Waseda University
19ᵗʰ World Digital Government Ranking 2024 Survey

Table of Contents

Preface

PREFACE

The 19th Waseda International Digital Government Ranking Survey 2024 has been conducted by Institute of Digital Government, Waseda University in cooperation with International Academy of CIO (IAC). Several meetings have been held via both in-person and online for the preparation of the ranking report. The 2024 edition is successfully prepared by the project team headed by Prof. Dr. Naoko Iwasaki, member professors, international experts of IAC, researchers headed by Dr. Nguyen Manh Hien and graduate students.

We appreciate with thanks for all distinguished persons and international organizations listed in the end as acknowledge corner. Especially, we thank for Dr. Obi as founders of both the Waseda Institute and IAC for his great achievement and contribution for 19 years in the fields of DG, DX and ICT. The historical trends over 19 years show the remarkable and fruitful progress based upon digital innovation. Also, we will be pleased to celebrate the next publication as the 20th memorial digital government edition in 2025.

Professor. Dr. Naoko Iwasaki,

Waseda University on behalf of the Team

December, 2024

1．Executive Summary

Highlights

- Singapore overtook Denmark which has won three times, to reclaim first place for the first time since 2017
- Both Saudi Arabia and Thailand join Group of the top 20 digitally advanced countries
- AI application competition is in full swing for the establishment of an "AI government"
- The entry of AI business will deepen the digital divide in domestic and global societies
- Citizen-oriented government services become an important issue in the Internet age
- The Original objective of Digital Government: Administrative and Fiscal Reforms have failed to achieve remarkable success as Growth Engines
- Divergence between the government's optimistic vision and evaluation of execution and performance
- Growing cybersecurity is real risk
- Conspicuous delays in SDGs such as standardization, duplicate investment, and measures to combat the problems of the population ageing

The Institute of Digital Government of Waseda University, Japan has announced the 19th Waseda University Global Digital Government Rankings 2024 in cooperation with International Academy of CIO. This research and analysis targets 66 digitally advanced countries and regions and evaluates the progress of digital government, which is indispensable for people's lives, from various perspectives using 10 key indicators, and contributes to the promotion of a digital society. We have collaborated with the United Nations, the World Bank, the Asia-Pacific Economic Cooperation (APEC), OECD, European Union, United Nations University, and other public and private organizations around the world.

2 ． 2024 Survey Results (Global Digital Government Rankings 2024 Overall Ranking)

Our rankings have enough big data to understand the trends in digital government. This year, as in the previous fiscal year, 66 countries and regions are targeted. The overall ranking of the 2024 rankings, which marked the 19th anniversary, is shown in Table 1.

19th Waseda University Global Digital Government Overall Ranking 2024

Table 1: Overall Rankings with scores

#	Country	Score	#	Country	Score	#	Country	Score
1	Singapore	94.6958	23	France	75.9131	45	Vietnam	66.1456
2	UK	94.4933	24	Indonesia	75.0191	46	Brazil	65.7295
3	Denmark	93.3444	25	Italy	74.1745	47	Turkey	65.3871
4	USA	92.9055	26	India	74.1408	48	Bahrain	64.9521
5	South Korea	92.0923	27	Spain	73.9218	49	Uruguay	64.5636
6	Netherlands	89.7234	28	Austria	73.6951	50	Romania	63.8980
7	Estonia	88.7839	29	Kazakhstan	73.5001	51	Brunei	63.8006
8	Saudi Arabia	88.6157	30	Belgium	72.7962	52	Columbia	62.4468
9	Germany	86.9834	31	Malaysia	72.7780	53	Uzbekistan	60.3000
10	New Zealand	85.1822	32	Israel	71.6896	54	Kenya	60.0938
11	Japan	84.5453	33	Oman	71.6698	55	Egypt	60.0364
12	Canada	83.8700	34	HK	70.9000	56	Argentina	58.2858
13	Ireland	82.7921	35	Philippines	70.3962	57	Pakistan	57.8534
14	Sweden	82.0123	36	Russia	70.2450	58	Peru	57.7553
15	Iceland	80.4813	37	Poland	69.5069	59	Nigeria	57.4120
16	Norway	80.4787	38	South Africa	69.0296	60	Tunisia	57.3086
17	Finland	80.3145	39	Czech	68.1114	61	Morocco	56.0840

18	Thailand	80.1091	40	Lithuania	67.6413	62	Fiji	55.2160
19	Switzerland	79.7118	41	Chile	67.4403	63	Paraguay	54.9768
20	Taiwan	79.3604	42	Portugal	67.2221	64	Bangladesh	52.4999
21	UAE	78.7963	43	China	66.8402	65	Costa Rica	50.3165
22	Australia	78.6834	44	Mexico	66.6262	66	Ghana	42.2337

This year, Singapore returned to first place. Denmark dropped to third place, relinquishing the No. 1 spot it had held for three consecutive years to Singapore. The U.K. is in second place, the U.S. is in fourth place, and South Korea in fifth place has moved up one spot each from two years ago. The Netherlands, which ranked sixth, also moved up two spots from eighth place with good citizen participation and activities being evaluated more than last year. Estonia ranked seventh, Saudi Arabia ranked eighth, followed by Germany in ninth and New Zealand in tenth.

The difference in the progress of digitalization in each country is that the top five places maintain a score of 92 or more out of 100 points as competitive manner. There is an overall score gap of 2.3 between 5th place South Korea and 6th place Netherlands. Even in the top-ranking group, the difference in overall scores is noticeable. The various factors that contribute to these differences in progress are:, our institute's website (https__idg-waseda.jp/ranking_jp.htm)

It is summarized in the report posted on the following page. The report states: The version of the text had analysis of each country's challenges, including a country assessment report for the top 25 countries created when analyzing digital government。 In addition, the report not only explains the contents of the rankings, but also summarizes themes such as the progress of the world's digital government over the past 19 years, trends in the overall ranking, digital policies of major countries, and new trends and recommendations to watch.

The report provides a variety of data and information on both public and private digital transformation and the digital economy. As the global provision of DX and AI information accelerates, the alarm is sounding that the gap between digitally advanced and underdeveloped countries and the gap in innovation is widening.

The 2024 rankings highlight key trends in the use of digital technologies in government activities. In the analysis of the report, we have identified several new trends that deserve special attention, such as the emergence of AI. This year, the use of AI has become more realistic, and it has become a turning point which we are reconsidering the fundamentals of digital government, such as ensuring not only efficiency and productivity, but also reliability and transparency.

The biggest topic of 2024 is the implementation of generative AI. This year's edition discusses examples of the application of AI to the administration of major countries. In

the field of government, as the use of generative AI is being discussed, attention is being paid to digital government initiatives that contribute to transparency and governance.

The countries at the top of the rankings are characterized by an emphasis on government services that contribute to greater efficiency, productivity, and addressing the digital divide. Government departments around the world have learned from the DX of digitally advanced countries that are leading the way in narrowing the digital divide, and the trend toward following that level has progressed more than last year.

In addition to the 10 highlights above, this edition highlights eight global social, economic, and political challenges related to digital government:

    (1) Digital Innovation Gap (AI, Robotics, Quantum Computing, etc.)
    (2) Addressing population issues such as an aging society and a declining birthrate
    (3) Global standardization of "open innovation" across borders
    (4) Digital literacy gaps in both global and local communities
    (5) Responding to cyberattacks stemming from Russia-Ukraine war issues, Middle East war issues, etc., and countermeasures against disinformation
    (6) Striking regional differences in urban and rural digitalization
    (7) The central government is a local government system
    (8) Improving the quality of administrative services, promoting capacity building and optimally allocating related human resources

In addition, the UN SDGs have 17 sectors. With only six years left until 2030 for the end, and further efforts are required to achieve the goal, it is unfortunately difficult to say that the utilization of digital government is highly evaluated. Digital government actively supports the smooth DX required for each SDG sector.

