for further improving public service delivery and promoting good governance via digital transformation have been laid forth by the Indonesian government. Connectivity upgrades, data-driven governance enhancements, adoption of new technologies, cybersecurity guarantees, transparency campaigns, and the cultivation of digital skills are all part of the long-term vision for digital transformation. These efforts are driven by a desire to improve public services via the use of technology while also making government more accessible and responsive to citizens.

- The government is investing in digital infrastructure to boost internet connection and increase broadband access nationwide, especially in underserved regions. This will allow more people to use government services online and take part in the online economy.
- Government wants to provide a safe and reliable authentication system for residents using digital identities to access online government services. As a result, service delivery fraud will be reduced, and efficiency will increase.

- Government that uses data to make decisions has announced intentions to create a robust data governance structure. To facilitate evidence-based policymaking and enhance service delivery, government entities must collect, store, analyze, and share data.
- Artificial intelligence (AI) and automation: The Indonesian government wants to use these tools to improve efficiency and effectiveness in government operations. Implementing chatbots for citizen questions and automating mundane jobs are two examples of this.
- To better secure residents' data and guarantee privacy, the government is planning to increase its cybersecurity measures. Building strong cybersecurity frameworks, raising cybersecurity awareness, and enforcing data privacy legislation are all part of this.
- The government is working to open and make more visible all official data. Government datasets should be made publicly available online, open data efforts should be supported, and citizens should be encouraged to participate in data analysis and use.
- The government acknowledges that individuals and government personnel alike need to improve their digital literacy and abilities. This involves establishing programs to teach people to use digital tools, encouraging people to start businesses online, and building relationships between businesses and educational institutions.
- The government intends to work with commercial firms, civil society groups, and foreign partners to advance digital transformation efforts, which brings us to point number eight: collaboration and partnerships. This involves collaborating on the advancement of digital governance by exchanging ideas, combining forces, and pooling resources.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Indonesia has invested much in its digital infrastructure, and the Ministry of Communications and Information Technology is dedicated to maintaining that infrastructure's high standards. To keep tabs on public complaints about service interruptions and evaluate QoS and QoE in all 514 provinces and cities, the Ministry has finished building a Telecommunication Monitoring Center. The activities stated in the Digital Indonesia Roadmap will be carried out by the Ministry with the aim of enhancing the

country's current telecommunications infrastructure. The Ministry's key emphasis in 2022 will be on completing the final mile of the backbone layer's growth.

The lack of funding has been cited as a significant barrier to expanding digital infrastructure in the 3T region (underdeveloped, outermost, and underdeveloped) that was identified in the 2022 development study. Because of this novel integrated financing strategy, the Ministry has made great strides forward.

4.2. Management Optimization [MO]

Indonesia has recognized the vast opportunities presented by digital technology, and its leaders have developed the Indonesia Digital Roadmap 2021-2024, a comprehensive plan to speed up the country's digital transformation in line with the government's goal. The Ministry of Human Resources' Research and Development division is making strides to encourage and equip people with digital potential in all parts of the world to seize the boundless opportunities that lie ahead.

To that end, the Ministry of Public Works and Housing has finished building the Palapa Ring, a massive network that stretches for 12,229 kilometers and connects 57 districts throughout Indonesia. The Ministry of Communications and Information Technology has lofty goals for the future, including the deployment of a constellation of innovative satellites. The Indonesia Raya Satellite, or SATRIA 1, is first in line because of its tremendous bandwidth of 150 Gbps. Based on this achievement, SATRIA 2 will be put into service with a total capacity of 300 Gbps, and then SATRIA 3 will be unveiled, demonstrating an unprecedented ability of 500 Gbps. These impressive projects are geared on making sure that all public services may connect to the internet quickly and easily through widespread Wi-Fi. In addition, the 3T areas, which are defined as "outermost," "remote," and "underdeveloped" by the Telecommunication and Information Accessibility Agency (BAKTI), will have a formidable network of 7,904 Base Transceiver Stations (BTS) built by the agency with great care and attention to detail.

4.3. Online Service [OS]

Even while other kinds of digital payment are widely used in Indonesia, credit card use is limited. In terms of market share, GoPAY was the most popular electronic wallet, followed by Ovo, Dana, and LinkAja. Electronic wallets are most often used for purchases in the following industries: online transportation, online food and beverage, and offline food and beverage. Incentives in the form of money or points for taking part in marketing campaigns are now the norm rather than the exception. Tokopedia is the most popular online marketplace in Indonesia because it makes it easy to open and run

an online store. In addition, Shopee is a major participant in the market, particularly in nations where "mobile first" is the norm. In its most basic form, it is a multi-vendor online store that is optimized for mobile users and provides the usual web buying experience.

Bukalapak, like Shopee, is an e-commerce center where people from all over the world can meet and do business online. Bukalapak places an emphasis on the swiftness and dependability of online trading for the sake of its consumers' safety and convenience. In place of a genuine, physical account, virtual accounts may be utilized for transactions temporarily. Each time a consumer makes a purchase, they are assigned a unique account number (or VA number). A personal, customizable, and secure virtual account is created for each consumer.

From the perspective of the client, a virtual account is preferable since it saves time and eliminates the need to register the sender's account number. In contrast, while conducting an interbank transfer, we must first register the receiving bank's account number. The virtual account also benefits the seller or merchant by removing the need for human validation. To streamline the identification process, firms may assign a predetermined payment amount and use type to each virtual account. With a virtual account, businesses need not repeatedly verify customers' payment information.

Due to the large number of people in Indonesia who still don't have bank accounts, e-wallets have become more common in recent years. Otoritas Jasa Keuangan (OJK), Indonesia's Financial Services Authority, reports that 36 percent of the country's population does not have a bank account. Even when compared to neighboring nations like Malaysia and Thailand, where the unbanked population is 8% and 18%, respectively, this percentage is quite high. What traditional banks lacked, e-wallets sought to rectify with a simpler sign-up procedure that required just a user's phone number for access to the service's most fundamental functions, such as making purchases from a variety of online and offline retailers.

4.4. National Portal [NPR]

The National Portal of the Republic of Indonesia, which can be found at Indonesia.go.id, is a website that is recognized and supported by the Indonesian government. This all-encompassing platform provides a wide-ranging picture of the country by offering information on the leaders of the government, legislative and regulatory organizations, updates on new projects, public service announcements, as

well as news and statistical data. It is essential to take into consideration the fact that assistance is only provided in the Indonesian language.

4.5. Government CIO [GCIO]

The President of Indonesia must designate a Chief Information Officer (CIO) for each government agency. To guarantee the smooth running of national digital projects, these CIOs work together with their colleagues in other ministries and businesses, as well as other C-level executives in the field of information technology. The appointment of a Chief Information Officer (CIO) to coordinate the government's technical goals across agencies has been mandated by President Joko Widodo. This presidential order's stated goal is to bring together government CIOs, private sector organizations, and government ministries to unify their respective technical infrastructures. It is crucial that all branches of government work together and embrace the same electronic services to effectively execute a national unified e-governance system.

4.6. E-Government Promotion [EPRO]

To implement Public Service Law No. 25/2009, the Republic of Indonesia has recently set up the Public Service Information System. However, it provides just the most fundamental data. Our long-term goal is to transform this data hub into a fully featured national site with a suite of interconnected e-services for the public. Each level of government in this country will have its own section of this national site. Education, business and employment, housing, communication, the environment, health, social insurance, tourism, and other vital areas will all be represented on the various portals. This portal's development might be done on a regional or industry basis. There must be direct interventions and regulations put in place to consolidate the many different e-services already being offered by the many different central and local government organizations in Indonesia.

The establishment of this portal also necessitates the adoption of a number of strategic initiatives. The creation of the gateway represents a major turning point. According to the National Medium-Term Development Plan 2020-2024, the government of Indonesia has invested around Rp 11 billion over the course of five years to create this site. The site will offer a central location where people can go to learn about and make use of the many digital government services available to them. The One-Stop Integrated Service (PTSP) and the Public Service Hall (MPP) will benefit from the integration of e-services. Before

2025, we want to have established a national site for e-services that people may use from any internet-connected device, no matter the time of day.

4.7. E-Participation [EPAR]

The country has considered several elements, and as a consequence, e-government programs have emerged that are compatible with a variety of smartphones and tablets. These creative applications have become quite popular among today's youth because they allow them to interact in the digital world even when basic facilities are not available. Establishing an online presence via the development of official websites has become the norm for governmental agencies, providing a medium for citizens to easily engage with them. Residents of Indonesia may use specialized e-participation sites like lapor.go.id to air their complaints and suggestions to the government. The Presidential Task Force, which has connections to every department in the federal government, is responsible for ensuring the website's continued operation and functioning.

4.8. Digital Transformation [DX] and Open Government Data [OGD]

Indonesia's present economic expansion is being fueled by the country's ongoing digital revolution. There is a virtuous cycle of innovation that grows the digital industry and benefits the economy. Understanding and navigating the regulatory environment is vital for navigating this cycle. The health of a country's economy, including its financial and investment sectors, is directly tied to the rate at which its population adopt and use various forms of digital service and process. Therefore, the major goal of the regulatory framework is to encourage a positive feedback loop.

The National Action Plan (NAP) is a political document in Indonesia that lays out the framework for a more transparent administration. Funding for the NAP has been pledged by several government departments and non-profit organizations. Detailed goals have been set for each individual to guarantee responsibility. "Clean, Effective, and Reliable Government Management" is the stated goal of the Open Government Indonesia National Action Plan, which seeks to accomplish this via increasing political stability and bettering public services. In addition to being in line with global initiatives like the Sustainable Development Goals (SDGs), this is essential for maintaining economic growth.

The Open Government Indonesia National Action Plan was established as a reaction to the COVID-19 pandemic, with a particular emphasis on post-pandemic recovery measures. Better public services, less corruption, more open budgets, better access to justice, and more gender-sensitive policies are all

feasible long-term goals. Initiating digital transformation as part of the 100 Smart Cities Movement is mostly the responsibility of the government. Smart governance is the result of the Indonesian government's push to digitize its operations in areas including public services, infrastructure, and commerce, often in collaboration with private sector firms. To effectively implement digital transformation and build smart cities, public and private organizations must work together. Academic institutions, businesses, government agencies, and others worked together to bring the smart city idea to life in Bandung, as just one example. Businesses in the technological and infrastructure sectors stand to benefit the most from this.

Integrated sensors, digital public safety systems, and data-collecting technologies are all essential components of a smart city's technical infrastructure, as is the participation of technology firms in planning and monitoring operations. The government's interest in forming collaborations with private companies of this kind suggests that Indonesia may emerge as a center of digital innovation in the near future.

4.9. Cybersecurity [CYB]

Recent shifts in Indonesian policy reflect an increasing awareness of the need for robust regulatory and legal responses to cyberattacks on important national infrastructure. Australia's security services may be able to help Indonesia improve its network defenses. The National Cyber and Crypto Agency (also known as the "State Cyber and Signal Agency") of Indonesia was recently given a boost in authority according to an executive order from President Joko Widodo. This directive followed a cyberattack that had happened earlier that day. Per Presidential Decree 28/2021, BSSN reports directly to the president, giving it more autonomy and sway than is possible under the traditional ministry system. Standards for "national security," "sovereignty," and "data protection" will improve, as will the efficacy and efficiency of BSSN. A national cybersecurity strategy for 2020–2024, a decree on domestic cyber crisis management, and a decree on the significance of important information infrastructure throughout the country will all be released concurrently in response to the BSSN directive. To improve its geopolitical and economic competitiveness and to further develop, safeguard, and employ cyberspace to fulfill national goals, Indonesia has issued a series of decrees.

In response to a cyber assault, Indonesia's president issued an executive order on April 13 aimed at bolstering the National Cyber and Crypto Agency (commonly known as BSSN). To better protect

national security, sovereignty, and personal information, BSSN will now report directly to the president thanks to this decree. There will also be a simultaneous publication of three decrees that highlight the significance of key information infrastructure, manage domestic cyber emergencies, and concentrate on the national cybersecurity strategy. These steps will help Indonesia become more competitive and give the country a leg up in its use of cyberspace for national development and security.

4.10. The use of Emerging ICT [EMG]

Incredible development and progress are being seen in Indonesia's digital innovation sector. Indonesia has the world's fourth-largest population, with 264.2 million people. By 2025, with an estimated internet penetration rate of 64.8%, the digital economy is predicted to produce annual revenues of US$133 billion. 96% of Indonesian internet users have at least one smartphone, making it the primary device for accessing the web.

Indonesia has the most internet users and the biggest economy in ASEAN, so it's no surprise that the startup scene there is robust and varied. This is mostly due to the 215 million internet users in the nation. Google and Temasek predict that Indonesia's internet economy will develop at a pace of 49 percent per year from 2015 through 2025, reaching US$130 billion. It was predicted to be worth $40 billion in 2019 and over 45% of the whole ASEAN digital economy by 2025.

E-commerce, digital health, finance, and educational technology are just a few examples of the fast-growing areas within the digital economy. It also acts as a catalyst for change in more established industries including banking, telecoms, agribusiness, logistics, retail, NRM, and public service delivery. The contributions of several accelerator and incubator programs, co-working spaces, and VCs have made this development feasible. Opportunities for new developments and expansion in Indonesia's digital economy abound thanks to the robust ecosystem.

6. Top 10 country Ranking evaluated by 10 Sectoral Indicators

① Level of network infrastructure

Regarding enrichment of " Network and Infrastructure", three sub-indicators are used to evaluate this sector of digital government. Internet users are an important sub-index for evaluating a country's online application services. The development and popularization of wireless broadband, especially 5G, has become mainstream. Infrastructure platform has already been developed and applied in many countries. This will greatly help ICT developing countries in terms of increasing high-speed connectivity, evolving broadband infrastructure, and adopting and advancing digital government strategies and implementation which can narrow the digital divide between ICT developed and developing countries.

In 2023, Switzerland takes the top spot. The second and following countries are Denmark, South Korea, Norway, and Iceland. It seems that European countries are doing well.

Table: Network infrastructure

#	Country	Score NIP
1	Switzerland	8.1186
2	Denmark	8.1172
3	South Korea	8.0613
4	Norway	8.0348
5	Iceland	7.9445
6	United Arab Emirates	7.9384
7	England	7.9303
8	Netherlands	7.8520
9	France	7.8284
10	Hong Kong	7.7419

② Contribution to administrative reform and optimization of administrative management

"Optimization of government operations" is an important indicator of digital government rankings, which indicates the government's optimal actions in the operation and implementation of digital

government. It will be evaluated through project implementation and ICT application development strategies. Several governments apply new technologies that are optimal for promoting online services. Digital policy and system architecture settings are also factors for all governments to consider moving to ideal digital model. This indicator assesses the use of ICT to improve government operations and internal processes (the back office of each organization). Government management optimization is an important indicator of digital government development as it relates to optimization progress, integrated enterprise architecture (EA), and government budget management systems. This year, Denmark, South Korea, Estonia, Ireland, and Canada tied for first place. Denmark continues to hold on to its number one spot from last year. Saudi Arabia this time is doing well in 8th place.