This report also analyzes and discusses the following points:

    (1) The report contains scores from 66 digitally covered countries, as well as a 220-page country assessment report for the top 25 countries.
    (2) Analysis and characteristics of the historical transition of digital government based on the work of the past 19 yearly activities.
    (3) The new trends of digital government and their impact on the economy and society are described as "DX", "GX (Green Transformation)", "Healthcare", "Generative AI", "Personal Information Protection", Highlights from the perspectives of "smart cities," "IT human resources," "Cybersecurity," and "SDGs"

３．Challenges

Challenges and structural weaknesses can be summarized as follows.

- Issues remain in the role and effectiveness of the Digital Agency as a control tower. The negative effects of vertically divided government administration, the lagging lack of DX and a sense of speed in the government continue to be issues.
- The complexity of decision-making due to the legal separation of e-government (central) and e-municipality (local) based on the Local Autonomy Law, etc.
- The widening of the administrative and financial and digital divide at the prefectural and municipal levels is remarkable in terms of human resources, technology, and budgets.
- Understanding and raising awareness of the importance of digital talent has a certain effect. However, the layer-by-layer human resource development model has not been widely used.
- The biggest challenge for the Identity Card is ensuring stable operation and usability. Therefore, in order to maintain and promote the utilization rate, it is essential to continuously educate the government and the public, such as eliminating human error.
- Exploring a novel form of digital government in the age of AI utilization from the perspective of the public.
- Education and training to improve literacy and countermeasures against the rapidly increasing number of cyber security troubles.
- Improvement of optimal administrative innovation that contributes to efficiency and productivity is essential.
- Sustainable disaster prevention measures are indispensable not only in non-peacetime (emergency) but also in normal times for severe disasters and pandemics, and the digital government should thoroughly prevent disasters and contribute to the elimination of inefficient government costs.

Recommendations

The top priorities for digital government include the following four recommendations:

① It has only been more than 20 years since digital government was born (formerly e-Gov). This report is the culmination of 19 years research and analysis activities, and evaluates and analyzes valuable historical transitions obtained from 19 years of time series analysis. It discusses the measures necessary to predict the future digital government image (model) from multiple perspectives. The community should learn from the singularity, which is ahead of schedule. AI, which continues to grow rapidly, will challenge human society as a historical lesson.

② What the government need to do now is to reduce administrative and fiscal costs and improve efficiency by promoting public-private partnerships and innovation through the use of digital technology, and to make proactive and optimal digital investments, in anticipation of the declining birthrate, an aging society, and

declining population. In addition, it should take the lead in implementing measures that contribute to improving the convenience of people's lives based on the serious problem of an aging society. In other words, the comprehensive fusion of the digital society and the aging society that will require the implementation of speedy administrative and fiscal reforms and one-stop administrative services centered on citizens, which is the concept of creating an excellent digital government.

③ The cornerstone of the Digital Innovation Growth Strategy is not partial) accumulation, but the formulation of a new comprehensive roadmap for the entire country is urgent.

④ High-quality digital infrastructure can be said to be the core of the construction of the "fifth-generation digital government" advocated by the Institute of Digital Government at Waseda University based on the development and spread of 5G/6G and the utilization of AI and blockchain.

Dr. Toshio Obi, professor emeritus at Waseda University, who founded the World Digital Government Ranking, has contributed to international organizations such as ITU, OECD, APEC, UNESCO, and the United Nations Department of Economic and Social Affairs. We are making a major shift toward digital innovation. The challenge of the global future and digital society envisioned in this report has begun.

What is the Waseda University World Digital Government Ranking?

The research, which evaluates the progress of digital governments in 66 countries in 10 key indicators, began in 2005 and is now in its 19th year. The efficient development of digital government is attracting attention from public and private organizations around the world as it contributes to the convenience of the citizens and administrative and fiscal reforms.

Each of the 10 indicators: "Digital Infrastructure Development," "Administrative and Financial Optimization," "Applications," "Portal Sites," and "Chief Information Officer (CIO)" "Strategy and Promotion" "Citizen Participation" "Open Government Data and DX" "Security" "Advanced Technology" which are analyzing it by benchmarking for each of them.

In the United Nations survey released every two years, four benchmarks are used as indicators, but in this survey, a total of 10 sectoral indicators mentioned above have been used to analyze a wide range of 19 times (years) in a wide range of details. The Institute's comprehensiveness, rigorous neutrality, and advanced academic analysis are highly regarded around the world. In particular, we are improving our analytical capabilities by adding DX and AI utilization, which have recently appeared, to the evaluation indicators of ranking analysis.

This evaluation model was developed in 2005 by Professor Emeritus Toshio Obi, the first Director of the institute, and the ranking method was established. The Institute also has served as the APEC Digital Government Research Center. In order to obtain the latest and

most accurate information, analyze and evaluate the data, this research survey is conducted by the NPO International Academy of CIO (President is Professor Naoko Iwasaki, Institute of Digital Government, Waseda University) has formed a joint research team consisting of experts representing partner universities under the umbrella of the International Academy of CIO, a global organization.

The collaborating universities are Peking University (China), George Mason University (USA), Bocconi University (Italy), Turku University (Finland), Thammasat University (Thailand), Presidential Federal University of Political Science and Economics (Russia), La Salle University (Philippines), Bandung Institute of Technology (Indonesia), and Core center, Waseda University (Japan). The research process emphasizes the exchange of ideas with teams of experts and with international organizations such as the digital departments of national governments, the United Nations, OECD, World Bank, APEC, and EU.

The Institute of Digital Government analyzes digital government activities using specific indicators for global collaboration and development of a digital society, and the Institute has organized the forums with the United Nations Headquarters to solve problems related to SDGs themes.

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Email: obi_waseda@yahoo.co.jp URL: https://idg-waseda.jp/ranking_jp.htm
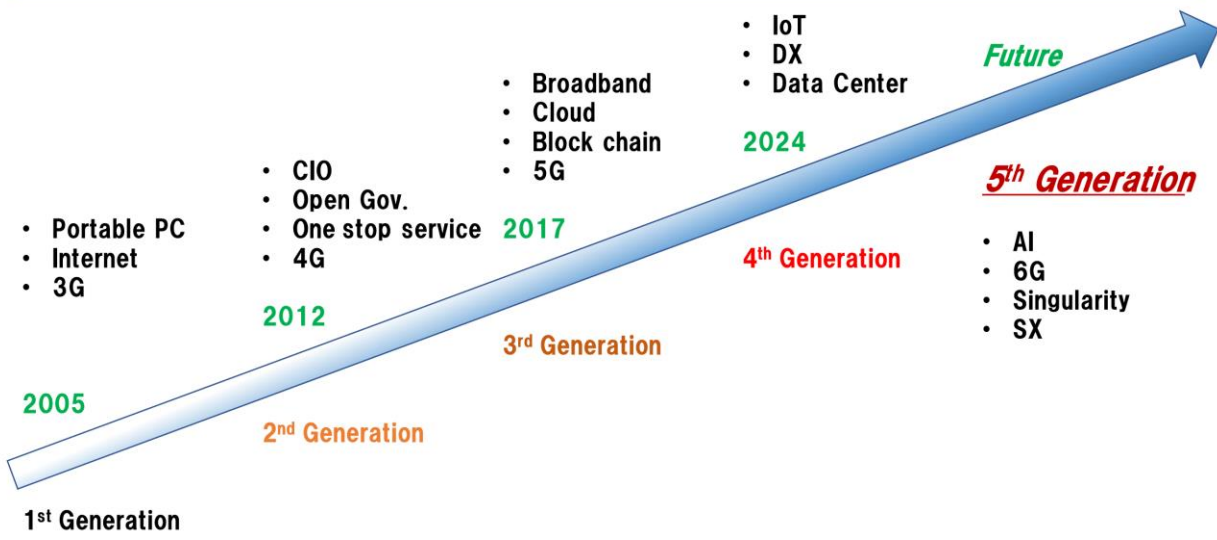
4．Historical Trends of the Rankings for 19 years