Table: Government reform and optimization of administrative management

#	Country	Score MO
1	Denmark	12.0000
1	South Korea	12.0000
1	Estonia	12.0000
1	Ireland	12.0000
1	Canada	12.0000
6	USA	11.6000
6	Singapore	11.6000
8	England	11.2000
8	Netherlands	11.2000
8	Saudi Arabia	11.2000
8	Sweden	11.2000

③ Progress of various online applications and services

The advancement of various online applications and services is also an important indicator of the development of digital government. The outcomes of Digital government include e-services, or products/services that governments provide to citizens and businesses positioning e-services as the interface of digital government. A nation's growth as a digital government is measured by the increase in online services and the level of services (information, downloads, transactions, electronic payments, etc.). This digital government ranking survey currently evaluates five major online services, including e-procurement, e-tax payment, e-payment, one-stop service, and e-health. The above is the basic activity of online services. This is to highlight and evaluate better online services. In 2023, Denmark takes first

place. Estonia follows. In addition to Canada which ranks third, Finland is ranked 4th for its contribution to citizen centric online services.

Table: Progress of various online apps and services

#	Country	Score OS
1	Denmark	14.0000
2	Estonia	13.9000
3	Canada	13.7000
4	Finland	13.3500
5	Indonesia	13.3000
6	Singapore	13.2000
7	Thailand	13.1000
7	England	13.1000
7	Saudi Arabia	13.1000
10	Norway	13.0500

④ Convenience of homepage and portal site

As a national portal (as one-stop service), a government portal is defined as a place where all electronic integrated services can be accessed through a single gateway. It is also the primary interface for stakeholders to access government electronically. Through national portals, governments offer many benefits to users of public services, with faster and better service between citizens/businesses to public offices. In the public sector, one-stop service, which is the comprehensive promising concept of different services provided by government, is the most important service. Implementing a national portal is included in most countries' digital government strategies. Denmark, Estonia, Canada, Finland, and South Korea are at the top. Canada remains in first place as continuity from last year.

Table: Convenience of table homepage and portal site

#	Country	Score NPR
1	Denmark	8.0000
1	Estonia	8.0000
1	Canada	8.0000
1	Finland	8.0000
1	South Korea	8.0000
6	New Zealand	7.9259

7	Saudi Arabia	7.8519
7	Netherlands	7.8519
7	Ireland	7.8519
10	Kazakhstan	7.8500
10	USA	7.8500

⑤ Activity of government CIO

The Waseda University Digital Government Ranking from the beginning introduced government CIO sector as an extremely important indicator for evaluating the digital government of each country. Government CIOs are expected to play an important role in planning and implementation, balancing digital strategy, organizational reform, and overall optimization. In recent years, government CIOs have also been paying attention to progress of digital government DX. Government CIOs are leading digital technology promoter, researching, and implementing the workflow by various methodologies. GCIO transforms federal agencies' digital agility and digital perspective. This indicator aims to assess the role of the information technology sector in the planning, development and implementation of digital government and promoting DX applications into management models by CIOs. In addition to traditional concept of “information”, CIOs are increasingly involved in “innovation” activities as their functions, and on this regard, the role of CDO (Chief Digital Officer) is also emerging.

This year, the United States stands in first place, followed by Singapore, the United Kingdom, New Zealand, and Japan in fifth place. In Japan, the Digital Agency was established two years ago, and the ``Digital Minister,'' who oversees the Digital Agency under the Prime Minister and oversees the overall operations of the Digital Agency. The Chief Digital Officer(CDO) is expected to play the role of demonstrating leadership through comprehensive collaboration through activities with other ministries and local governments and promoting administrative DX. Saudi Arabia ranks 9th along with South Korea.

Table: Activity of government CIO

#	Country	Score GCIO
1	USA	10.0000
2	Singapore	9.5455
2	England	9.5455
4	New Zealand	9.0909

5	Japan	8.4091
6	Canada	8.1818
7	Hong Kong	7.7273
7	Ireland	7.7273
9	South Korea	7.2727
9	Saudi Arabia	7.2727

⑥ Digital government strategies and promotion measures

This sector measures government efforts on digital services for citizens, businesses, and other stakeholders. This includes activities related to supporting the implementation of digital government, such as legal frameworks and mechanisms (laws, plans, policies, strategies). In other words, the government carries out these activities to support both the development of digital services and the overall development of digital government.

This time, Denmark and the Netherlands are in first place, followed by New Zealand and Japan in third place.

Table: Digital government strategies and promotion measures

#	Country	Score EPRO
1	Denmark	9.3548
1	Netherlands	9.3548
3	New Zealand	9.0323
3	Japan	9.0323
5	South Korea	8.7097
6	England	8.5484
6	Taiwan	8.5484
8	Singapore	8.3871
9	Italy	8.2258
9	Hong Kong	8.2258

⑦ Enhancement of citizen participation in government through ICT

E-participation is a governance management tool for citizens in digital participation to expand their active participation in the operation of digital government. Implementing digital projects allows businesses and citizens to connect, interact with governments, and increase the transparency and

consistency of processes. These processes relate to operational management, service delivery, decision making, and policy development.

Denmark, Singapore, and Italy come out on top. In Denmark in particular, it keeps its first place from last year by maintaining hearty administrative services for the vulnerable and elderly and providing hybrid services that have been successfully digitized almost 100%.

Table: Enhancement of citizens' participation in government through ICT

#	Country	Score EPAR
1	Denmark	8.0000
1	Singapore	8.0000
1	Italy	8.0000
4	Netherlands	7.8000
4	England	7.8000
4	Canada	7.8000
4	USA	7.8000
5	Iceland	7.8000
9	South Korea	7.6000
9	Hong Kong	7.6000
9	Germany	7.6000
9	Sweden	7.6000
9	Australia	7.6000

⑧ Open government and DX

Open Government /Open Data is a barometer of the openness of certain government data to private sector such as citizens, businesses, and other stakeholders. This sector will make also target DX promotion by the government. Dx is a popular terminology in business fields as well and needs collaboration between them Denmark, Canada, and South Korea stands with a tie for first place. Japan tied with Australia and Switzerland for 9th place.

Table: Open government and DX

#	Country	Score OGD
1	Denmark	10.0000
1	Canada	10.0000
1	South Korea	10.0000

5	New Zealand	9.8000
5	England	9.3000
6	Norway	9.2000
6	Indonesia	9.2000
6	Netherlands	9.2000
9	Australia	9.0000
9	Switzerland	9.0000
9	Japan	9.0000

⑨ Cybersecurity

One of increasingly important issues in promoting digital government is cybersecurity measures. This year, five countries ranked in the top spot: Norway, Denmark, Canada, New Zealand, and Singapore. England, which ranked first last year, is in sixth place with 9.8 points. Just like last year, England is praised for its adequate security measures, but it surrendered the top spot to Denmark, Canada, New Zealand, Norway, and Singapore, which are progressing its capacity of anti-cybersecurity measurement.

Table: Cybersecurity

#	Country	Score_CYB
1	Denmark	10.0000
1	Canada	10.0000
1	New Zealand	10.0000
1	Norway	10.0000
1	Singapore	10.0000
6	England	9.8000
6	Switzerland	9.8000
6	Germany	9.8000
6	Austria	9.8000
10	Estonia	9.6000
10	South Korea	9.6000
10	Netherlands	9.6000
10	Iceland	9.6000
10	Sweden	9.6000

⑩ Utilization of advanced ICT

The role of innovation is to use the Internet and communication networks to provide effective services to all citizens and businesses. Discussions on the introduction and utilization of generative AI are also progressing this year. Cloud computing helps foster connections between governments and private sectors. Big data helps governments scale data and optimize their services. Therefore, the emergence of these destructive technologies should always be a top priority and actively implemented by governments.

International policy coordination, including standardization of AI, quantum computers, biotechnology, etc., has begun. The appointment of a new position in charge of emerging technologies will further accelerate the digitalization of government. First place is given to Canada, New Zealand, and Singapore with the same score. Canada has moved up its ranking from last year to take first place. There is no longer a significant difference in the scores of the top countries. With remarkable technological advances and their applications to digital government and civil society, top group competitiveness is expected to become even more intense.

Table: Utilization of advanced ICT

#	Country	Score EMG
1	Canada	7.5000
1	New Zealand	7.5000
1	Singapore	7.5000
4	USA	7.2500
5	Denmark	7.0000
5	England	7.0000
7	Estonia	6.5000
7	South Korea	6.5000
9	Taiwan	6.2500
10	Belgium	6.0000
10	Indonesia	6.0000

7. Highlight of Digital Government Related Trends

A. AI

B. Smart city, Mobility, and Disaster management.

C. Digital Healthcare

A. AI (Artificial Intelligence) Implementations in Several High-development-ranking Countries' Digital-Governmental Operations

I. Introduction

The term "artificial intelligence" (AI) can be defined in several ways. Within the scope of this research, AI can be defined as a machine-based system that can predict, make recommendations, or make decisions that can influence both virtual and practical environments on sets of human-defined objectives (National Artificial Intelligence Act, 2020). In recent years, AI has become a significant factor in how virtual governments around the world operate. In our increasingly complex and data-driven world, countries have adopted AI to boost their efficiency and provide services that meet modern expectations. However, AI is still at the early stage of development, its integration might still be flawed to a certain extent. For this end, the main purpose of this article is to take a closer look at how several nations are harnessing AI in various aspects of virtual government operations, highlighting and assessing the global trend of integrating AI into critical sectors to provide exploratory insights into the matter as well as some proposals to better utilize this potential tool.

The paper is structured as follows: A literature review is presented after an introduction about the definition of the term "artificial intelligence" and the research's main objectives. Afterward, an in-depth analysis of the performance and efficiency of AI implementations in the virtual government activities of several countries is then discussed, which magnifies the strengths, and reduces the impacts of the system's weaknesses.

II. Discussion and Findings:

1. Artificial Intelligence Implementations in Government Operations

In recent times, the level of AI implementations in several industrial sectors has increased over time, as suggested by numerous data sources (from 2015 to 2022, using data from Github). This trend suggests that there has been a notable and significant increase in the integration of artificial intelligence (AI) into governmental operations on a global scale as well. This trend signifies a pivotal and revolutionary period in the field of virtual governance.

Indeed, several countries across the globe have been actively engaging in not only international cooperation for AI (as suggested by the birth of several forums such as the Trade and Technology Council, the Council of Europe, the G7 and G20, and the International Telecommunications Union) but also their national virtual government activities. A comprehensive review indicates that more and more countries are increasing the budget portions spent on AI, such as the United States and several European countries.

The common goals of AI implementations are to increase government efficiency, provide better public services, and ultimately increase citizen happiness. However, each country has its own focus, depending on its current political and geographical situation. Some of the most famous sectors to be invested in were found to be public services, streamline administrative procedures, and facilitate evidence-based policy development. Many countries are trying to build their own virtual public space where they can provide their citizens with the most efficient public services. In addition, several countries, such as India and Vietnam, have also initiated an artificial intelligence (AI) endeavor with the aim of augmenting transparency in government and improving the delivery of services.

Public health services, the military, national security, and international trade have also benefited from the surging popularity of AI implementations. This movement paved the way for countless groundbreaking inventions in the mentioned sectors that have proven to be more and more relevant and impactful to the living standard worldwide.

2. Countries analysis

2.1. Denmark

According to the Waseda Rankings 2023, Denmark is the best performing nation overall. The government has been actively promoting the use of AI in commercial settings. The unveiling of the country's national AI policy in 2019 demonstrates the government's dedication to integrating AI into its

public services and internal processes. AI is being used by Denmark's Agency for Digital Government to streamline processes like handling welfare claims and tax filings. The agency may boost productivity, cut down on mistakes, and simplify procedures by automating these tasks. This helps the government out, but it also makes it easier for people to apply for benefits and file their taxes. The nation has spent about DKK 23 billion on artificial intelligence research and development. Additionally, the government adopted legislation in 2023 restricting the collecting of children's data, demonstrating concern for the privacy of its residents (Verdict, 2023). Tax data is analyzed using AI to spot irregularities that might indicate fraud. The Danish Ministry of Employment uses AI to tailor its services to individual job-seekers by evaluating their credentials and presenting them with relevant openings. The Danish Ministry of Health uses AI to improve the quality of care provided to citizens. This requires the creation of diagnostic resources, treatment strategies, and the tracking of individual patients' health records. The Danish Ministry of Education uses AI to tailor education to each student by analyzing their specific needs and preferences and then developing a plan of study accordingly.

2.2. Canada

The Canadian government has invested over $443 million (Loprespub, 2023) in AI research projects, focusing on commercializing, and adopting AI technology, developing AI standards, and advancing AI in computing capacity, infrastructure, health, energy, and the environment. Canada has also become the first country to establish official AI regulations in 2023. As AI technology continues to progress, it is expected that new and effective applications of AI will emerge. These investments have led to Canada securing the 2nd position in the Online Service rankings. The Canada Revenue Agency (CRA) utilizes AI to combat tax evasion by analyzing tax data for irregularities that may indicate fraud. Employment and Social Development Canada (ESDC) employs AI to provide personalized support throughout the job-seeking process, matching qualified applicants with suitable positions based on their unique skills and experience. The Canadian Department of National Defense (DND) utilizes AI to enhance training programs for troops and aid military officials in making informed decisions during combat. The United States Department of Health (DOH) implements AI projects to improve healthcare quality, utilizing AI for various purposes such as diagnosis, treatment planning, and data monitoring.

2.3. UK

The United Kingdom government has shown a strong commitment to leveraging artificial intelligence (AI) to enhance public services and improve government operations. This dedication is reflected in the

investment in AI research and development, with the government allocating over £1 billion for AI research. The country ranks within the top 10 in Online Services and Network Preparedness rankings. AI is utilized by the UK government to detect and prevent tax evasion by analyzing tax data for anomalies that may indicate fraud. AI is also employed to automate passport applications, reducing processing time by checking for errors and exclusions. The justice system is improved through AI, which predicts crime, identifies high-risk areas, and optimizes law enforcement asset allocation. Additionally, AI generates personalized statements for criminals. In the healthcare sector, AI is used for diagnostics, therapy, and patient health data monitoring, resulting in improved disease detection and treatment (The UK Parliament Post, 2020).

2.4. New Zealand

New Zealand's government has been developing many toolkits and utilizing several algorithms to increase governmental transparency and credibility (The New Zealand Government, 2023). Relying on several models, the government also implements AI to automate several public service processes in the justice system, corrections system, claim system, logistics regression, and public health (Whittaker, 2023). The country's efforts serve as a model for other nations seeking to leverage AI for the public benefit.

2.5. Singapore

Singapore is famous for developing a trustworthy AI system (Kin, Sie, Rui, 2023) with the issuance of the National AI Projects, which focus mainly on six sectors: healthcare, government, Smart estates, finance, logistics, and Border security (Miller, 2023). Singapore is indeed a global leader in the adoption and use of artificial intelligence (AI) in government operations, particularly in the domains of smart cities and disaster management. The country has implemented various AI-driven initiatives to enhance efficiency, improve services, and increase resilience. The country has also launched several programs to further take advantage of AI in public services, such as the AI Verify Foundation and Advisory Council on the Ethical Use of AI and Data to help build a reliable data source and create a solution to digital fraud. Having secured the 7th spot in the Online Services ranking this year, the country will further explore the integration of AI in public housing, law enforcement, and transportation in the coming years. (Hirdaramani, 2023). When it comes to running government services, Singapore is dedicated to leveraging AI to make them more accessible, effective, and efficient. The government is making

significant investments in AI R&D, with the goal of creating and deploying AI solutions that can deal with a broad variety of issues.

2.6. South Korea

According to the Presidential Committee of the Digital Platform Government of South Korea, the country has allocated a fund with a total amount of over $424 million to invest in AI and Digital Government. The goals are to improve the convenience of more than 1,500 public services in the nation, including tax payments and welfare applications, by establishing several AI-based websites to connect the data between the private and public sectors. The South Korean government also plans to seek individuals' consent to share their personal data for better public services. As AI continues to evolve, South Korea's innovative and effective use of AI in government operations will likely inspire further advancements and applications in the future. The Smart City Platform is an AI-powered, cloud-based platform that compiles data from several sources—including traffic sensors, CCTV cameras, and social media—to provide city administrators access to real-time insights and predictive analytics. South Korean cities such as Seoul, Busan, and Daegu are using the platform. In addition, the Government's New AI-Powered Chatbot: Citizens get around-the-clock access to data and services provided by the government through the AI-powered Public Service Chatbot. The Ministry of Science and ICT and the National IT Industry Promotion Agency (NIPA) are working together to create the chatbot.

2.7. USA

Despite being one of the most developed countries in the world, the US has only allocated a small percentage (less than 5%) of its federal government funding to digital government activities, as shown by a report by Brookings (Dawson, 2022). The nation also ranked 7th in the Management Optimization rankings this year. However, with the considerable $192 million worth of investment in the AI sector, the amount can still be considered adequate. These projects put the focus on health and human services, as well as securities and defense. The United States Internal Revenue Service (IRS) is using AI to help identify and prevent tax fraud. Tax data is analyzed by AI to spot outliers and suspicious trends that might point to tax fraud. Among them is finding those who aren't paying their fair share of taxes and filing fake tax returns. The Veterans Administration (VA) division of the United States Department of Veterans Affairs uses AI to speed up the process of handling Social Security disability claims. Claims are reviewed and checked for mistakes or missing information using AI, speeding up the processing time. The US Department of Homeland Security's DHS division is using AI to forecast crime trends and

identify potential hotspots. To better distribute police resources, this data is utilized. Customized punishments for offenders are another area where AI is being use.

2.8. Netherlands

The Dutch government prioritizes education, citizen skill development, and digital skills development for the workforce when investing in AI (Jākobsone, 2022). This shows that the nation not only focuses on developing a virtual environment for digital governance, but it also wants its citizens to utilize it well and effectively. In fact, the Dutch e-government has a proud history of being the most efficient in recognizing residency (with over 340 million Digital authentications being made annually) and submitting tax forms (Sear, 2022). MijnOverheid is a citizen-centric, one-stop shop for all things government-related online. The portal employs AI to tailor what each user sees and has access to. The Dutch rail network is being made more efficient and reliable thanks to an initiative called Digital Rail Netherlands. Train scheduling, traffic control, and predictive maintenance are just some of the areas where the initiative is creating AI-powered solutions. The Netherlands Artificial Intelligence Coalition is a public-private cooperation with the goal of hastening the spread of AI in the Netherlands. The alliance is working on a variety of projects to facilitate the creation and dissemination of AI-based solutions in public and private sectors.

2.9. Estonia

As AI continues to advance and develop, Estonia is at the forefront of AI government implementation, with the highest scores of Online Service Indicators in the Waseda rankings, serving as a model for other nations, especially in the EU. Tallinn, the capital city, utilizes AI to improve traffic flow, reduce pollution, and enhance the quality of life for residents. AI is employed to manage traffic signals, optimize public transportation systems, and monitor air quality. Tartu, the second-largest city, employs AI to improve waste management, energy efficiency, and public safety. AI is utilized to predict waste collection needs, optimize the energy grid, and detect crimes. Also, Pärnu, a popular tourist destination, uses AI to enhance the visitor experience and minimize environmental impact. AI is employed to recommend personalized tourist attractions and predict and manage energy demand. The government's significant investments in AI research and development have contributed to its leadership in disaster management. The Estonian Emergency Response Centre (EERC) utilizes AI to predict disaster spread, identify vulnerable areas, and coordinate response efforts. AI is employed to predict the path of forest fires and develop evacuation plans. The Estonian Land Board uses AI to monitor and assess natural hazards, such as floods and

landslides. Estonia's success in AI implementation can serve as a model for other countries. The government's dedication to responsible and ethical AI development and usage is commendable. However, challenges and risks must be addressed. Ensuring fairness and equity in AI systems is crucial to prevent biases and discrimination. Additionally, maintaining the security and trustworthiness of AI systems is essential to protect against hacking and manipulation.

2.10. Ireland

Being one of the first countries to establish a thorough AI development strategy since 2021, the Irish AI Advisory Council is now gathering its resources for advancement in academia, business, law, security, social sciences, economics, and civil society sectors. As stated by the country's Trade Promotion, Digital, and Company Regulations, the country thrives on "a robust governance framework to safeguard against risk and ensure public trust in AI." Ireland has emerged as a global leader in the advancement and application of artificial intelligence (AI). Ireland is a global leader in the advancement and application of AI. Dublin uses AI to improve traffic flow, reduce pollution, and enhance residents' quality of life. Galway utilizes AI to enhance the visitor experience, minimize environmental impact, and provide personalized tourist recommendations and energy demand predictions.

2.11. Japan

Japan is one of prominent global leaders in the advancement and utilization of artificial intelligence (AI). The Japanese government has been actively collaborating with global technology titans such as Microsoft and OpenAI to improve administrative services and strengthen domestic data infrastructure and security, paving the way for nationwide pilot projects. Several government bodies plan to integrate AI into the country's agriculture, forestry, and fisheries to update application materials. However, the Ministry of Transport, Land, Infrastructure, and Tourism has not integrated AI into its workflow due to concerns about privacy, cybersecurity, and disinformation. In the realm of smart cities, examples of AI implementation include Tokyo's utilization of AI to optimize traffic flow, reduce pollution, and enhance the quality of life for residents. This involves the AI-driven management of traffic signals, optimization of public transportation systems, and monitoring of air quality. Similarly, Osaka is at the forefront of AI adoption for smart city initiatives, employing AI to improve waste management, enhance energy efficiency, and ensure public safety. AI is utilized to predict waste collection needs, optimize the energy grid, and detect and prevent criminal activities. These examples highlight Japan's commitment to integrating AI into government operations for smart cities and disaster management. The government's

substantial investments in AI research and development, coupled with the establishment of policies and regulations to ensure responsible and ethical AI usage, position Japan as one of leading authorities in this field.

2.12. Germany

According to a report by Köstler and Ossewaarde (2022), Germany is in a thorough process of developing strategies and regulations to develop an AI society in the future. In Berlin, AI is being used to improve traffic flow, reduce pollution, and enhance the quality of life for residents. The city effectively manages traffic signals, optimizes the public transportation system, and monitors air quality using AI technology. This approach addresses concerns related to urban mobility and environmental sustainability. Hamburg, a prominent city in Germany, is at the forefront of AI adoption for smart city initiatives. The city utilizes AI to improve waste management, enhance energy efficiency, and ensure public safety. AI algorithms accurately predict waste collection needs, optimize the energy grid, and detect and prevent criminal activities, creating a more sustainable and secure urban environment. Munich, known as a major tech hub, leverages AI to enhance its transportation system and reduce its carbon footprint. The city optimizes traffic signals using AI technology, resulting in smoother traffic flow and reduced congestion. Munich also explores innovative transportation solutions like self-driving cars and electric buses to promote sustainable mobility and mitigate environmental impact. The Federal Office for Civil Protection and Disaster Assistance (BBK) plays a crucial role in disaster management in Germany. The BBK utilizes AI to predict the spread of disasters, identify vulnerable areas, and coordinate response efforts. By utilizing AI algorithms, the BBK accurately forecasts the path of floods and develops effective evacuation plans, ensuring the safety and well-being of citizens during crises. Moreover, the Federal Institute for Geosciences and Natural Resources (BGR), a prominent German research institute, utilizes AI to develop innovative solutions for protecting the country from natural hazards. The BGR employs AI technology to predict the impact of earthquakes and landslides, enabling the design of resilient infrastructure and effective disaster preparedness strategies.

2.13. Norway

Similar to Germany, the country's attention to AI integration only surged recently in 2023. An article from NTNU Digital Transformation showed a positive outlook for such implementation, arguing that it would make the public sector more efficient, improve the relationship between citizens and the government, and advance technology-related projects to increase people's convenience while

participating in public services (Reutter, 2022). In smart cities, cities like Oslo, Bergen, and Trondheim are utilizing AI to improve traffic flow, reduce pollution, optimize waste management, enhance energy efficiency, and promote sustainable transportation. These AI implementations have resulted in improved quality of life for residents and more efficient city operations. In disaster management, government agencies such as the Norwegian Directorate of Civil Protection (DSB), Norwegian Meteorological Institute (MET Norway), and Norwegian Water Resources and Energy Directorate (NVE) are using AI to predict the spread of disasters, identify areas at risk, develop evacuation plans, improve weather forecasting accuracy, and monitor natural hazards. These AI-powered systems contribute to effective disaster preparedness and response efforts. The Norwegian government is committed to the responsible and ethical development and use of AI. They are developing policies and regulations to address challenges such as fairness, equity, cybersecurity, and trustworthiness in AI systems.

2.14. Sweden

According to a report by the European Commission, Sweden has invested more than allocated at least SEK 550 million to support AI development and explore its impact on society as well as public services. The country is reported to be focusing on developing its own language model using generative AI. It is also presented in the report published by Vinnova, an official Swedish governmental innovation agency, that a large proportion of the fund is for developing innovations such as self-driving buses, weather forecasting, and tracking citizens' behavior abnormalities for a better justice system. The Swedish government is providing cash for study of artificial intelligence's potential to improve medical diagnosis. The Karolinska Institute, for instance, is working on an AI-driven system that can more accurately identify cancer than current approaches. The government is also investing in AI-related research to improve environmental monitoring techniques. To better anticipate severe weather occurrences than current approaches, scientists at the Swedish Meteorological and Hydrological Institute are creating a system driven by artificial intelligence. Swedish startup Transdev is collaborating with the Swedish Transport Administration to create an AI-powered system that can improve bus timetables and routes in real time.

2.15. Taiwan

The Cabinet of Taiwan has approved new guidelines for the government's use of generative artificial intelligence (AI) as a tool for official tasks. Kaohsiung and New Taipei City are utilizing artificial intelligence (AI) to optimize rubbish collection routes, reduce collection times, and minimize energy

consumption. These achievements represent the initial stage of utilizing AI in intelligent urban areas and emergency response systems. The Taiwanese government sets an exemplary example in this regard, and other countries would be wise to follow suit.

2.16. Switzerland

Geneva, Zurich, and Lausanne are at the forefront of AI adoption in Switzerland for smart city initiatives and disaster management. In terms of smart cities, Geneva utilizes AI to enhance traffic flow, reduce pollution, and improve residents' quality of life. This involves AI-managed traffic signals, optimized public transportation, and air quality monitoring, resulting in improved traffic efficiency, reduced congestion, and cleaner air. Similarly, Zurich focuses on waste management, energy efficiency, and public safety through AI implementation. AI is used to predict waste collection needs, optimize the energy grid, and detect crimes. These AI solutions have led to more efficient waste management, reduced energy consumption, and enhanced public safety. Lausanne, known as a major tech hub, employs AI to enhance its transportation system and reduce its carbon footprint. This involves AI-optimized traffic signals and the development of innovative transportation modes like self-driving cars and electric buses. The outcomes include smoother traffic flow, reduced emissions, and increased sustainability.

2.17. Australia

The Australian government was reported to have made a commitment of AUD 41.2 million for the “responsible deployment of AI” in the fiscal year of 2023 (Lyons, 2023). However, the country seems to be approaching this matter with care, as Australia’s Digital Transformation Agency has just released a draft consultation paper about AI and digital strategy with the hope that the implementation of the plan is expected at the end of 2023 (Tan, 2023). The government of Australia is employing AI to create more efficient strategies for dealing with natural catastrophes. To better anticipate bushfires, for instance, the Commonwealth Scientific and Industrial Research Organization (CSIRO) is creating a system driven by artificial intelligence. The country is also employing AI to help with studies on climate change. The Australian Bureau of Meteorology (BOM), for instance, is using AI to create updated and more precise climate models. Artificial intelligence is used to create advanced medical therapies. To better assist clinicians in making accurate cancer diagnoses, for instance, researchers at the University of Melbourne are creating a system driven by artificial intelligence.

2.18. Finland

The country is committed to both green and digital development and has introduced a plan called Artificial Intelligence 4.0 to encourage investment in these sectors. According to government-released Digital Public Administration factsheets, the country is promoting efficient and secure processing in the health and social sectors while also prioritizing safe and environmentally friendly transportation. AI is effectively utilized to manage real-time traffic flow, reducing congestion, and improving air quality. Artificial intelligence is being used by the Finnish Tax Administration to create a tax audit system that can detect tax evasion more accurately than human auditors (Koivula , 2022). More precise techniques of illness diagnosis are priority subjects, hence the government is supporting study of AI in this area. A system driven by AI is being developed by scientists at the University of Helsinki to improve upon current cancer diagnostic techniques. In addition, the government is investing in the study of artificial intelligence to improve environmental monitoring techniques. To better anticipate severe weather occurrences than conventional approaches, scientists at the Finnish Meteorological Institute are creating a system driven by artificial intelligence.