Table 4: 19 years (2005-2024) of Historical rankings

#	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	UK	USA	USA	Finland
3	Singapore	Singapore	Canada	Canada	Sweden	USA	Sweden	South Korea	USA
4	Finland	Japan	Japan	South Korea	UK	Canada	South Korea	Finland	South Korea
5	Sweden	South Korea	South Korea	Japan	Japan	Australia	Finland	Denmark	UK
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	UK	UK	Sweden	Finland	Sweden	Belgium	UK	Taiwan
10	UK	Finland	Sweden	Taiwan	Germany/ Italy	Taiwan/ Italy	UK/ Denmark	Taiwan/ Canada	Netherlands

#	2014	2015	2016	2017	2018	2019	2021	2022	2023	2024
1	USA	Singapore	Singapore	Singapore	Denmark	USA	Denmark	Denmark	Denmark	**Singapore**

2	Singapore	USA	USA	Denmark	Singapore	Denmark	Singapore	New Zealand	Canada	**UK**
3	South Korea	Denmark	Denmark	USA	UK	Singapore	UK	Canada	UK	**Denmark**
4	UK	UK	South Korea	Japan	Estonia	UK	USA	Singapore	New Zealand	**USA**
5	Japan	South Korea	Japan	Estonia	USA	Estonia	Canada	USA	Singapore	**South Korea**
6	Canada	Japan	Estonia	Canada	South Korea	Australia	Estonia	UK	South Korea	**Netherlands**
7	Estonia	Australia	Canada	New Zealand	Japan	Japan	New Zealand	South Korea	USA	**Estonia**
8	Finland	Estonia	Australia	South Korea	Sweden	Canada	South Korea	Estonia	Netherlands	**Saudi Arabia**
9	Australia	Canada	New Zealand	UK	Taiwan	South Korea	Japan	Taiwan	Estonia	**Germany**
10	Sweden	Norway	UK/Taiwan	Taiwan	Australia	Sweden	Taiwan	Japan	Ireland	**New Zealand**

Toward the 5th Generation of Digital Government
Program of Digital Government by Technologies

1st Generation — 2005
- Portable PC
- Internet
- 3G

2nd Generation — 2012
- CIO
- Open Gov.
- One stop service
- 4G

3rd Generation — 2017
- Broadband
- Cloud
- Block chain
- 5G

4th Generation — 2024
- IoT
- DX
- Data Center

5th Generation — Future
- AI
- 6G
- Singularity
- SX

History of DG Development with Waseda Rankings

2005	2012	2017	2024	Future
Start of Waseda Rankings	CIO framework	Broadband	Cyber threat	AI Gov
Internet	One stop service	Citizen Centric	E-Gov to D-Gov	5th DG
Lack of Digital Infrastructure	International Competition	SNS	DX	Singularity
Portable PC	Digital Divide	Bloak chain	SGDs	SX
Main activity =HP, Network	Open Government	Covid-19	Tech for Disaster	Robots
Strategy of IT manpower	Rise of Small Population countries	Cloud computing	Smart City	

Proposal of New 5th generation Digital Government model

Merit of New model

@ AI Innovative Government (AI Government)

@ Big Data – Block chain-Digital Twin for Tech- Government

@ 5G/6G mobile government

@ Digital Government for SDGs

@ Citizen centric and Social Inclusion

@ Data driven and Open Innovation
@ Emergency action for crises
@ Global network and Standardization
@ Reduction of Corruption and Increase of
Transparency for Clean Government
@ Decrease of Manpower and Office expenditure to
save Labor Shortage
@ Promotion of One stop service/Accessibility and
Useability

SUSTAINABLE
DEVELOPMENT
GOALS
Smart City
and HRD

Waseda University＝United
Nations/CSD SDGs Workshops at UN HQ
（New York） SDGs2030

2016

2018　　　　2020　　　　2021

早稲田大学電子政府・自治体研究所

5. Top Rankings by 10 Sector Indicators

Table 2. Main 10 Indicators and 37 Sub-indicators List

10 Major Survey Items	37 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 3-6 e-Disaster, e-Mobility and Smart city 3.7 Usages of AI and Web3
Convenience of homepage and portal site – NPR (Status of National Portal)	4-1 Information 4-2 Technical 4-3 Functionality
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
Digital Government Promotion -EPRO	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 10-4 The Application of AI

5-1

Ranking by NIP		
#	Country	NIP 8%
1	Singapore	7.2320
2	Norway	6.5307
3	Denmark	6.4773
4	Switzerland	6.4720
5	South Korea	6.4693
6	UAE	6.4000
7	Saudi Arabia	6.3200
8	Netherlands	6.3173
9	UK	6.2987
10	Sweden	6.2773

5-2

Rankings by MO		
#	Country	MO 12%
1	Singapore	12.0000
1	Denmark	12.0000
1	USA	12.0000
1	Sweden	12.0000
1	Finland	12.0000
6	Iceland	11.9302
6	UK	11.9302
8	Saudi Arabia	11.7209
8	Australia	11.7209
10	Ireland	11.5000

5-3

Rankings by OS		
#	Country	OS 14%
1	Singapore	13.9364

2	USA	13.4545
2	Netherlands	13.4545
3	Estonia	13.1818
3	Thailand	13.1818
6	Saudi Arabia	12.9091
7	Denmark	12.8000
8	UK	12.7273
8	Finland	12.7273
10	Canada	12.6727

5-4

Rankings by NPR		
#	Country	NPR 6%
1	Singapore	5.8929
2	Denmark	5.7857
2	Estonia	5.7857
2	USA	5.7857
5	Netherlands	5.5714
5	Canada	5.5714
5	South Korea	5.5714
5	Sweden	5.5714
5	New Zealand	5.5714
5	Finland	5.5714

5-5

Rankings by GCIO		
#	Country	GCIO 10%
1	Singapore	9.6610
2	UK	9.3220
2	USA	9.3220
2	Estonia	9.3220
5	South Korea	8.9831

6	Saudi Arabia	8.8136
7	Germany	7.9492
8	Denmark	7.6271
9	New Zealand	7.4915
10	Japan	7.4576

5-6

Rankings by EPRO		
#	Country	EPRO 10%
1	Denmark	9.3651
2	UK	9.2063
3	USA	9.0476
3	South Korea	9.0476
5	Germany	8.5714
5	Japan	8.5714
7	Singapore	8.4127
7	Netherlands	8.4127
7	New Zealand	8.4127
7	Estonia	8.4127

5-7

Rankings by EPAR		
#	Country	EPAR 8%
1	UK	8.0000
1	Denmark	8.0000
1	Switzerland	8.0000
4	Singapore	6.8571
5	Iceland	7.8095
5	USA	7.8095
5	South Korea	7.8095
8	Germany	7.6190
8	Sweden	7.6190

| 8 | Australia | 7.6190 |

5-8

Rankings by OGD		
#	Country	OGD 10%
1	Denmark	9.8148
2	UK	9.6296
2	South Korea	9.6296
2	Germany	9.6296
2	Norway	9.6296
6	Iceland	9.4444
7	Netherlands	9.2593
7	Italy	9.2593
7	New Zealand	9.2593
10	USA	8.8889

5-9

Rankings by CYB		
#	Country	CYB 10%
1	Singapore	10.0000
2	UK	9.8077
2	Denmark	9.8077
2	Netherlands	9.8077
2	New Zealand	9.8077
6	Saudi Arabia	9.6154
7	USA	9.5385
8	Germany	9.4231
09	South Korea	9.2308
9	Norway	9.2308