2.19. Thailand

According to the Thailand National AI Strategy and Action Plan (2022–2027), the country intends to implement AI to: enhance public access to government services; bridge income, education, and healthcare gaps; facilitate a better environment and efficient use of natural resources; and facilitate a better environment and better use of natural resources. Improve national safety and security. The country's ranking for Online Services this year remains at the 3rd position, reflecting the significant investment made in AI development. Chiang Mai, Phuket, Chonburi, and various government departments in Thailand have successfully implemented AI technologies to enhance different aspects of city infrastructure and disaster management. AI is used to improve public transportation efficiency by predicting passenger demand and adjusting bus schedules accordingly. Waste management processes are streamlined through AI, which tracks waste truck movement and optimizes collection routes. Energy efficiency is prioritized by utilizing AI algorithms to analyze energy consumption patterns in municipal buildings. The Royal Irrigation Department utilizes AI to predict and mitigate the impact of floods, while the Geological Survey Division develops an AI-based landslide prediction system. AI is also employed to enhance emergency response coordination and communication, tracking the real-time location and status of emergency responders. The Thai government's proactive approach in incorporating AI serves

as an example for other countries seeking to enhance their smart city infrastructure and disaster management capabilities.

2.20. Saudi Arabia

Saudi Arabia is very active in advancing AI implementations in government work. The Saudi Data and Artificial Intelligence Authority (SDAIA) has launched several applications for public use, such as Tawakkalna and Tabaud (public health). According to the strategy published by the SDAIA, transportation, health, space, renewable energy, water, technology, education, environment, and traffic are among the nine sectors in which AI is anticipated to have the greatest impact. By employing AI algorithms, Neom can optimize traffic signals, leading to smoother traffic and reduced congestion. Additionally, AI helps in waste management by minimizing waste and ensuring efficient disposal. Furthermore, AI is used to monitor air quality and take necessary measures to maintain a clean and healthy environment. Similarly, Qiddiya is leveraging AI to improve traffic flow, reduce waste, and enhance the visitor experience.

2.21. UAE

The UAE has been one of the quickest to adapt AI to their governmental activities and can be considered one of the leaders in AI implementation. According to the UAE Strategy for Artificial Intelligence, the use of AI and generative AI is to reduce accidents and operational costs, reduce chronic and dangerous diseases, reduce the rate of costly errors, manage renewable energy facilities, conduct analyses and studies to provide water sources, reduce costs and increase the desire for education, increase the rate of forestation, reduce accidents, and traffic congestion, and develop more effective traffic policies. UAE was in the top 10 in terms of Network Preparedness in the Waseda rankings. The Abu Dhabi Police is utilizing AI to enhance its emergency response capabilities. By analyzing data and patterns, AI algorithms can predict crime hotspots and enable the police to deploy resources more effectively, improving public safety and security.

The integration of AI in Dubai Smart City, Abu Dhabi Smart City, and Sharjah Smart City initiatives demonstrates the UAE government's commitment to utilizing technology for the betterment of its cities and citizens. Through AI-driven traffic management, energy efficiency improvements, waste management optimization, personalized services, and enhanced disaster response capabilities, these cities are becoming more sustainable, efficient, and resilient.

2.22. France

According to the Conseil d'État, AI is now utilized in various sectors of France, including traffic management, defense and security, anti-fraud measures, and employment policies. The government is prioritizing the implementation of AI to expedite procedure processing time and ensure continuous public service through task automation. AI is playing a crucial role in various aspects of government operations in France. It is being used for fraud detection and prevention in areas like tax, benefits, and healthcare. Administrative tasks are being automated using AI, such as passport and visa processing, as well as business license applications. AI is also helping government officials make better decisions by providing insights from data, such as predicting traffic congestion and air quality. Additionally, AI is used to personalize government services, such as developing personalized learning plans for students and providing personalized job search assistance to the unemployed.

2.23. Italy

Italy is the first Western country to ban the use of ChatGPT. Although the country's AI integration in the public sector has not been very optimistic, the national government has made a strategic plan to promote education and careers in technology, engineering, and mathematics in universities and colleges to strengthen the skills related to AI in the preparation of the future implementation of the tool. AI is being used in Italy for tax fraud detection, healthcare diagnostics, and environmental monitoring (Asquith, 2023). The Italian Revenue Agency is developing an AI-powered system to identify fraudulent tax claims. The Ministry of Health is funding research into AI-based methods for disease diagnosis, such as an AI-powered system for cancer detection. The Ministry of the Environment is funding research into AI-based environmental monitoring, including predicting extreme weather events.

2.24. Iceland

Iceland is renowned for its exemplary digital public services, as confirmed by the European Commission's benchmark report. The country has seamlessly integrated AI into local, central, and regional online governments, ensuring transparency and accessibility. With a commitment to continuous improvement, Iceland aims to expand and enhance the scope and quality of its online services. Reykjavík and Akureyri, two cities in Iceland, are implementing government initiatives to transform into smart urban areas. AI is utilized to optimize traffic flow, reduce pollution, and improve residents' quality of life. The initiatives include optimizing traffic signals, reducing waste and energy consumption, and

providing personalized public transportation recommendations. Additionally, AI is employed in disaster management by enhancing weather forecasting accuracy and developing early warning systems for disasters. The Icelandic government's proactive approach in incorporating AI aims to create more efficient and resilient cities, with the Icelandic Meteorological Office and the Civil Protection Department playing crucial roles in weather forecasting and disaster management.

2.25. Indonesia

Indonesia's National Strategy for Artificial Intelligence (2023) has stipulated five priorities for AI development, which include services, bureaucratic reform, education and research, food security, mobility, and smart cities. The government has also established several research centers and drafted new regulations focusing on the implementation of AI until the end of 2025. Jakarta, Bandung, and Surabaya are implementing government initiatives to transform into smart urban areas. AI is utilized to optimize traffic flow, reduce pollution, and improve residents' quality of life. The initiatives include optimizing traffic signals, reducing waste and energy consumption, and providing personalized public transportation recommendations. Additionally, AI is employed in disaster management by predicting the spread of disasters, identifying high-risk areas, and coordinating response efforts. AI is also used to enhance weather forecasting accuracy and develop early warning systems for disasters. The Indonesian government's proactive approach in incorporating AI aims to create more efficient and resilient cities.

III. Conclusion:

Overall, most of the countries mentioned within the scope of this paper have been successfully adopting AI into their government operations to a particular extent, with Denmark, Saudi Arabia, the UAE, and Estonia being among the worldwide leaders. However, there are serious concerns about the ethical, security, and privacy aspects of the tools, hence the issuance of several regulations and guidance across borderlines. It can be concluded that the benefits that AI offers are undeniable, and the world is moving towards the implementation of such a tool in its governance at a relatively high pace. Authorized and competent governmental bodies, agencies, and policymakers have to carefully assess their national status and capability to put forward suitable strategies to adapt to the blooming growth of technology in general and AI in particular.

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B. Smart city, Mobility, and Disaster management.

I. Introduction

Government digitalization in the context of smart cities, mobility, and disaster management refers to the use of digital technologies and data-driven approaches to transform urban environments, improve transportation systems, and enhance emergency response capabilities. In smart cities, government digitalization integrates intelligent transportation systems, such as traffic management, smart parking, and optimized public transportation networks. These technologies enable more efficient and sustainable mobility by reducing congestion, improving traffic flow, and enhancing the overall urban transportation experience. In disaster management, government digitalization plays a crucial role in enhancing preparedness, response, and recovery efforts. Digital technologies collect, analyze, and disseminate real-time data, including geospatial information, weather patterns, and sensor data, providing accurate information and timely warnings to the public. This enables effective emergency response coordination, evacuation planning, and resource allocation. Citizen engagement platforms empower individuals to actively participate in disaster management efforts, fostering community resilience and enabling faster and more efficient responses during crises. Overall, by leveraging digital technologies, governments can improve transportation systems, enhance emergency response capabilities, and ensure the safety and well-being of their citizens in the face of urban challenges and natural disasters.

II. Discussion and Findings:

1. Smart city, mobility, and disaster management in Government Operations

Governments are realizing they need to use creative techniques to improve their operations and better serve their inhabitants considering the increased urbanization and increasing issues faced by cities. The Internet of Things (IoT), data analytics, and artificial intelligence (AI) are all components of smart city technologies that hold tremendous promise for helping governments streamline their operations. Governments can monitor urban transportation, energy use, and public safety in real-time with the use of Internet of Things (IoT) sensors and data analytics. Using this data-driven strategy, governments can better provide services to their citizens and raise their standard of living.

This paper looks at how disaster management, mobility solutions, and smart city technology all work together. The advantages and disadvantages of using these novel strategies are discussed. To further demonstrate how governments may improve their operations and better serve their citizens via the use

of smart city, mobility, and disaster management methods, we also evaluate case studies and best practices from cities throughout the globe. Policymakers and government officials may improve smart city projects, transportation systems, and disaster management capacities if they have a thorough awareness of the benefits and drawbacks of combining these fields. The goal is to build communities that are better equipped to handle natural disasters while still providing citizens with a high quality of life.

2. Countries analysis

2.1. Denmark

Denmark, ranked 2nd in the Online Service indicator this year, is renowned for its livable and sustainable cities. The country has embraced smart city technologies and mobility solutions to enhance transportation systems and decrease carbon emissions. Denmark has successfully implemented intelligent transportation systems, bike-sharing initiatives, and electric vehicle infrastructure to promote sustainable mobility (Shaharuddin, 2021). Moreover, Denmark boasts a robust emergency response system that integrates real-time data and advanced analytics to bolster preparedness and response efforts. They are utilizing AI to develop new diagnostic tools and enhance the efficiency of healthcare delivery. By leveraging AI, the ministry can improve the accuracy and speed of disease diagnosis, particularly for complex conditions like cancer and heart disease. Early and accurate diagnoses can lead to better patient outcomes, as timely interventions can be implemented. In the field of education, the Danish Ministry of Education is harnessing AI to develop personalized learning tools. These tools cater to the unique needs and learning styles of students, allowing them to learn at their own pace and in their preferred manner. By providing personalized support, AI can enhance the educational experience and promote better learning outcomes for students. By automating tasks, digitalization reduces the burden on human resources, allowing government employees to focus on more complex and strategic endeavors. By supporting the development and adoption of technologies, the Danish government is paving the way for a more efficient, personalized, and citizen-centric approach to public services.

2.2. Canada

Canada, known for its expansive and varied urban landscapes, has been actively embracing smart city initiatives. Toronto, for instance, has adopted smart mobility solutions such as connected and autonomous vehicles to enhance transportation efficiency and alleviate traffic congestion. In the realm

of disaster management, Canada has implemented robust emergency management systems that utilize technology for early warning systems, real-time monitoring, and efficient coordination among government agencies. An example of digitalization in severe weather forecasting systems is the Canadian Radar Decision System (CARDS) developed by Environment Canada. The passing of the Health Data and Information Governance and Capability Framework also suggested that the country's government showed a high level of concern about utilizing digitalization to improve public health. Toronto employs AI to optimize traffic flow, reduce energy consumption, and enhance public transit. The city harnesses AI to create a real-time traffic management system that adjusts traffic lights based on current conditions. Calgary uses AI to improve waste management and snow clearing by developing a predictive system for waste collection. Montreal leverages AI to enhance public safety and security through the development of a system that automatically detects and identifies suspicious activity in public spaces. In disaster management, Natural Resources Canada employs AI to develop tools for predicting and responding to disasters. For instance, AI is used to create a system capable of predicting the likelihood of floods and wildfires. Public Safety Canada utilizes AI to enhance emergency communication and coordination by developing a system that automatically translates emergency messages into multiple languages. The Canadian Red Cross employs AI to improve disaster response by developing a system that identifies individuals at risk of being affected by a disaster. These examples demonstrate the diverse applications of AI in Canadian government operations, specifically in smart cities and disaster management.

2.3. UK

The UK has been at the forefront of smart city initiatives, with cities like London leading the way in adopting innovative technologies. The UK has witnessed a significant increase in the adoption of electric vehicles, supported by incentives and improved charging infrastructure. By 2027, the EV market is projected to reach $32bn. This transition to EVs offers advantages such as reduced emissions, technological advancements, and job creation in the clean energy sector (Taj Shorter, 2023). In terms of disaster management, the UK has established strong emergency response frameworks and employs advanced analytics for risk assessment and mitigation. In the realm of smart cities, London is utilizing AI to address key challenges such as traffic congestion, air pollution, and energy efficiency. By developing a real-time traffic management system that adjusts traffic lights based on current traffic conditions, London aims to improve traffic flow and reduce congestion. Manchester is focusing on waste management and public safety by leveraging AI to predict optimal waste collection timings. This

proactive approach not only enhances efficiency but also contributes to a cleaner and more sustainable environment. Birmingham is utilizing AI to improve public transportation and healthcare services, with real-time information on bus and train arrivals being made available through AI-powered systems (Public Law Project, 2023). The Environment Agency is using AI to improve flood forecasting and warning systems, enabling more accurate predictions and better protection for individual properties. The Met Office is harnessing AI to enhance weather forecasting and warning systems, enabling the prediction of extreme weather events such as hurricanes and tornadoes. The National Emergency Management Agency is utilizing AI to improve emergency communication and coordination with an automated translation system that facilitates multilingual communication during crises (Tobin, 2023).

2.4. New Zealand

New Zealand, renowned for its breathtaking landscapes and susceptibility to natural calamities, has been proactively integrating smart city technologies and disaster management strategies. The nation has successfully implemented smart transportation systems, including real-time traffic management and electric vehicle infrastructure, to enhance mobility and decrease emissions. Auckland, Wellington, and Christchurch are leading the way in implementing AI solutions to address various challenges. Auckland is developing a real-time traffic management system that adjusts traffic lights based on current conditions, while Wellington is utilizing digitalization to predict waste collection needs. In the area of disaster management, the Ministry of Civil Defense and Emergency Management, the National Institute of Water and Atmospheric Research, and the New Zealand Fire Service are enhancing prediction, response, and detection capabilities. The Ministry is developing a system to predict the impact of earthquakes and floods on individual properties. The National Institute of Water and Atmospheric Research is using AI for weather forecasting and warning systems, including the prediction of extreme weather events like cyclones and tornadoes. The New Zealand Fire Service is implementing AI to automatically detect fires in CCTV footage, improving fire detection and response. The government aims to ensure that digitalization benefits people, is accessible to all, and is developed and used safely and securely.

2.5. Singapore

Singapore, renowned as a global frontrunner in smart city endeavors, has adopted a comprehensive approach to enhance both mobility and disaster management. According to the data from Smart nation, the city-state has successfully implemented an Intelligent Transport System (ITS) to optimize traffic

flow and public transportation services, leading to reduced travel times and improved punctuality. Furthermore, Singapore has actively promoted sustainable transportation solutions, such as electric vehicles (EVs), to mitigate carbon emissions and foster a greener urban environment. The city's smart city initiatives heavily rely on data and analytics for effective urban planning. Using "Digital Twins", policymakers can simulate various scenarios and evaluate the impact of infrastructure projects, policies, and emergency response strategies. This data-driven approach enables authorities to make informed decisions, optimize resource allocation, and enhance the overall livability of the city (Specialist Telecommunications, Media & Technology (TMT) Talent, 2023).

2.6. South Korea

South Korea has established itself as a frontrunner in smart city endeavors, prioritizing the use of technology to enhance the well-being of its citizens. The nation's commitment to digitalization is evident in its impressive third place ranking in the Network Preparedness Waseda rankings. South Korea has successfully implemented intelligent transportation systems, encompassing intelligent traffic management and electric vehicle infrastructure, to improve mobility and decrease emissions. In the realm of disaster management, the country has implemented advanced early warning systems, emergency response protocols, and public safety initiatives to safeguard the welfare of its residents (Ministry of the Interior and Safety, 2019). Seoul stands out as one of the most technologically advanced cities worldwide, which has successfully integrated digitalization into its infrastructure to enhance traffic flow, reduce pollution, and improve the quality of life for its residents. The Disaster Management Information System (DMIS) is a national platform that integrates data from multiple government agencies and sensors to provide real-time information on disasters. DMIS can analyze this data and predict the spread of disasters, such as floods and wildfires. The Korea Institute of Civil Engineering and Building Technology (KICT) is another government research institute actively developing AI-powered solutions for disaster management. For instance, the KICT is working on an AI system capable of predicting the impact of earthquakes on buildings and infrastructure. Additionally, the Korea Meteorological Administration (KMA), responsible for weather forecasting and disaster warnings, employs AI to enhance weather forecasting accuracy and develop advanced early warning systems.

2.7. USA

The United States has been at the forefront of smart city initiatives, with cities like New York and San Francisco leading the way. Smart grid systems promote the modernization of the electricity network in

New York, providing affordable electricity and a reliable energy system. The LinkNYC project offers free Wi-Fi and charging stations throughout the city. The NYCx Moonshot Challenge encourages individuals and organizations to propose ideas to improve the lives of New Yorkers, with winners receiving support and funding to bring their ideas to life (Matco, 2023). The country has implemented smart transportation solutions, such as connected and autonomous vehicles, to improve mobility and reduce congestion. The US has strong disaster management systems, including emergency response frameworks, early warning systems, and communication networks. Washington, D.C. employs AI to enhance traffic flow, reduce crime rates, and improve residents' quality of life. This includes managing traffic signals, optimizing public transportation systems, and predicting crime rates. New York City is at the forefront of utilizing AI for smart city initiatives. The city leverages AI to improve waste management, enhance energy efficiency, and ensure public safety. For instance, AI is used to predict waste collection needs, optimize energy grids, and detect crimes. San Francisco, a major tech hub, utilizes AI to improve transportation systems and reduce carbon footprint. AI is employed to optimize traffic signals and develop innovative modes of transportation, such as self-driving cars and electric buses.

In disaster management, various government agencies utilize AI to predict, respond to, and recover from disasters:

- The Federal Emergency Management Agency (FEMA) employs AI to predict disaster spread, identify vulnerable areas, and coordinate response efforts. For example, AI is utilized to predict hurricane paths and develop evacuation plans.

- The National Oceanic and Atmospheric Administration (NOAA) utilizes AI to enhance weather forecasting accuracy and develop early warning systems for disasters. AI is employed to predict the intensity of thunderstorms and tornadoes.

- The US Geological Survey (USGS) employs AI to monitor earthquakes and other geological hazards, developing early warning systems for earthquakes and landslides.

The US government acknowledges these challenges and risks, actively working on policies and regulations to tackle them. Initiatives such as the development of a national AI strategy and the implementation of cybersecurity measures demonstrate their commitment to responsible AI development and usage.

2.8. Netherlands

The Netherlands has emerged as a frontrunner in smart city initiatives, mobility solutions, and disaster management (Lugt, 2019). In Amsterdam, they have successfully implemented a range of smart city technologies, with a specific focus on sustainable mobility, energy efficiency, and citizen engagement. The Netherlands has also made significant progress in intelligent transportation systems and explored the potential of connected and autonomous vehicles. In terms of disaster management, the Dutch Flood Protection Programme (DFPP), a collaboration between regional water authorities and the Ministry of Infrastructure and Water Management, is actively funding and prioritizing a large-scale operation. This operation encompasses nearly 300 projects across the country, with a particular emphasis on coastal areas, lakes, and major rivers, effectively managing flood risks (Tromp, 2022).

2.9. Estonia

Estonia, renowned for its digital innovation, has embraced smart city technologies to enhance government operations. The country has successfully implemented e-governance initiatives, digital infrastructure, and smart transportation systems to improve efficiency and service delivery. The city of Tartu is actively participating in the SmartEnCity project, focusing on enhancing energy efficiency. This involves renovating old Soviet-era apartment buildings and connecting them to a renewable-powered district heating system. Smart home solutions will also be utilized to monitor indoor climate and energy consumption. Additionally, Estonia has integrated technology into its disaster management systems, utilizing real-time data, analytics, and communication platforms to enhance preparedness and response efforts. These investments and efforts have earned Estonia the top position in the Online Service Waseda rankings for this year.

2.10. Ireland

Ireland has also acknowledged the significance of smart city initiatives and has successfully implemented a range of smart transportation solutions, such as intelligent traffic management and electric vehicle infrastructure. The country has also prioritized disaster management, establishing emergency response frameworks, early warning systems, and community resilience initiatives to improve preparedness and response efforts. The digitalization of the Irish economy is expected to reach a value of approximately €300 billion by 2023, accounting for 65% of the country's economic output. This projection is based on estimates from Amárach and the International Data Corporation (Farrell, 2022). The Department of the

Environment, Climate, and Communications employs AI to predict disaster spread, identify vulnerable areas, and coordinate response efforts, including storm and flood prediction and evacuation planning. The Marine Institute specializes in marine science and technology, using AI to develop innovative solutions for coastal flooding and other marine hazards, such as predicting sea level rise impacts and designing resilient coastal defenses.

2.11. Japan

Japan, renowned for its technological advancements, has embraced smart city technologies and mobility solutions to enhance government operations. The country has successfully implemented intelligent transportation systems, such as advanced traffic management and high-speed rail networks, to improve mobility and alleviate congestion.

Disaster management is a top priority for the Japanese government, given the frequent occurrence of disasters in the country. They consistently invest in and adopt technology and digitalization to enhance their disaster management efforts. For example, the Nuclear Regulation Authority (NRA) has established the "Emergency Radiation Monitoring Information Sharing/Announcement System" on its website, in accordance with the notification requirements outlined in Article 10, Paragraph 1 of the "Act on Special Measures Concerning Nuclear Emergency Preparedness" (Japan times, 2022). In the domain of disaster management, the Japanese government has leveraged AI to enhance prediction and response capabilities. The Cabinet Office, responsible for disaster management, utilizes AI to predict the spread of disasters, identify vulnerable areas, and coordinate response efforts. The Japan Meteorological Corporation (JMC) employs AI to enhance weather forecasting accuracy and develop early warning systems for natural disasters. Additionally, the National Research Institute for Earth Science and Disaster Resilience (NIED) utilizes AI to develop innovative solutions for disaster protection, such as predicting earthquake and tsunami impacts and designing resilient infrastructure.

2.12. Germany

Germany has allocated funding for 73 smart city pilot projects, covering strategy development and application implementation. These projects are distributed across various cities and municipalities, encompassing a wide range of solutions. The total funding for these initiatives amounts to 820 million euros, distributed over three rounds between 2019 and 2022. Furthermore, Berlin has formulated a comprehensive smart city strategy that emphasizes social welfare and sustainability. The objective is to

foster a shared understanding among the city administration, citizens, and the business sector. Several pilot projects have been identified, such as smart city squares, improved data governance, citizen engagement, smart water modeling, and environmental data collection. Berlin's approach serves as a model for open discussions and strategic planning that involve multiple stakeholders, benefiting the entire city (Beucker, 2022).

2.13. Norway

Norway is at the forefront of implementing technology on a large scale, particularly in the construction industry. The government is heavily investing in technology for construction projects, making it more accessible to private entities. Additionally, Norway places a strong emphasis on energy efficiency in new buildings, enforcing stringent requirements. The country is also a strong advocate for open data, maintaining a national registry of open data from the public sector, overseen by the Agency for Public Management and eGovernment (Difi). This registry encompasses data in various domains, including the environment, health, geography, agriculture, traffic, and demographics, and is accessible to all. The availability of this extensive open data enables car-sharing companies and other entrepreneurs to leverage traffic data and information from the Norwegian Mapping Authority to identify demand and develop intelligent solutions for smart cities.

2.14. Sweden

Sweden has prioritized the integration of renewable energy, energy-efficient buildings, and smart grids. The country is renowned for its sustainable transportation solutions, which encompass well-developed public transportation networks, cycling infrastructure, and electric mobility. Sweden has successfully implemented intelligent transportation systems and actively promotes clean and efficient transportation options. Additionally, Sweden has robust disaster management strategies in place, including early warning systems, emergency response plans, and community resilience initiatives. Stockholm, Gothenburg, and Malmö are leading the way in the use of AI in government operations, particularly in the areas of smart cities and disaster management. In smart cities, Stockholm is using AI to improve traffic flow, reduce pollution, and enhance the quality of life for residents. The city utilizes AI to manage its traffic signals, optimize its public transportation system, and monitor air quality. These AI implementations have resulted in improved traffic efficiency, reduced congestion, and cleaner air for residents. Gothenburg is also leveraging AI for smart city initiatives, focusing on waste management,

energy efficiency, and public safety. The city uses AI to predict waste collection needs, optimize its energy grid, and detect crimes. These AI-powered solutions have led to more efficient waste management, reduced energy consumption, and improved public safety. The Swedish government agencies are utilizing AI to predict and respond to disasters. The Swedish Civil Contingencies Agency (MSB) uses AI to predict the spread of disasters, identify at-risk areas, and coordinate response efforts. The Swedish Meteorological and Hydrological Institute (SMHI) uses AI to improve weather forecasting accuracy and develop early warning systems. The Swedish Geological Survey (SGU) uses AI to predict the risk of landslides and design resilient infrastructure.

2.15. Taiwan

Taiwan has established a strong digital infrastructure characterized by high-speed internet connectivity and widespread access to digital devices. This facilitates effective communication and data sharing during emergencies. The government has embraced cloud computing to store and analyze extensive amounts of data relevant to disaster management. This enables swift access to information and promotes collaboration among various agencies engaged in disaster response. Furthermore, Taiwan leverages IoT devices and sensors for real-time monitoring of crucial factors like weather conditions, air quality, and infrastructure stability. This data aids in early detection of potential disasters and supports proactive response measures (Kai-Yuan Ke, 2020). The development of digitalization for earthquake prediction is underway, with the Central Weather Bureau working on an advanced system for enhanced accuracy and quicker response times. The Water Resources Agency is also employing AI to improve flood prediction accuracy and timeliness. Additionally, the National Fire Agency is utilizing AI to monitor the real-time location and availability of firefighters. Residents of this bustling city benefit from autonomous cars and buses, renewable energy sources for household needs, and a comprehensive recycling system for waste materials. They can also take comfort in knowing that AI is actively mitigating the impact of natural disasters.

2.16. Switzerland

Switzerland has fully embraced digital transformation to enhance its disaster management capabilities. The country has successfully implemented advanced early warning systems, utilized GIS technology for data analysis, developed mobile applications for real-time information, employed drones for surveillance and rescue operations, and utilized data analytics and AI for effective management. Switzerland's top-

ranking position in the Network Preparedness Waseda rankings this year is a testament to its investments in this field. The country promotes innovation through public-private partnerships, aiming to enhance disaster preparedness, response, and recovery, establishing Switzerland as a leading country in smart disaster management. Data analytics and artificial intelligence play a crucial role in Switzerland's approach. By leveraging these technologies, Switzerland can analyze large volumes of data, identify patterns, predict potential risks, and optimize resource allocation during emergencies.

2.17. Australia

Australia has successfully adopted cutting-edge digital technologies and strategies to enhance its disaster management capabilities. The country has implemented advanced early warning systems that utilize real-time data from sensors and satellites to detect and predict natural disasters. Remote sensing and satellite imagery play a crucial role in disaster management, providing valuable information for monitoring and response operations. Australia aims to enhance its disaster resilience and response capabilities by embracing digitalization and innovative technologies. The Commonwealth Scientific and Industrial Research Organization (CSIRO) is developing an AI-powered system capable of predicting bushfire spread within minutes or AI algorithms can provide advance warnings and enable authorities to take appropriate measures to protect lives and property. The Australian Emergency Management Institute utilizes AI to identify the safest evacuation routes for individuals in danger. By considering various factors such as traffic conditions, population density, and infrastructure, AI algorithms can optimize evacuation plans and save lives. Through AI-powered traffic management, public transportation optimization, waste management efficiency, and energy consumption reduction, smart cities are becoming more sustainable and livable. Simultaneously, AI applications in disaster management, including bushfire prediction, flood forecasting, and evacuation planning, are enhancing preparedness and response capabilities. As AI technology continues to evolve, it is expected that Australia will remain at the forefront of AI innovation, exploring new and inventive ways to utilize AI for the betterment of its citizens and the environment.

2.18. Finland

The Smart City program in Helsinki, Finland, aims to enhance energy efficiency, mobility, and citizen services using digital technologies and data analytics. The Finnish Transport Agency contributes to this initiative by providing open transportation data, which supports the development of innovative mobility solutions. The Emergency Response Centre Agency plays a vital role in coordinating emergency services

and utilizes advanced communication systems. The national emergency alert system, FINNMEDI, enables authorities to send emergency messages to citizens through various channels. Additionally, the "112 Suomi" mobile application provides real-time emergency information, allows incident reporting, and offers guidance on emergency procedures (Campioni, 2023).