5-10

Rankings by EMG		
#	Country	EMG 12%

1	UK	12.0000
1	South Korea	12.0000
1	Singapore	12.0000
4	Netherlands	11.6667
4	Denmark	11.6667
6	Ireland	11.3333
7	USA	11.0000
8	Saudi Arabia	10.6667
8	New Zealand	10.6667
8	Belgium	10.6667

6. Top Rankings by Organizations, Relations and Groups

#	Rankings by OECD Country
1	UK
2	Denmark
3	USA
4	South Korea
5	Netherlands
6	Estonia
7	Germany
8	New Zealand
9	Japan
10	Canada
11	Ireland
12	Sweden
13	Iceland
14	Norway
15	Finland
16	Switzerland
17	Australia
18	France
19	Italy
20	Spain
21	Austria
22	Belgium

#	
23	Israel
24	Poland
25	Czech
26	Lithuania
27	Chile
28	Portugal
29	Mexico
30	Turkey
31	Columbia
32	Costa Rica

#	Ranking by APEC Economies
1	Singapore
2	USA
3	South Korea
4	New Zealand
5	Japan
6	Canada
7	Thailand
8	Taiwan
9	Australia
10	Indonesia
11	Malaysia
12	Hong Kong
13	Philippines
14	Russia
15	Chile
16	China
17	Mexico
18	Vietnam
19	Brunei
20	Peru

#	Rankings by Big Population Countries
1	USA
2	Japan
3	Indonesia
4	India
5	Philippines
6	Russia
7	China

#	
8	Mexico
9	Brazil
10	Pakistan
11	Nigeria
12	Bangladesh

#	Rankings by Small Population Countries
1	Singapore
2	Denmark
3	Estonia
4	New Zealand
5	Ireland
6	Sweden
7	Iceland
8	Norway
9	Finland
10	Switzerland
11	UAE
12	Austria
13	Israel
14	Oman
15	Hong Kong
16	Lithuania
17	Bahrain
18	Uruguay
19	Brunei
20	Fiji
21	Costa Rica

#	Rankings by Highest GDP Countries
1	UK
2	USA
3	Germany
4	Japan
5	Canada
6	France
7	Italy
8	Russia
9	China
10	Brazil

#	Rankings by Asia-Pacific Countries
1	Singapore
2	South Korea
3	New Zealand
4	Japan
5	Thailand
6	Taiwan
7	Australia
8	Indonesia
9	India
10	Malaysia
11	Hong Kong
12	Philippines
13	China
14	Vietnam
15	Brunei
16	Pakistan
17	Fiji
18	Bangladesh

#	Rankings by Americas Countries
1	USA
2	Canada
3	Chile
4	Mexico
5	Brazil
6	Uruguay
7	Colombia
8	Argentina
9	Peru
10	Paraguay
11	Costa Rica

#	Rankings by AMC Countries
1	Saudi Arabia
2	UAE
3	Kazakhstan
4	Israel
5	Oman

#	
6	Russia
7	South Africa
8	Turkey
9	Bahrain
10	Uzbekistan
11	Kenya
12	Egypt
13	Nigeria
14	Tunisia
15	Morocco
16	Ghana

AMC= Africa, Middle East and Central Asia

#	Rankings by EU Countries
1	Denmark
2	Netherlands
3	Estonia
4	Germany
5	Ireland
6	Sweden
7	Iceland
8	Norway
9	Finland
10	Switzerland
11	France
13	Italy
14	Spain
15	Austria
12	Belgium
16	Poland
17	Czech
18	Lithuania
19	Portugal
20	Romania

7. Country Assessment Reports (25 countries)

1. Singapore

1. General Information

Area: **735.6 km2**

Population: **5,843,958**

Government Type: Parliamentary Republic

2024 Growth Rate: **2.6%**

GDP (IMF '24): **$525.23 Bn**

GDP Per Capita; **$90,054**

Internet User: **96%**

Wired (Fixed Broadband User) per 100 people: **27.2**

Wireless Broadband User per 100 people: **167**

2. Digital Government Overview in Country
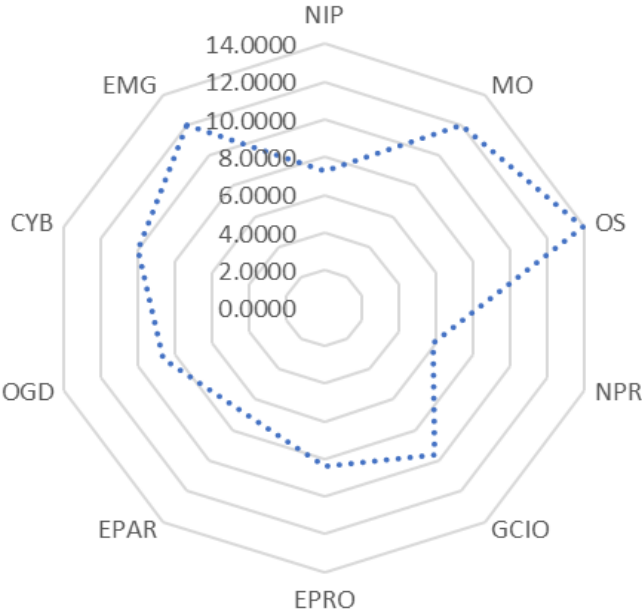
3. Digital Government Development and new trends

3.1. The development

Singapore's government digitalization initiatives in 2024 have highlighted the effective use of emerging technologies like artificial intelligence (AI), blockchain, and the Internet of Things (IoT) into public services. These endeavors are a component of the wider Smart country programme, which seeks to evolve Singapore into a country enabled by digital technology. An important undertaking under this program is the extensive implementation of digital identity authentication via the use of face recognition technology, which is coordinated with the SingPass Face Verification system. Provided via government kiosks and online platforms, this service enables residents to safely avail themselves of services like banking, healthcare, and housing applications.

The unique approach to digitization adopted by Singapore continues to garner worldwide acclaim. This year, Singapore stood at the top among 66 countries in the Waseda rankings, indicating its significant progress in digital governance, administrative modernization, and technology integration into public services. The nation also achieved a high ranking in the 2024 United Nations E-Government Development Index (EGDI) because to its robust digital infrastructure and sophisticated e-participation systems. Singapore has shown exceptional proficiency in open government data, as seen by the availability of more than 1,000 datasets on the Data.gov.sg website. This platform serves to enhance openness and stimulate innovation in several industries.

3.2. New Trends

Singapore's digital strategy is centered around the Smart Nation 2025 initiative, which sets out a comprehensive vision for harnessing the full potential of digital technologies across public and private sectors. The initiative prioritizes the development of AI, cybersecurity, and digital inclusivity. For instance, the National AI Strategy, which includes several flagship projects, has advanced rapidly in sectors such as healthcare, education, and public safety. One notable example is the deployment of AI-assisted diagnostic tools in public hospitals, which has improved diagnostic accuracy by 30% and reduced waiting times for patients.