2.19. Thailand

The Thai government is actively implementing the Smart City Thailand project, which incorporates advanced technologies such as IoT, data analytics, and AI to enhance urban services. The City Data Platform collects and analyzes data in real time to facilitate informed decision-making. In terms of natural disaster management, the National Disaster Warning Center (NDWC) utilizes cutting-edge technologies like early warning systems and satellite imagery analysis. The NDWC ensures timely alerts and supports emergency response operations. These initiatives are aimed at creating sustainable and resilient cities in Thailand. Thailand, along with Denmark, secured the second position in this year's Online Service Waseda rankings. In Bangkok, digitalization is utilized to optimize traffic signals and manage traffic flow in real time. This implementation has resulted in reduced congestion and improved air quality. Travel times have also been significantly reduced, enhancing the overall efficiency of the city's transportation network. Chiang Mai has leveraged AI to enhance the efficiency and convenience of its public transportation system. The Royal Irrigation Department has harnessed the power of AI to predict the occurrence and severity of floods. By analyzing various data sources, AI algorithms can provide more accurate and timely flood forecasts. This enables authorities to take proactive measures and mitigate the impact of flooding on vulnerable areas and communities. The Disaster Prevention and Mitigation Department is leveraging digitalization to enhance emergency response coordination and communication. AI-powered systems track the real-time location and status of emergency responders, enabling efficient resource allocation and timely assistance to affect areas. This improves the overall effectiveness of emergency response efforts and enhances public safety. The Thai government's proactive approach to incorporating AI sets an example for other countries seeking to enhance their smart city infrastructure and disaster management capabilities.

2.20. Saudi Arabia

Saudi Arabia has initiated the NEOM project, which prioritizes the utilization of advanced technologies such as AI and renewable energy to establish a sustainable urban environment. These endeavors position Saudi Arabia as a frontrunner in smart city development and disaster management solutions. The Red

Sea Project focuses on sustainability and guest experience, utilizing AI to reduce environmental impact and provide personalized recommendations. AI manages energy consumption, helping to reduce the project's carbon footprint. Waste reduction and efficient disposal are also achieved through AI. The Saudi Vision 2030 encompasses the development of smart cities. The Saudi Civil Defense effectively coordinates emergency response operations using advanced communication systems. The "Saudi Alert" application offers real-time emergency information and guidance, while the "911" hotline efficiently handles emergency calls and dispatches response teams. Additionally, AI provides personalized recommendations to guests, enhancing their stay and satisfaction. The National Center for Meteorology (NCM) utilizes AI to improve weather forecasting accuracy and develop early warning systems for disasters such as sandstorms and floods. By analyzing data and patterns, AI algorithms can predict the intensity and path of these disasters, enabling authorities to issue timely warnings and implement preventive measures. The Saudi Civil Defense (SCD) also employs AI to predict the spread of disasters, identify at-risk areas, and coordinate response efforts.

2.21. UAE

The United Arab Emirates (UAE) is actively implementing the Dubai Smart City project, which aims to integrate technologies like IoT, AI, and blockchain to enhance various urban services including transportation, energy, waste management, and public safety. The government has made significant investments in digital technologies to improve emergency response capabilities. The National Crisis and Emergency Management Authority (NCEMA) plays a crucial role in coordinating emergency responders through advanced communication systems. To ensure citizen preparedness and effective emergency response, the UAE has developed platforms and apps like "UAE Alert" and the "999" hotline. Additionally, the government promotes the use of drones for disaster management and has established regulations and training programs to ensure their safe and efficient utilization (Adamowicz, 2023).

2.22. France

According to a report by the Statista Research Department, the French government's "Smart City Plan" aims to enhance energy efficiency, transportation, waste management, and citizen services through the utilization of digital technologies. The plan promotes the implementation of IoT devices, smart grids, and data analytics to optimize urban infrastructure. The "Territoires d'Innovation" program provides funding and resources to support the development of smart cities. To ensure public safety, the SAIP

mobile application offers real-time emergency information and guidance, while emergency hotlines like "112" and "18" handle calls and dispatch response teams. The integration of digitalization in major cities like Paris, Lyon, and Toulouse's smart city initiatives exemplifies the French government's commitment to using technology for the improvement of cities and citizens. By optimizing traffic signals, reducing waste, and monitoring air quality, these cities are becoming more sustainable, efficient, and livable. In terms of disaster management, the French Civil Security, Météo-France, and BRGM employ AI to predict the spread of disasters, identify high-risk areas, and coordinate response efforts. By analyzing data and patterns, the system can forecast the path and intensity of wildfires, floods, thunderstorms, tornadoes, landslides, and more. This enables authorities to issue timely warnings, develop evacuation plans, and design resilient infrastructure. The incorporation of digitalization in smart city development and disaster management in France demonstrates the government's dedication to leveraging technology for the safety and well-being of its citizens. These initiatives aim to create sustainable, resilient, and livable cities that enhance the quality of life for residents and visitors alike.

2.23. Italy

Italy's "National Smart City Strategy" provides guidance for local governments to implement smart city projects, aiming to enhance urban livability, sustainability, and economic growth. The government has made significant investments in digital technologies and systems to improve emergency response capabilities, especially for natural disasters such as earthquakes, volcanic eruptions, and floods. The government initiative in Rome endeavors to transform the city into a more intelligent urban area. AI is utilized to optimize traffic signals, decrease energy consumption, and offer personalized public transportation recommendations, thereby improving traffic flow, reducing pollution, and enhancing residents' quality of life. Likewise, the government initiative in Turin strives to transform the city into a more intelligent urban area. AI is employed to optimize traffic signals, minimize waste, and provide personalized healthcare services, thereby enhancing traffic flow, reducing pollution, and improving residents' quality of life. The National Civil Protection Department (DPC) serves as the Italian government agency responsible for disaster management. The Italian Meteorological Service (SMI) is the government agency responsible for weather forecasting and disaster warnings. AI is employed to develop innovative solutions to safeguard Italy against natural hazards, such as landslides and floods.

2.24. Iceland

Reykjavik, the capital city of Iceland, has taken a leading role in the government's efforts to develop smart cities. Smart solutions have been implemented in transportation, energy, waste management, and public services. The city has also introduced smart waste management systems and advanced monitoring systems for natural hazards. The Icelandic Meteorological Office and the Icelandic Civil Protection Agency utilize geospatial data, satellite imagery, and real-time monitoring systems to provide accurate information and timely warnings to the public. The SafeTravel website and app offer up-to-date information to travelers, while the 112 Iceland app enables citizens to report emergencies and share their location for faster assistance.

2.25. Indonesia

The Indonesian government is actively working towards creating smarter and more connected cities through initiatives like the "100 Smart Cities Movement." This movement aims to transform 100 cities in Indonesia into smart cities by 2025, focusing on improving public services, transportation, waste management, and citizen engagement through digital technologies. The government has also invested in enhancing emergency response capabilities for natural hazards like earthquakes, volcanic eruptions, and tsunamis. The National Disaster Management Agency (BNPB) oversees disaster management efforts and utilizes advanced communication and information systems for efficient coordination. The "InaSAFE" platform provides real-time hazard information, risk assessment, and decision-making support during emergencies. Emergency hotlines and the use of drones further contribute to effectively handling disaster and emergency situations.

III. Conclusion:

Governments' digitalization efforts in smart city development, mobility, and disaster management have resulted in significant advancements in urban services, emergency response systems, and overall city resilience. Smart city initiatives optimize energy usage, waste management, and transportation systems through IoT devices, smart grids, and data analytics. Digitalization has revolutionized transportation with real-time monitoring, intelligent systems, and mobile applications. Disaster management benefits from advanced technologies, including real-time monitoring, geospatial data, and satellite imagery, enabling accurate warnings and citizen assistance.

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C. Digital Health

I. Introduction:

The push for superior governmental digital services includes healthcare, but there are challenges in governance and risk management. Digital healthcare devices have the potential to cause harm, and finding a balance between security and aesthetics is difficult. Approval processes in healthcare governance are more involved. Factors such as patient activation, digital skills, health literacy, and health confidence influence healthcare consumers' decisions to self-serve or participate in their care. The problems facing digital healthcare vary between nations, with preferences for in-person interactions in the UK due to the NHS, while cost considerations may encourage online health services in the US. This paper analyzes the application of digital health in government operations among 25 countries earning the highest scores in the Waseda rankings. Different case studies resulted in different lessons behind.

II. Discussion and Findings:

1. Digital Health Implementations in Government Operations

Digital health is a rapidly growing field worldwide, with many countries recognizing its potential to improve healthcare delivery, increase access to care, and enhance patient outcomes. Here are some worldwide trends and plans for digital health:

- Telehealth and telemedicine:
- Electronic health records (EHRs):
- Health information exchange (HIE):
- Artificial intelligence (AI) and machine learning:
- Mobile health (mHealth) and wearable devices:
- Data privacy and security:
- Collaborative initiatives and partnerships:

These digital health applications aim to transform healthcare delivery, improve patient outcomes, and create a more connected and efficient healthcare ecosystem. The findings conducted in this paper go specifically in analyzing case studies from 25 countries earning the top scores in the Waseda rankings.

2. Countries analysis:

2.1. Denmark

Denmark leads in e-health and digital health tech. This year, the country ranked first in the Waseda rankings and top 3 of many indicators, i.e., Online Services and Digital Transformation and Open Government. It has a strong digital infrastructure and commitment to healthcare digitalization. Key initiatives include the national electronic health record system "Sundhedsplatformen" for secure information sharing. Denmark also established the "Health Data Hub" for ethical data sharing, research, and innovation (Coiera, 2009). The utilization of electronic health records (EHRs) is a crucial aspect of Danish digital health. These digitalized versions of patients' medical records can be accessed by authorized healthcare providers across the country, greatly facilitating care coordination and enhancing the patient experience. Denmark has also emerged as a pioneer in telemedicine, which leverages technology to deliver healthcare services remotely. Telemedicine encompasses various applications, including remote consultations, disease diagnosis, and even treatment provision. By eliminating the need for physical visits to healthcare facilities, telemedicine enables patients to conveniently access necessary healthcare services. Furthermore, the Danish government has introduced several other digital health solutions alongside EHRs and telemedicine. These include online prescription refills, allowing patients to conveniently renew their medications without visiting a doctor's office. Secure messaging platforms enable secure communication between patients and healthcare providers. Digital appointment scheduling empowers patients to book appointments online, while self-service kiosks facilitate check-ins, bill payments, and access to relevant information. The implementation of these digital health solutions has significantly improved efficiency and convenience within the Danish healthcare system. Waiting times have been reduced, unnecessary in-person visits have been minimized, and communication between patients and healthcare providers has been enhanced. Moreover, the adoption of digital health solutions has led to cost savings for both patients and the healthcare system, as it reduces the need for physical visits and streamlines administrative processes. Overall, Denmark's utilization of EHRs, telemedicine, and other digital health solutions has revolutionized its healthcare system. It has enhanced healthcare accessibility, increased efficiency, and reduced costs, making it a notable model for other countries to emulate.

2.2. Canada

To improve healthcare, propel innovation, and increase positive results, Canada has enthusiastically embraced e-health and digital health. Electronic health records (EHRs) that can communicate with one another in a secure manner are a fundamental endeavor. Because of the COVID-19 epidemic, the use of telemedicine and other forms of virtual treatment is increasing, especially in outlying locations. Data analysis, policy choices, and innovation are all aided by the existence of digital health infrastructure like the Canadian Institute for Health Information (CIHI) and the Canadian Foundation for Healthcare Improvement (CFHI). Canada is at the forefront of healthcare innovation because of its dedication to interoperability, telemedicine, patient involvement, and research. To improve digital health in Canada, the federal agency Canada Health Infoway works together with other governments, healthcare providers, and physicians. Infoway funds projects to increase electronic health record (EHR) interoperability and create innovative digital health tools and services. The Electronic Health Record (EHR) and other health information are accessible via MyHealthRecord, a secure internet interface available to all Canadians outside of Quebec (The Conversation, 2019). Another online tool that helps Canadians learn what prescription pharmaceuticals are covered by their provincial or territorial health care system is the Canada Prescription Drug List (CPDL). The Canadian government has also put money into increasing people's ability to use "virtual care services," or healthcare delivered over computer networks. Canada's healthcare system has benefited greatly from these digital health advances. They have boosted the standard of treatment by easing coordination and making visits more pleasant for patients. By eliminating the need for human labor, digital health solutions have enhanced productivity, freeing up medical staff for other important work. In addition, these innovations have helped lower the overall cost of providing healthcare. Digital health solutions have been well-received by patients because to the efficiency and comfort they provide.

2.3. UK

According to the data on the UK Parliament website, the nation invests in digitalizing healthcare for efficiency, outcomes, and access. Key initiatives include electronic health records (EHRs) and the NHS Digital Health and Social Care Integration Platform for secure information sharing. Telemedicine and remote monitoring expand access, especially during COVID-19. NHS Digital is a government agency responsible for delivering digital services to the NHS. They have developed various systems and services, including the NHS App, NHS website, and NHS Spine, a secure network connecting NHS

organizations. The NHS serves as a secure network connecting NHS organizations, facilitating the electronic sharing of patient information. The UK government is actively working on new digital health initiatives, including integrated care systems (ICSs). ICSs are partnerships between NHS organizations and other healthcare providers, leveraging digital technology to enhance care integration and provide patients with a seamless experience. Remote monitoring is another digital health initiative that enables healthcare providers to remotely monitor patients' health using wearable devices and sensors. This approach improves chronic disease management and helps prevent complications. Artificial intelligence (AI) is also playing a significant role in digital health. It is being utilized in various ways, such as developing diagnostic tools, enhancing the accuracy of medical imaging, and supporting clinical decision-making.

2.4. New Zealand

New Zealand prioritizes telehealth and virtual care (Clarkson, 2021). COVID-19 accelerates remote consultations and digital tools. Telehealth infrastructure supports care, especially in rural areas. Digital solutions empower patients with access to health information and active participation. My Health Record portal enables viewing medical history, test results, and online services. Data privacy and security are paramount in e-health initiatives with strict regulations to protect patient information. HealthInfoNet and My Health Record are secure nationwide networks that enable healthcare providers throughout New Zealand to electronically share patient information. The National Telehealth Service offers New Zealanders remote access to various healthcare services, including video consultations, phone consultations, and email consultations. The ePrescription Service allows healthcare providers to electronically send prescriptions to pharmacies. The COVID-19 Contact Tracing App helps track the spread of COVID-19 by notifying users if they have been in close contact with someone who has tested positive for the virus. Efforts to enhance digital health services for rural and remote communities ensure better access to healthcare in these areas.

2.5. Singapore

Singapore prioritizes digital health investments to improve healthcare and patient outcomes. The NEHR system enables secure access and sharing of patient information, enhancing care coordination, and reducing duplication. Telemedicine and virtual care services, like HealthHub and teleconsultation, ensure remote healthcare access, especially during COVID-19 (The Ministry of Health Singapore,

2023). NEHR is a secure online database that stores the health records of all Singaporeans. Authorized healthcare providers across Singapore can access this database, enabling them to coordinate care more efficiently. HealthHub is a secure online platform where Singaporeans can view their health records, schedule appointments, and order repeat prescriptions. In addition, the Singapore government is promoting the use of telemedicine to improve access to healthcare services, particularly for those in rural or remote areas.

The Singapore government is also actively working on several new digital health initiatives, including:

- Integrated care systems (ICSs): the collaborations between public and private healthcare organizations that leverage digital technology to improve care integration and provide patients with a seamless experience.
- Remote monitoring: this enables healthcare providers to remotely track patients' health using wearable devices and other sensors. This approach enhances the management of chronic diseases and helps prevent complications.
- Digital health for the elderly: The Singapore government is developing digital health solutions to cater to the needs of the elderly population. For instance, a digital health platform is being created to empower the elderly to manage their own health, stay connected with healthcare providers, and access support services.

2.6. South Korea

South Korea is heavily investing in e-health and digital health. The National Health Insurance Service (NHIS) integrates health databases to provide comprehensive services (The Healthcare IT, 2023). Telemedicine is expanding access, particularly in remote areas, through the establishment of telemedicine centers and the implementation of policies that enable remote consultations and prescriptions, reducing the need for in-person visits. The NHIS has been instrumental in driving digital health innovation by providing funding and assistance for the development and implementation of new digital health solutions. The Korea Health Industry Development Institute (KHIDI), a government-funded research institute, plays a crucial role in promoting digital health innovation through research, education, and industry support. The government's Smart Hospital Program aims to establish smart hospitals in South Korea that leverage digital technology to enhance the quality, efficiency, and accessibility of healthcare services. Additionally, the government has established the Digital Healthcare

Innovation Fund to provide financial assistance to startups and venture capital firms in the development of digital health technologies and services, fostering innovation in the digital health sector.

2.7. USA

The US invests in digital health initiatives like HIE and EHRs. HIE allows for the secure exchange of patient information, promoting care coordination. The Meaningful Use program incentivizes EHR adoption for improved healthcare delivery (Electronic Health Information Exchange, 2023). Telehealth expanded during COVID-19 with relaxed regulations and reimbursement policies for remote consultations and monitoring. The NIH is a leading research agency that heavily invests in digital health research. One notable initiative is the All of Us Research Program, which aims to create a national research database of health information from over one million Americans. The FDA regulates medical devices and drugs in the US and has established programs like the Digital Health Innovation Action Plan and the Breakthrough Devices Program to support digital health technologies. The ONC, part of the US Department of Health and Human Services, promotes the adoption and use of health information technology through programs like the Meaningful Use Program and the Health IT Certification Program. The US government also provides funding for digital health through agencies like the CDC and the AHRQ.

2.8. Netherlands

The Netherlands has made significant advancements in digital health. The Dutch Personal Health Record (PGO) allows individuals to access and manage their health information, including medical records, test results, and medication history. The National Exchange Point for Healthcare Information (LSP) enables secure exchange of patient information among healthcare providers, promoting care coordination and reducing duplication of tests and procedures. The Dutch government has formulated a comprehensive national strategy for digital health, outlining its vision for the future of healthcare in the Netherlands. The strategy aims to enhance the quality, efficiency, and accessibility of healthcare through the utilization of digital technology. Electronic health records (EHRs) play a crucial role in the Dutch healthcare system, as they are utilized by all healthcare providers across the country. This integrated EHR system enables the seamless sharing of patient information, enhancing care coordination and ensuring a smoother patient experience. Telemedicine is being actively promoted by the Dutch government to facilitate easier access to healthcare services, particularly for individuals

residing in remote or rural areas. Various telemedicine programs, such as the Dutch Telemedicine Center and the National Telemedicine Program, have been established to support this initiative. To facilitate patient engagement and convenience, the Dutch government has implemented platforms like MijnZorgNet, an online portal where patients can securely access their EHRs, schedule appointments, and order repeat prescriptions. Additionally, ZorgDomein serves as a secure online platform for healthcare providers to collaborate and communicate effectively. TeleZorg Nederland, a network of telemedicine providers, offers diverse telemedicine services, including video consultations, phone consultations, and remote monitoring. Thuisarts.nl is a reliable website that provides patients with access to comprehensive health information and advice. The Dutch government is committed to leveraging digital health to transform healthcare delivery and enhance the well-being of its citizens. Investments are being made in innovative digital health technologies, while policies and regulations are being developed to ensure responsible and ethical development and utilization of digital health solutions.

2.9. Estonia

Estonia possesses a sophisticated digital health infrastructure, which includes the Estonian Electronic Health Record (EHR) system. This system enables secure access and sharing of patient information among healthcare providers. Estonia also boasts an e-prescription system for electronic prescribing and a convenient e-consultation system for remote specialist advice. These advancements enhance healthcare access, reduce waiting times, and improve patient safety. According to the data from the website e-Estonia, the nation has successfully implemented a comprehensive e-health Record system that allows patients and healthcare providers to securely access medical records. Patients can utilize this system to review their medical history, lab results, and prescribed medications, while healthcare providers can effectively coordinate care and make informed treatment decisions. In addition, Estonia has introduced the e-Ambulance, a mobile medical unit that employs telemedicine to deliver urgent care to patients residing in remote areas. Equipped with essential medical equipment such as a defibrillator, electrocardiogram machine, and ultrasound machine, paramedics on the e-Ambulance can consult with doctors at the hospital through telemedicine and receive expert advice on patient treatment. Moreover, Estonia has successfully implemented the e-Prescription system, allowing doctors to electronically prescribe medications. Patients can conveniently collect their prescriptions from any pharmacy within the country. This system has significantly improved patient access to medications while reducing the risk of prescription errors. Estonia's dedication to digital health has garnered international recognition,

with the country receiving numerous awards for its innovative solutions. It is frequently cited as a leading example of a nation that effectively utilizes technology to enhance healthcare delivery.

2.10. Ireland

Ireland has implemented digital health initiatives to enhance healthcare delivery. The Health Identifier (HI) system assigns unique identifiers to individuals, enabling secure access and sharing of patient information among healthcare providers. The eHealth Ireland program focuses on developing and implementing digital health solutions, including the Electronic Health Record (EHR) system, telehealth services, and mobile health applications. The Health Service Executive (HSE) is responsible for healthcare services in Ireland and is actively implementing digital health initiatives. These initiatives include the development of a national electronic health record (EHR) system and the introduction of telemedicine services. Digital Health Ireland, a government-industry partnership, aims to establish Ireland as a global leader in digital health. It focuses on research and development, innovation, and commercialization. Ireland has implemented several digital health solutions in its government operations. MyHealth Record is an online portal that allows patients to securely access their health information, including medical records, prescription history, and immunization records. This service is available to all patients registered with a general practitioner (GP) in Ireland. HSE Telemedicine enables patients to receive healthcare services remotely through video and phone consultations, as well as remote monitoring. This service is particularly beneficial for individuals in rural or remote areas and those with chronic conditions. The COVID-19 Vaccination Portal facilitated online booking of COVID-19 vaccination appointments in Ireland (Cullen, 2019). This user-friendly portal contributed to an efficient and effective vaccination rollout. The Irish government remains committed to investing in digital health and developing innovative solutions to enhance the quality, efficiency, and accessibility of healthcare for all citizens.

2.11. Japan

Japan has been actively investing in digital health in government operations. The government has implemented the My Number system, which assigns a unique identification number to each citizen. This system is used to manage health insurance and facilitate the sharing of medical information (Digital Health on the Rise as Japan's Healthcare System Gets Hi-Tech Makeover, 2023). Japan has also developed the National Electronic Health Record (NEHR) system, which enables healthcare providers

to access and share patient information securely. The NEHR promotes care coordination and reduces medical errors. The Myna Portal is an online platform in Japan that offers secure access to various government services, including healthcare. Through this portal, Japanese citizens can view their medical records, schedule appointments, and request repeat prescriptions. The Japan Medical Data Center (JMDC) is a government-funded organization responsible for collecting and managing health data in Japan. Researchers and healthcare providers can access this data through the JMDC, which supports efforts to enhance healthcare delivery and develop new medical treatments. In response to the COVID-19 pandemic, the Japanese government developed a contact tracing app in 2020. This app helps track the spread of the virus by notifying users if they have been near someone who has tested positive for COVID-19.

2.12. Germany

Germany has implemented digital health initiatives to enhance healthcare delivery. The Electronic Health Card (eGK) system securely stores and exchanges patient information, including medical data, prescriptions, and emergency contact details (The Electronic Medical Data Card, 2022). The Telematics Infrastructure allows healthcare providers to access and exchange patient information, supporting telemedicine services, electronic prescriptions, and electronic referrals. The Elektronische Patientenakte (ePA) is Germany's nationwide electronic health record (EHR) system, currently being implemented for patients and healthcare providers. Patients can use the ePA to access their medical records, schedule appointments, and request repeat prescriptions. Healthcare providers can utilize the ePA to coordinate care and make informed decisions about patient treatment. Additionally, Digitale Gesundheitsanwendungen (DiGA) is a government-approved digital health application. Patients can download DiGAs from the DiGA directory to manage their health conditions, while healthcare providers can prescribe DiGAs to their patients. Moreover, the German government actively promotes the use of telemedicine to improve patient access to healthcare services, especially for those in rural or remote areas. To facilitate this, various telemedicine programs, such as the Telemedicine Act and the Telemedicine Directive, have been implemented.

2.13. Norway

Norway has implemented a comprehensive digital health infrastructure to enhance healthcare services. The National Health Portal empowers individuals to access their health records, book appointments,

and communicate with healthcare providers, promoting patient engagement. The National Health Network facilitates secure exchange of patient information among healthcare providers, reducing duplication of tests and procedures and supporting care coordination (Gafurov, 2020). The Norwegian government is committed to leveraging digital health to achieve these goals and has implemented several initiatives. A key initiative is the establishment of a nationwide electronic health record (EHR) system. This system enables seamless sharing of patient information among healthcare providers, improving care coordination and ensuring a smooth patient experience. The EHR system is currently being rolled out to patients and healthcare providers across the country. Another significant effort is the promotion of telemedicine, which allows patients to remotely access healthcare services through video or phone consultations, as well as remote monitoring. This is particularly beneficial for individuals in rural or remote areas and those with chronic conditions. The Norwegian government has developed various telemedicine programs and is actively working to increase reimbursement for telemedicine services. In addition to the EHR system and telemedicine, the Norwegian government supports the development and adoption of other digital health solutions, including digital health apps, wearable devices, and AI in advanced diagnostic tools. These solutions enhance the accuracy of medical imaging, support clinical decision-making, and improve overall healthcare delivery. The Norwegian government is investing in AI research in the field of digital health and is actively working on developing regulations for its use in healthcare.

2.14. Sweden

Sweden has made significant strides in implementing digital health initiatives within government operations. The National Patient Overview (NPÖ) system enables healthcare professionals to access patient information from different care providers, fostering continuity of care and reducing medical errors (Health Information Portal). Moreover, the National Quality Registers collect and analyze data on medical conditions and treatments, supporting evidence-based decision-making and enhancing healthcare outcomes. The Swedish government has developed a national strategy for eHealth, which sets forth a vision for the future of digital healthcare in Sweden. This strategy aims to leverage digital technology to improve the quality, efficiency, and accessibility of healthcare services for all Swedish citizens. To facilitate better care coordination and provide a seamless experience for patients, the government has implemented a nationwide Electronic Health Record (EHR) system that is utilized by all healthcare providers across the country. This system enables the smooth exchange of patient

information among healthcare providers. To enhance access to healthcare services, particularly for individuals residing in rural or remote areas, the Swedish government actively promotes the use of telemedicine. Various telemedicine programs have been developed, and the government is also working towards increasing reimbursement for telemedicine services. Additionally, the government has established an expedited approval process for digital health apps, with the aim of simplifying access to high-quality apps for patients. This initiative is designed to enhance the utilization of digital health solutions.

2.15. Taiwan

Taiwan has built a robust digital health infrastructure within its government operations. The National Health Insurance system, which includes the National Health Insurance IC Card, allows individuals to access healthcare services and prescriptions electronically. The National Electronic Medical Record system enables secure access and sharing of patient information among healthcare providers, supporting telemedicine, remote consultations, and electronic prescriptions (Tai & Wu, 2022). The Taiwanese government has implemented various initiatives to promote and facilitate the use of digital health technologies and services. All Taiwanese citizens are mandated to carry the NHIC, a smart card containing their medical information, insurance details, medical history, and medication list. This card grants access to healthcare services at any hospital or clinic in Taiwan. The Taiwan Telemedicine Platform allows patients to receive remote healthcare services, including video and phone consultations. It is particularly beneficial for patients in rural or remote areas, as well as those with chronic conditions. These initiatives strive to enhance healthcare accessibility, efficiency, and patient outcomes by harnessing digital health technologies and services in Taiwan.

2.16. Switzerland

Switzerland has implemented digital health initiatives to improve healthcare delivery. The Electronic Patient Dossier (EPD) system enables secure access and sharing of patient information among healthcare providers, promoting care coordination and empowering patients (Kostera, 2018). The Swiss eHealth strategy focuses on promoting digital health technologies and services, including telemedicine, mobile health applications, and electronic prescriptions. The government has formulated a national strategy for digital health that outlines a vision for the future of digital healthcare in Sweden. The strategy focuses on utilizing digital technology to enhance the quality, efficiency, and accessibility of

healthcare for all Swedish citizens. Electronic health records (EHR) are actively promoted to facilitate the seamless exchange of patient information among healthcare providers, improving care coordination and providing patients with a more streamlined experience. Various telemedicine programs have been developed, and the government is working towards increasing reimbursement for telemedicine services. The government has established an expedited approval process for digital health apps, aiming to simplify access to high-quality apps for patients. Additionally, the government is investing in research on digital health apps to further support their development and adoption.

2.17. Australia

Australia has implemented digital health initiatives to improve healthcare delivery. The My Health Record system enables individuals to access and manage their health information online, promoting patient engagement and facilitating information sharing among healthcare providers. The National Digital Health Strategy focuses on enhancing interoperability, promoting telehealth services, and improving digital health literacy among healthcare professionals and the public. Australia's government is dedicated to leveraging digital health to enhance healthcare quality, efficiency, and accessibility for all citizens. Several key initiatives have been implemented. The ADHA is a government agency responsible for developing and implementing the Australian Digital Health Strategy, which provides leadership and support to the digital health sector. The My Health Record is a secure online platform that stores individuals' essential health information, including medications, allergies, and immunizations. This record is accessible to authorized healthcare providers, ensuring continuity of care. Medicare Benefits Schedule (MBS) is a list of medical services funded by the government. It includes various items specifically for telehealth services, enabling patients to receive healthcare remotely. These initiatives collectively aim to improve healthcare outcomes and make healthcare services more accessible and efficient for all Australians.