In 2024, Singapore introduced the "Digital for Life" movement, an extension of its digital inclusion efforts, which aims to bridge the digital divide by providing citizens with the necessary skills to engage in the digital economy. The initiative offers community-based training programs in collaboration with tech companies such as Google and Microsoft, particularly targeting seniors and low-income households. By the end of the year, over 200,000 citizens had participated in these programs, furthering Singapore's goal of achieving a digitally inclusive society.
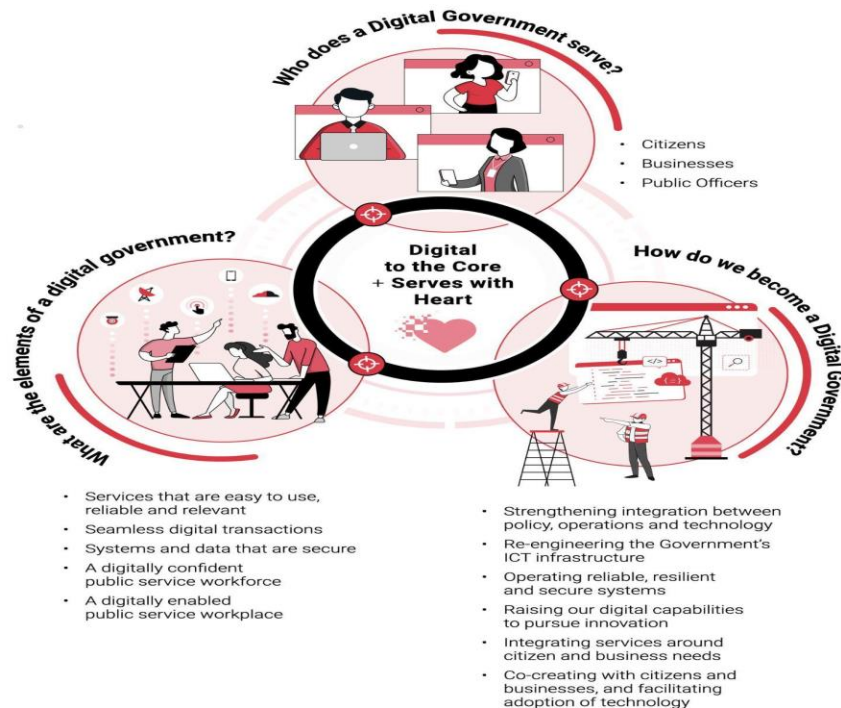
4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

The country held the first position in the NIP indicator of the Waseda rankings. Singapore's strong focus on enhancing its network infrastructure has been central to the success of its digitalization efforts. In 2024, Singapore achieved full nationwide 5G coverage, making it one of the first countries in the world to do so. This achievement supports the deployment of smart city applications, such as autonomous vehicles, IoT devices, and smart buildings, further enhancing the quality of life for residents. For example, the Land Transport Authority (LTA) has piloted autonomous buses on public roads, utilizing 5G networks to ensure real-time communication between vehicles and traffic management systems.

Furthermore, the government has continued to invest in data center infrastructure to meet the growing demands of cloud computing and big data analytics. The expansion of the Data Center Park in 2024 attracted additional investments from major technology firms, including Amazon Web Services (AWS) and Google Cloud, bolstering Singapore's position as a regional data hub. This has enabled local businesses to access high-speed, reliable cloud services, driving digital innovation and economic growth.

4.2. Management Optimization [MO]

Singapore stands out with a maximum score in Management Optimization, exemplifying its superior methods for managing and optimizing digital operations. The Singapore government has leveraged digital technologies to optimize management and operations across its ministries and agencies. In 2024, the Ministry of Finance (MOF) implemented a digital budget management system that uses machine learning algorithms to predict budget needs and allocate resources more efficiently. This system has reduced administrative overheads by 15%, allowing the ministry to focus on higher-level fiscal policy planning.

Another example of management optimization is the use of AI-driven platforms in human resource management within the public sector. GovTech, the government's technology agency, introduced an AI-powered recruitment tool that matches job seekers with government vacancies based on their skills and experience. This tool has streamlined the hiring process, reducing the time-to-hire by 25% and increasing job placement rates by 10% across ministries.

4.3. Online Service [OS]

Singapore continues to enhance its online services, making government interactions faster, more convenient, and more accessible for its citizens. The country secured the top spot in the OS indicator of the Waseda rankings. One major improvement in 2024 is the expansion of the SingPass system, which now includes the "SingPass Wallet" feature. This digital wallet stores and manages a variety of personal identification documents, including driver's licenses, National Service records, and vaccination certificates. Citizens can use these digital documents to complete transactions and verify their identity both online and offline, reducing reliance on physical documents. Significantly, Singapore held the 2nd spot in the Online Service Indicator, demonstrating its strong performance and commitment to top-notch digital services.

Additionally, the Ministry of Manpower (MOM) introduced an enhanced online platform for work pass applications in 2024. The new system uses AI to assess applications in real-time, automatically flagging incomplete or erroneous submissions for correction. This has significantly reduced processing times, with 90% of work pass applications being approved or flagged for follow-up within 24 hours. The platform has also reduced the backlog of pending applications by 40%, improving overall efficiency in work pass processing.

4.4. National Portal [NPR]

Gov.sg, the national portal of Singapore, has evolved to become a comprehensive and user-centric platform for accessing public services. In 2024, the portal introduced several new features, including an AI-powered chatbot named AskGov. This virtual assistant can handle queries across multiple government agencies, providing users with instant responses to common questions about services like taxes, health insurance, and housing grants. The implementation of AskGov has reduced the workload on call centers by 30%, allowing human agents to focus on more complex issues. Obviously, Singapore is the country with the highest score in the Waseda's National Portal Indicator 2024.

The MyInfo system, integrated into the national portal, enables citizens to securely share their personal information across government services, simplifying processes such as housing applications, tax returns, and school registrations. By reducing the need for repetitive data entry, MyInfo has improved user satisfaction, with a recent survey reporting that 92% of users found the service easy to use and efficient.

4.5. Government CIO [GCIO]

Singapore also led the GCIO indicator in the Waseda rankings 2024. The Government Chief Information Officer (GCIO) plays a critical role in driving the digitalization agenda in Singapore. In 2024, the GCIO's office focused on implementing a cloud-first strategy across all government agencies, mandating that new IT projects prioritize cloud-based solutions over traditional infrastructure. This policy aims to increase the agility and resilience of government IT systems, with the migration of over 70% of government data and applications to cloud platforms expected by 2025. Singapore tops the rankings in the Government Chief Information Officer Indicator, demonstrating its leadership in appointing and empowering a highly effective GCIO.

The GCIO also led the rollout of the "Whole-of-Government ICT Strategy," which emphasizes the importance of data-driven governance and interagency collaboration. Under this strategy, agencies are encouraged to share data and resources to streamline operations and deliver more integrated public services. An example of this is the centralized data-sharing platform that facilitates the exchange of real-time traffic data between the Land Transport Authority (LTA) and the Urban Redevelopment Authority (URA), improving traffic management and urban planning.

4.6. E-Government Promotion [EPRO]

Promoting e-government services remains a priority for Singapore as it strives to engage more citizens through digital platforms. In 2024, the government launched the "Digital Ambassadors Program," which deploys trained volunteers to assist seniors, people with disabilities, and other vulnerable groups in using e-government services. This initiative has been instrumental in increasing digital literacy and ensuring that all citizens can benefit from Singapore's digital government services.

The government also continued its collaboration with private sector partners to promote e-government adoption. For example, the Infocomm Media Development Authority (IMDA) partnered with local fintech startups to integrate digital payment options into government services, allowing citizens to pay fines, fees, and taxes via mobile apps. This collaboration has led to a 20% increase in digital transactions within the public sector in 2024, further promoting the convenience of e-government services.

4.7. E-Participation [EPAR]

Singapore's e-participation platforms have been instrumental in fostering greater civic engagement and transparency in governance. The government's REACH platform, which enables citizens to provide feedback on public policies and engage in discussions with policymakers, was expanded in 2024 to include new interactive features such as live polls and virtual town halls. These enhancements have led to a 35% increase in citizen participation, with over 1 million users actively engaging on the platform in the first half of 2024.

Additionally, Singapore launched a digital consultation portal in 2024, allowing citizens to contribute to the legislative process by submitting their views on proposed laws and regulations. One notable success was the consultation on the new Personal Data Protection Act amendments, where over 20,000 submissions were received, leading to significant revisions in the final legislation. This e-participation effort has reinforced the government's commitment to involving citizens in policy-making through digital means.

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

In 2024, Singapore continued to embrace digital transformation across its public sector. The "Digital Government Blueprint" outlines ambitious goals for achieving end-to-end digitalization in all government services by 2025. This year, the government automated several routine processes in the

healthcare and education sectors, such as the use of AI to manage hospital resources and smart sensors in classrooms to monitor attendance and optimize learning environments.

Open Government Data initiatives have also expanded, with the Data.gov.sg platform offering over 1,200 datasets that are freely accessible to the public. These datasets have been used by startups and researchers to create innovative applications, including predictive traffic management systems and health analytics tools. In 2024, the government also launched a series of data challenges to encourage the use of open data in solving urban and social issues, awarding grants to the most promising solutions.

4.9. Cyber Security [CYB]

Singapore remains a leader in cybersecurity, with the maximum scores in the Waseda rankings for this indicator, with the Cyber Security Agency of Singapore (CSA) continuing to enforce rigorous cybersecurity standards. In 2024, Singapore launched the "Cyber Safe Program," which focuses on protecting small and medium enterprises (SMEs) by offering grants for cybersecurity solutions and conducting training workshops. Over 5,000 SMEs benefitted from this program, significantly reducing their exposure to cyber threats.

Additionally, Singapore's National AI Governance Framework has been updated to address ethical concerns around AI use in cybersecurity, ensuring that AI applications in this space adhere to strict standards of transparency and accountability.

4.10. Emerging ICT [EMG]

As a result of Singapore's emphasis on developing information and communications technology, the country has made significant expenditures in artificial intelligence, quantum computing, and 5G technology. The country also led this indicator in the Waseda rankings this year. A cooperation between the government and the Massachusetts Institute of Technology (MIT) to construct a Quantum Computing Research Center is announced in 2024. This agreement would position Singapore as a leader in Asia's quantum technology. The development of cryptography and data encryption, both of which are essential for maintaining national security, will be facilitated by this facility.

In addition, the Emerging Technology Innovation Fund continues to provide financial assistance to firms working on creating cutting-edge technologies, such as artificial intelligence-driven healthcare

solutions and autonomous vehicle systems. This fund has been allocated one billion Singapore dollars. These programs show Singapore's proactive attitude to being at the forefront of global information and communication technology breakthroughs.

2. United Kingdom

1. General Information

Area: **244,376 km2**

Population: **69,263,077**

Government Type: Constitutional Monarchy

2024 Growth Rate: **1.1%**

GDP (IMF '24): **$3.50 Tn**

GDP Per Capita: **$50,555**

Internet User: **94.8%**

Wired (Fixed Broadband User) per 100 people: **41**

Wireless Broadband User per 100 people: **115**

2. Digital Government Overview in Country
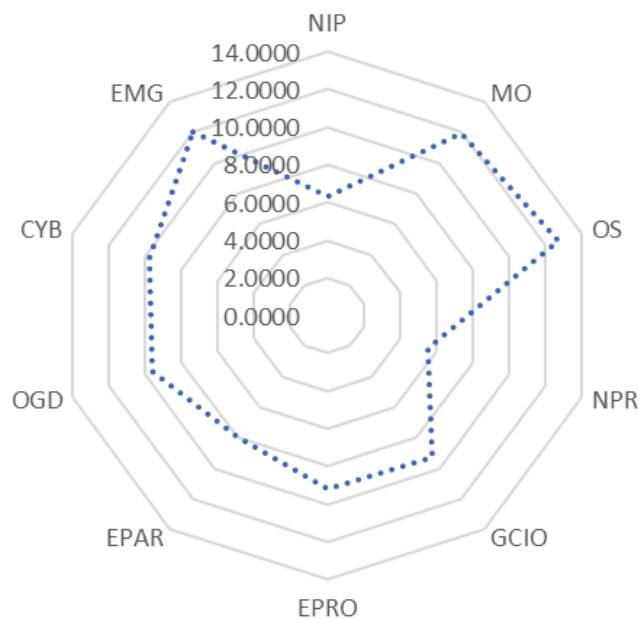
3. Digital Government Development and new trends

3.1. The development

The United Kingdom has made significant strides in government digitalization in recent years, aiming to improve efficiency, transparency, and accessibility for citizens The country came in the 2nd position in the Waseda rankings. In 2024, the government continued its efforts to enhance digital

services and modernize public sector operations. One of the key initiatives undertaken in 2024 was expanding online services. The government focused on digitizing essential services such as applying for passports, renewing driving licenses, and accessing healthcare records. This shift towards digital platforms aimed to reduce administrative burdens, improve customer satisfaction, and streamline service delivery. Additionally, the government invested in upgrading its IT infrastructure to support the growing demand for digital services and ensure data security.

Another important aspect of the UK's government digitalization efforts in 2024 was promoting open data. The government released large datasets across various domains, including healthcare, education, and transportation. This initiative encouraged innovation, citizen engagement, and the development of new applications and services based on public data. Moreover, the government worked to improve data quality and accessibility, making it easier for citizens and businesses to utilize the available information.

3.2. New Trends

The government's 2022-25 Roadmap for Digital and Data outlines a shared vision for 2025 and the collaborative steps to achieve it. Developed by the Central Digital and Data Office (CDDO) in partnership with other federal agencies, this roadmap aims to address past shortcomings in government digital transformation efforts. Previous attempts at digital transformation have often been hindered by vague plans, unclear responsibilities, and a lack of ownership within agencies. As a result, many promising initiatives have stalled or failed to meet expectations.

Since the CDDO's establishment, the government has experienced unprecedented digital change, marked by increased cooperation and strong leadership from Permanent Secretaries. Senior officials and digital experts from both government and external organizations worked together to create this comprehensive plan. The roadmap includes specific, measurable, and ambitious goals, along with detailed strategies for cross-agency collaboration. While this plan primarily focuses on central government agencies, the CDDO and the Department of Levelling Up, Housing and Communities are working to encourage local governments to adopt similar reforms and align their services with national objectives. The CDDO is also consulting with devolved administrations to ensure their plans complement the federal government's strategy.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

A robust and expanding network infrastructure significantly bolstered the UK's government digitalization efforts in 2024. The government's strategic investments in this area have been instrumental in supporting the increasing demand for digital services and ensuring the resilience of critical systems. One of the most notable initiatives was the nationwide accelerated rollout of fiber optic networks. This expansion has provided high-speed broadband access to a broader population, enabling remote working, online learning, and other digital services. Additionally, the government has invested in modernizing its data centers to improve efficiency, security, and reliability. These upgrades have been essential for handling the growing volume of data generated by government services and ensuring the continuity of operations.

To protect its network infrastructure from cyber threats, the government has strengthened its cybersecurity measures. This includes implementing robust security protocols, investing in advanced threat detection technologies, and raising awareness among government employees about cyber risks. Furthermore, the government has embraced cloud computing to improve scalability, flexibility, and cost-efficiency. By migrating certain services to the cloud, the government has been able to reduce its reliance on on-premises infrastructure and improve disaster recovery capabilities.

The government's commitment to network infrastructure preparedness has been further strengthened through partnerships with industry. By collaborating with industry partners, the government has been able to leverage its expertise in network infrastructure management and develop innovative solutions. These partnerships have helped to accelerate the deployment of new technologies and improve the overall performance of the UK's network infrastructure. In conclusion, the UK's network infrastructure has played a pivotal role in supporting its government digitalization efforts in 2024. By investing in fiber optic networks, modernizing data centers, enhancing cybersecurity, adopting cloud computing, and partnering with industry, the government has laid a strong foundation for the future of digital government services.

4.2. Management Optimization [MO]

Strategic management optimization significantly influenced the UK's government digitalization efforts in 2024. Effective leadership, governance, and project management practices were instrumental in ensuring the success of these initiatives. Strong leadership and governance played a

pivotal role in guiding digital transformation efforts. The government established clear structures and frameworks to oversee these initiatives by appointing dedicated digital leaders and creating cross-departmental teams. Agile project management methodologies were also adopted to improve flexibility, responsiveness, and collaboration. This involved iterative development, continuous feedback, and a focus on delivering value incrementally.