2.18. Finland

Finland is renowned globally for its leadership in digital health, and the government plays a pivotal role in promoting and facilitating the advancement and adoption of digital health technologies and services. Finland has established a robust digital health infrastructure in government operations. The Kanta Services, including the Electronic Prescription system, Patient Data Repository, and My Kanta Pages, allow individuals to access their health records, manage prescriptions, and communicate with healthcare

providers. Additionally, the National Health Information Exchange (KanTa) facilitates the secure exchange of patient information among healthcare providers, promoting care coordination and reducing medical errors (Health Information Exchange in Finland, 2018). One of the key government initiatives is the implementation of the National Electronic Health Record (EHR) system, known as Kanta. This nationwide EHR system is utilized by all healthcare providers across the country. Kanta enables seamless sharing of patient information, enhancing care coordination and providing patients with a more integrated healthcare experience. The government is actively promoting the utilization of telemedicine to improve access to healthcare services, particularly for individuals residing in rural or remote areas. Numerous telemedicine programs have been developed, and efforts are underway to increase reimbursement for telemedicine services. The government is actively encouraging the development of wearable devices, such as smartwatches and fitness trackers, which can monitor health data such as heart rate, blood pressure, and activity levels. These devices have the potential to enhance healthcare delivery and patient outcomes.

2.19. Thailand

Thailand has made significant progress in digital health within its government operations, ranking 3rd in the Waseda Online Services rankings. The National eHealth System, including the Electronic Health Record system and the Universal Coverage Scheme, facilitates the access and sharing of patient information among healthcare providers, enhancing care coordination and efficiency (Patel, 2023). Thailand has also implemented a telemedicine platform, enabled remote medical consultations, and improved healthcare access, particularly in remote areas and for specialized care. The NHI Smart Card is available to all Thai citizens and contains vital medical information like insurance details, medical history, and medication lists, allowing individuals to access healthcare services at any hospital or clinic in Thailand. The NHSO Telemedicine Platform offers remote healthcare services, including video and phone consultations, which are particularly beneficial for patients in rural or remote areas and those with chronic conditions. The Thailand Health Cloud is a secure online platform where Thai citizens can access their electronic health records (EHR) and other health information. It also provides features like appointment booking, repeat prescription ordering and communication with healthcare providers. The National EHR System, set to be fully operational by 2026, will enable healthcare providers across Thailand to access a patient's complete medical history, regardless of where they received care.

2.20. Saudi Arabia

There have been massive expenditures on digital health infrastructure in Saudi Arabian government institutions. According to the Ministry of Health and Prevention's website, the National Unified Medical Record (NUMR) system's stated goal is to provide a single electronic health record for every individual in the country, which in turn would facilitate better care coordination and cut down on preventable medical mistakes. While also giving information on healthcare services and encouraging health education, the Sehaty app enables users to access their health data, schedule appointments, and contact with their healthcare professionals. All Saudi citizens and residents will benefit from the government's continued investments in digital health and the creation of ground-breaking technologies to improve healthcare quality, efficiency, and access. The Saudi government is also encouraging businesses to use digital health solutions. There have been campaigns conducted to get private clinics and hospitals to adopt EHRs and start offering telemedicine. The healthcare system in Saudi Arabia has improved significantly because to the government's dedication to digital health. The quality, efficiency, and availability of medical treatment for all Saudi citizens and residents have been greatly enhanced thanks to these digital technologies.

2.21. UAE

The United Arab Emirates (UAE) has made significant investments in digital health within its government operations. The UAE Health Information Exchange (HIE) allows secure access and exchange of patient information among healthcare providers, promoting care coordination and reducing duplication of tests. The UAE Telemedicine Program offers remote healthcare services, particularly valuable during the COVID-19 pandemic, enabling patients to consult with healthcare professionals from home. The Ministry of Health and Prevention (MoHAP) in the UAE has introduced various digital health services, including a mobile app, a telemedicine service, a national COVID-19 testing, and vaccination program supported by a digital platform, facilitating efficient management, and tracking of testing and vaccination efforts. The UAE government remains committed to investing in digital health and developing innovative solutions to enhance the quality, efficiency, and accessibility of healthcare for all UAE citizens and residents.

2.22. France

France has made significant advancements in digital health within its government operations. The Health Data Hub has been implemented to collect and analyze health data, supporting research and improving healthcare outcomes while maintaining patient privacy and security. The Dossier Médical Partagé (DMP) system allows individuals to access and manage their health information, promoting care coordination and facilitating the sharing of medical data among healthcare providers (French Property, 2019). Over 21 million French citizens and more than 1 million healthcare providers utilize the ENS, which grants patients access to their electronic health records (EHR) and other health information. They can also schedule appointments, request repeat prescriptions, and communicate with their healthcare providers. The MDMP, used by over 10 million French citizens, enables patients to share their EHR with healthcare providers and trusted individuals. This improves care coordination and ensures timely access to medical information. To enhance healthcare accessibility, the French government has implemented various telemedicine initiatives. The Telesanté platform allows patients to receive remote healthcare services, including video and phone consultations. This is particularly beneficial for individuals in rural or remote areas, as well as those with chronic conditions.

2.23. Italy

Italy has made significant progress in digital health within government operations. The implementation of the Electronic Health Record (EHR) system allows for secure access and sharing of patient information among healthcare providers, promoting care coordination and reducing medical errors. The application implementation, such as the Immuni app, Dreceta app, or Prenota Salute app, allows patients to easily track their health history and book appointments online. Furthermore, the Italian government is actively working on developing innovative digital health solutions, such as:

- Utilizing artificial intelligence (AI) to support clinical decision-making and enhance the accuracy of medical imaging.

- Introducing wearable devices to monitor patient health data and promote preventive healthcare.

- Implementing blockchain technology to ensure the security of patient data and enhance the efficiency of healthcare processes.

Additionally, the Electronic Prescription (ePrescription) system enables healthcare providers to electronically prescribe medications, improving medication management and reducing the risk of prescription errors.

2.24. Iceland

Iceland has a robust digital health infrastructure in government operations. The National Electronic Health Record (NEHR) system enables secure access and sharing of patient information among healthcare providers, enhancing care coordination and delivery. The Heilsuvera app provides individuals with access to health records, appointment booking, communication with healthcare providers, and information on healthcare services and education. The national health insurance program in Iceland effectively utilizes digital health technology, employing an electronic claims processing system for efficient claims processing. Additionally, the NHIA oversees the national prescription drug program using digital health technology. The Icelandic Directorate of Health utilizes digital health technology to monitor public health and prevent disease outbreaks, employing an electronic disease surveillance system for monitoring infectious diseases. Furthermore, the Directorate of Health coordinates vaccination campaigns through digital health technology. The Icelandic Ministry of Health aims to improve healthcare delivery by implementing a national Electronic Health Record (EHR) system, facilitating seamless sharing of patient information among healthcare providers. The Ministry of Health actively promotes the use of telemedicine services.

2.25. Indonesia

Indonesia has implemented digital health initiatives in government operations. The Electronic Health Record (EHR) system centralizes patient information, facilitating access and sharing among healthcare providers. The Sehati app allows individuals to access health records, book appointments, and consult with healthcare professionals remotely. The app also provides health education and information on healthcare services (Mulyanto, 2022). This year, Indonesia ranked fifth in the Online Services rankings. The implementation of a mobile app enables patients to conveniently schedule appointments, request repeat prescriptions, and access their medical records. The national COVID-19 testing and vaccination program, supported by a digital platform, efficiently manages and tracks testing and vaccination efforts across the country. The SATUSEHAT Platform has gained significant traction, with over 10 million Indonesian citizens and more than 10,000 healthcare providers utilizing it. This platform enables

patients to access their EHR, book appointments, order repeat prescriptions, and communicate with their healthcare providers. The National EHR System has been implemented in over 1,000 hospitals and clinics throughout Indonesia, with plans for full operational coverage by 2024. This system will be utilized by both public and private healthcare providers, ensuring comprehensive and standardized access to patient health information. Lastly, the Telemedicine Program has been adopted by over 1 million Indonesians, providing crucial healthcare services to individuals in remote or rural areas, as well as those managing chronic conditions.

III. Conclusion:

Governments worldwide are embracing digital health initiatives to enhance healthcare delivery and outcomes. These efforts leverage technology to improve access, efficiency, and quality of services. Benefits include increased access for underserved populations, efficient data collection and analysis, cost reduction through remote monitoring and telehealth, and enhanced patient engagement. However, challenges such as interoperability issues, data privacy concerns, and resistance to change can impede implementation. The digital divide and financial constraints also pose obstacles. To address these, governments are focusing on improving interoperability, investing in digital infrastructure, fostering collaborations, and continuously evaluating and refining initiatives for patient-centered care.

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8. Methodology and Contributors

For evaluating digital government development, this ranking survey is based on a group of indicators to evaluate the overall digital government development in a country, ranging from policy development and e-Services implementation to management optimization and digital government promotion. To improve the evaluation of digital government development in a country, from 2010, the ranking added an e-participation indicator. In 2014, both Open Government Data and Cybersecurity were also added to the ranking. In the 2017 Ranking, the research team added "the usage of emerging ICT technologies". It makes the total ten main indicators for evaluation. And in 2022, in the section of Open Government/Data, Digital Transformation (DX) is added.

Increasing the quality, the assessment used a questionnaire as a tool to obtain some information from respondents who reside in the countries. The respondents are government officers who work for a ministry that concerns digital government and, to some extent, respondents from academia who are knowledgeable in digital government. The score will use the feedback as additional information to mitigate the sample risk, thus, reducing bias during scoring. The following diagram shows the due process of creating the ranking.

1. Formulation

The Raw score is normalized to the 0-100 scale score using the following formula.

$$NormScore = \frac{RawScore}{MaxScore} \times 100$$

Raw score is the Score generated by averaging the Score 0, Score 0.5 and Score 1 in 3 levels; Max Score is the maximum score of the sub-indicators.

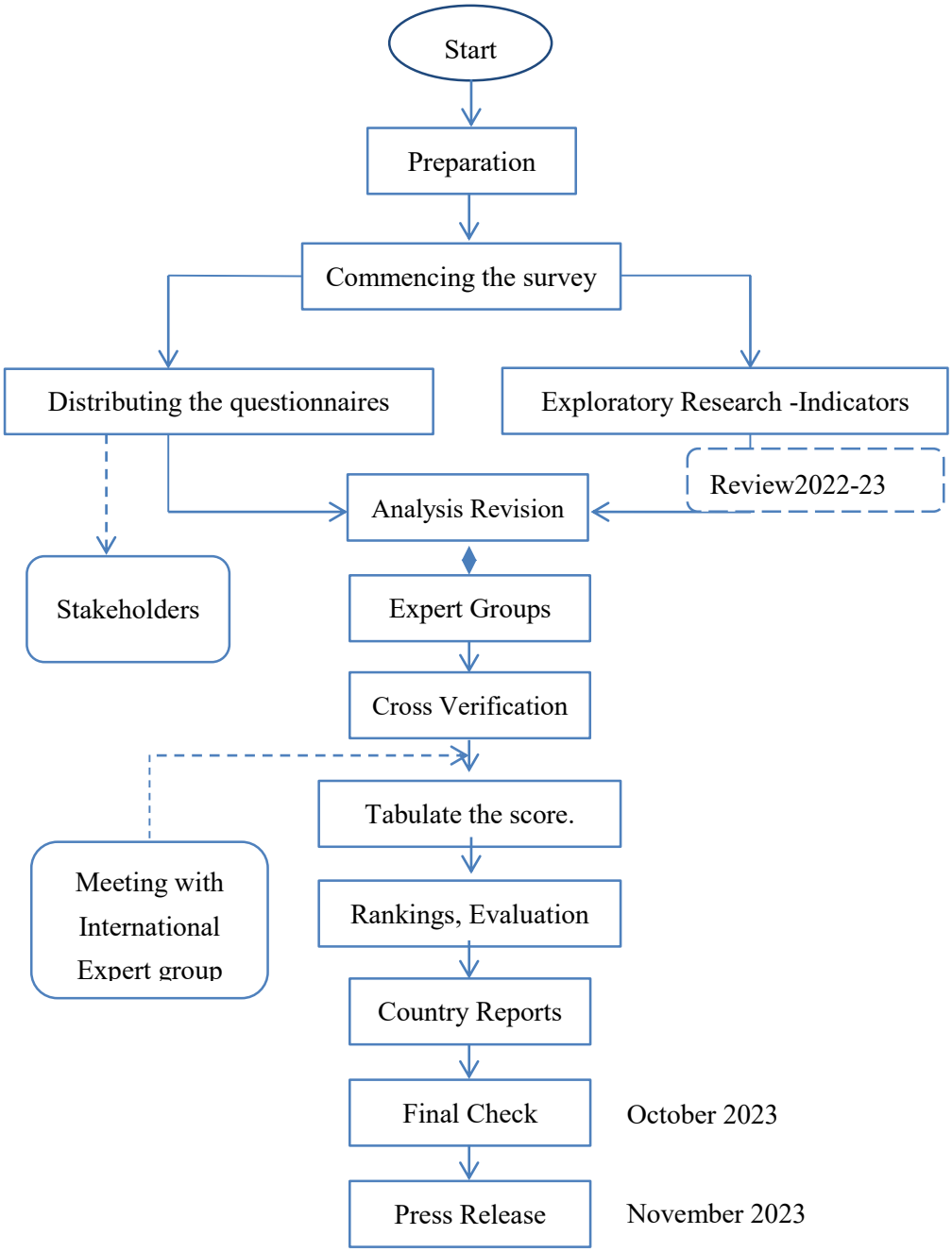
This will generate the Normalized Score which ranges 0 – 100. Furthermore, the Normalized Score is recalculated by weighted rate. The result is the released score that will be used as the source for arranging the rank.

No	Indicators	2023
1	Network Infrastructure Preparedness (NIP)	NormScore x 10%
2	Management Optimization (MO)	NormScore x 12%
3	Online Services (OS)	NormScore x 14%
4	National Portal (NPR)	NormScore x 8%
5	Government Chief Information Officer (GCIO)	NormScore x 10%
6	Digital government Promotion (EPRO)	NormScore x 10%
7	E-Participation (EPAR)	NormScore x 8%
8	Open Government Data (OGD) & DX	NormScore x 10%
9	Cybersecurity (CYB)	NormScore x 10%
10	The emerging technology in Digital government (EMG)	NormScore x 8%

List of Main Indicators

Processes of Evaluation

The following process prepares the rankings.



Processes Diagram

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