Risk management and mitigation were essential to address potential challenges and risks associated with digital transformation. The government implemented robust processes to identify and address these issues, including conducting risk assessments, developing contingency plans, and monitoring emerging threats. Additionally, effective data governance and management were crucial to ensure data quality, security, and privacy. The government established frameworks to develop data policies, implement data protection measures, and promote data-driven decision-making.

To ensure the ongoing success of digital transformation initiatives, a culture of continuous improvement and learning was fostered. The government conducted regular evaluations, gathered feedback from stakeholders, measured outcomes, and adapted strategies as needed. By optimizing management practices, the UK government improved the efficiency, effectiveness, and sustainability of its digital transformation efforts. This helped ensure that digital initiatives delivered tangible benefits to citizens and businesses while also mitigating risks and challenges.

4.3. Online Service [OS]

In 2024, the UK has continued its efforts to enhance online government services, prioritizing ease of access, inclusivity, and security to improve citizen engagement and satisfaction. Key advancements include a significant expansion in the availability and efficiency of digital portals, enabling citizens to access essential services—from tax filings to healthcare information—through streamlined, user-friendly platforms. With initiatives such as "One Login for Government," the UK aims to simplify the digital experience, allowing users to access multiple government services with a single login, reducing redundancy and enhancing convenience.

The UK government has also emphasized digital inclusivity in its 2024 initiatives, launching programs to assist digitally underserved communities in using online services. Investments in cybersecurity measures have been equally prominent, with an increased focus on safeguarding user data against cyber threats. These initiatives reflect the UK's commitment to making its digital services not only

more accessible but also safer and more resilient, aligning with the government's broader digital transformation goals.

4.4. National Portal [NPR]

The UK government has made significant strides in digitizing its services, providing citizens and businesses a more convenient and efficient way to interact with government agencies. However, like any large-scale digital transformation initiative, there are both strengths and weaknesses to consider. One key strength of the UK's digital government landscape is the ease of use of its online services. Websites like GOV.UK are generally intuitive and provide clear information. Additionally, the government has made a commitment to accessibility, ensuring that its digital services are usable by individuals with disabilities.

While the information provided on government websites is generally comprehensive, there may still be instances where users struggle to find the information they need or where information is outdated or incomplete. Furthermore, while the government has implemented measures to protect user data, there is always a risk of cyberattacks and data breaches. Another area where the UK's digital government landscape could benefit from further development is customer service. While the government has made efforts to improve online support, the quality of customer service can vary depending on the specific service and department.

4.5. Government CIO [GCIO]

The UK Government Chief Information Officer (CIO) plays a pivotal role in shaping the nation's digital landscape. In 2024, the CIO was instrumental in driving digital transformation initiatives, ensuring the effective delivery of digital government services, and improving the overall citizen experience. At the forefront of the government's digital agenda, the CIO set strategic direction and ensured alignment with broader government priorities. This involved overseeing the development and implementation of digital strategies and roadmaps. Moreover, the CIO focused on improving efficiency and cost-effectiveness within government operations. By leveraging technology to streamline processes, optimize resource allocation, and reduce administrative burdens, the CIO contributed to a more efficient and effective government.

Enhancing the citizen experience was another key priority for the CIO. By ensuring that government services were accessible, user-friendly, and responsive to citizen needs, the CIO helped to improve

the overall satisfaction of citizens interacting with the government. Additionally, the CIO promoted data-driven decision-making by encouraging the use of data analytics and insights to inform policy decisions and improve service delivery. This involved developing data governance frameworks, promoting open data initiatives, and ensuring that data was used effectively to drive positive outcomes. Managing cybersecurity risks is another critical responsibility of the CIO. By implementing robust security controls, raising awareness of cybersecurity risks, and responding effectively to incidents, the CIO helped to protect government systems and data from cyber threats.

4.6. E-Government Promotion [EPRO]

The UK's e-government promotion in 2024 was a multifaceted effort aimed at improving the delivery of public services through digital channels. The government focused on several key areas to enhance the effectiveness and accessibility of its online services. The government continued its digital transformation initiatives, aiming to modernize public services and make them more efficient and user-friendly. This involved digitizing existing services, developing new online platforms, and integrating different systems to create a seamless experience for citizens.

The government prioritized improving the user experience of its online services, making them easier to navigate and understand. This included redesigning websites, simplifying forms, and providing clear guidance and support. In the year, the government promoted data-driven decision making by leveraging data analytics to improve service delivery and policy development. This involved collecting and analyzing data on service usage, citizen satisfaction, and other relevant metrics.

Overall, the UK's e-government promotion in 2024 was a comprehensive effort to improve the delivery of public services through digital channels. By focusing on digital transformation, user experience, accessibility, data-driven decision making, and cybersecurity, the government aimed to create a more efficient, effective, and inclusive digital government.

4.7. E-Participation [EPAR]

This year, the UK shared the top 1 position in Waseda's E-Participation with the other three countries: Denmark, and Switzerland. The UK's e-participation and government digitalization efforts in 2024 significantly transformed the way citizens interacted with the government. Online platforms like "Gov.UK" empowered citizens to access government services, provide feedback, and participate in public consultations. For instance, during the 2024 national budget proposal, the platform received

thousands of citizen suggestions, which government officials carefully considered. Additionally, the government launched several mobile applications to streamline essential services. The "e-Health" app, for example, allowed citizens to book appointments with doctors, access medical records, and even consult with healthcare professionals online. This initiative reduced the burden on healthcare facilities and improved access to healthcare services, especially in remote areas.

E-participation initiatives also played a crucial role in promoting transparency and accountability within the UK government. By making information readily available online, the government aimed to increase public trust and confidence. Additionally, digital platforms provided opportunities for citizens to report corruption and misconduct, fostering a more accountable and responsive government. UK e-participation and government digitalization in 2024 demonstrated a commitment to improving governance, enhancing citizen engagement, and promoting transparency and accountability. By leveraging digital technologies, the UK government aimed to create a more efficient, effective, and responsive public sector.

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

The Government Digital and Data teams have made considerable strides in advancing the digital transformation of public services, achieving important milestones across six strategic missions. The first mission focuses on transforming public services to meet high standards of efficiency and usability. As of now, 15 key services, including the registration for flood warnings and the voter registration process, have achieved the "great" standard, meaning they deliver measurable results for both the public and government.

The second mission, GOV.UK One Login, was introduced to simplify access to government services. This system provides citizens with a single, secure login method to access multiple government services online without the need for repeated identity verification. Over 2.5 million people have already verified their identities through One Login, and the app has been downloaded more than 3 million times.

The third mission targets improving data usage to power better decision-making across the government. This mission involves creating a data governance model to establish consistent roles and responsibilities for data management, as well as launching a Data Maturity Assessment that all government departments will adopt by the end of the 2023/2024 financial year.

Ensuring that government technology is efficient, secure, and sustainable is the focus of the fourth mission. This involves the roll-out of a common Legacy IT Framework, which helps measure the risks associated with outdated technology and aids in prioritizing systems for decommissioning or migration. Teams are also working on a Secure by Design framework to ensure new services are developed with security at their core.

The fifth mission aims to scale up digital skills across the government workforce. Senior civil servants are also being upskilled, with over 600 leaders trained in digital and data essentials to ensure that leadership aligns with the growing digital demands of the government.

Finally, the sixth mission is dedicated to creating a system that unlocks digital transformation. Digital leaders have developed a new digital functional standard that provides senior leaders with guidance on how to manage digital, data, and technology across government. Additionally, frameworks for product-centric ways of working are being piloted, fostering greater collaboration and quality in digital service delivery. Teams are also bridging the gap between digital services and policy, as seen in departments like the Home Office and Department for Education, where digital expertise is being integrated into policy-making and operations to enhance outcomes.

These efforts reflect the government's commitment to modernizing public services, leveraging data effectively, enhancing digital skills, and ensuring secure and efficient technology—all while aligning digital transformation with broader policy goals. Leading the OGD indicator, the UK came in the first position.

4.9. Cyber Security [CYB]

Recognizing the increasing complexity of cyber threats, the Telecommunications (Security) Act 2021 was introduced to help safeguard public networks and services. This legislation enables the government to establish security standards and release guidelines while also placing new responsibilities on telecommunications providers to identify and address security threats. Additionally, it grants the government more control over the procurement of equipment, services, and infrastructure used by UK telecommunications providers. As part of this, the government has proposed that telecommunications operators eliminate Huawei equipment from 5G networks by 2027, with public consultations underway to formalize this recommendation through the Telecommunications Act.

The UK's tech industry is a key driver of the nation's economy, fueling job creation, growth, and essential services. The government is dedicated to strengthening the technological infrastructure while maintaining national security. The National Security and Investment Act (NSI Act), which came into effect in January 2022, allows for continued investment in the UK while ensuring the protection of national security. The Act gives the government the authority to investigate and take action against acquisitions of businesses or assets that could present security risks. However, it's important to emphasize that most transactions are not subject to this scrutiny, as the government will only intervene in exceptional cases.

In addition to the NSI Act, other safeguards protect the UK's IT industry from security risks linked to financial dealings. Export controls restrict the spread of sensitive technologies, allowing the UK's IT sector to benefit from international trade while managing potential security threats. This includes broadening military end-use controls to address a wider range of risks.

4.10. The use of Emerging ICT [EMG]

The United Kingdom is a leading market for Information and Communication Technology (ICT) in Europe, offering substantial opportunities for U.S. tech providers. With an annual digital tech turnover of $170 billion and home to over 100,000 software companies, the UK ranks as the second-largest ICT market globally regarding spending per capita. London, considered one of the most connected tech hubs, is second only to Silicon Valley. The UK is also Europe's top scaling tech nation and the top destination for U.S. ICT businesses setting up European headquarters. The country held the first position of EMG indicator in the Waseda rankings this year.

Key sectors presenting opportunities for U.K. tech providers include cybersecurity, cloud computing, and artificial intelligence (AI). The rapid digitization of services has heightened the need for more advanced cyber solutions due to the surge in cybercrime. The UK's largest data center market in Europe supports the growth of cloud services, with most software companies adopting cloud technologies. AI is also a focal area, with the UK committed to become a global leader in AI, supported by substantial government funding and enterprise adoption.

Opportunities exist across large enterprises, public sector entities, and SMEs regarding market segments. The UK government has invested heavily in ICT as part of its digital transformation agenda. AI and cloud services are being deployed to address complex public sector challenges, including

improving efficiency in areas such as tax processing, pensions, and call center operations. The UK's pro-innovation regulatory approach to AI further solidifies its position as a favorable destination.

3. Denmark

1. General Information

Area: **43,094 km2**

Population: **5,985,250**

Government Type: Constitutional Monarchy
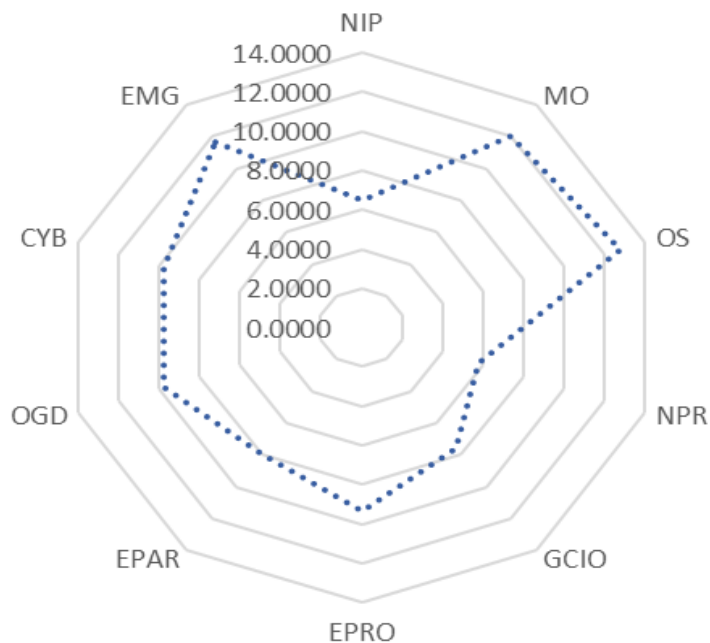
2024 Growth Rate: **1.9%**

GDP (IMF '24): **$409.99 Bn**

GDP Per Capita: **$68,590**

Internet User: **97.9%**

Wired (Fixed Broadband User) per 100 people: **44.5**

Wireless Broadband User per 100 people: **145**

2. Digital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development

Denmark has consistently demonstrated its commitment to digital transformation, and this year, it has once again secured the 3rd place in the Waseda ranking. This achievement underscores the country's unwavering dedication to government digitalization. Denmark's progress in this area can be attributed

to several key factors. Firstly, the government has made significant investments in digital infrastructure, ensuring widespread access to high-speed internet and digital services. Secondly, Denmark has adopted a citizen-centric approach, prioritizing the needs and convenience of its citizens in the design and implementation of digital solutions. Thirdly, the government has fostered a culture of innovation and collaboration, encouraging public and private sectors partnerships to drive digital development. As a result of these efforts, Denmark has witnessed remarkable advancements in various areas, including e-government services, digital healthcare, and smart city initiatives.

3.2. New Trends

Denmark's National Strategy for Digitalization is a comprehensive plan designed to position the country as a global leader in digital innovation. The strategy outlines a vision for a digital future in which technology enhances the quality of life, drives economic growth, and strengthens national security. The strategy focuses on nine key areas: cyber and information security, citizen and business services, welfare, SME growth, healthcare, the green transition, ethics, international leadership, and digital literacy. These interconnected areas reflect the government's commitment to a holistic approach to digitalization.

To achieve these goals, the strategy is guided by five principles: benefit for all, security and ethics, public-private collaboration, data as a common good, and global leadership. These principles ensure that digital development is aligned with Danish values and priorities.

The Digitization Council, a newly established body, plays a crucial role in advising the government and monitoring the implementation of the strategy. By following this comprehensive approach, Denmark aims to harness the power of digital technology to create a more prosperous, secure, and equitable society.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Denmark's network infrastructure has consistently been recognized as among the best in the world. The country has consistently ranked high in global assessments of digital infrastructure, such as the IMD World Digital Competitiveness Index and the ITU Global Connectivity Index. These rankings highlight the country's strong performance in areas like broadband penetration, internet affordability, and digital government services.

Denmark has one of the highest rates of fiber optic broadband penetration globally. This extensive infrastructure provides ultra-fast internet speeds to a significant portion of the population, enabling the use of data-intensive applications and services. The country's mobile networks have been praised for their speed, reliability, and coverage. The country has invested heavily in 5G technology, ensuring that its citizens and businesses have access to the latest mobile communication capabilities.

Denmark also has a high density of data centers, attracting international businesses and contributing to the country's digital economy. These facilities offer secure and reliable data storage and processing services, supporting various industries and applications. The Danish government has actively supported digital infrastructure development through policies, investments, and partnerships. Initiatives like the "Denmark 2025" strategy have aimed to create a digital society and promote innovation in the technology sector.

These factors collectively demonstrate Denmark's exceptional network infrastructure preparedness. The country's commitment to technological advancements and its focus on connectivity, reliability, and cybersecurity has positioned it as a global leader in the digital age.

4.2. Management Optimization [MO]

Denmark has emerged as a global leader in government digitalization, setting a high standard for other nations to follow. The country's success can be attributed to several key factors:

- **Citizen-Centric Approach:** Denmark has consistently prioritized the needs and experiences of its citizens in its digitalization efforts. This has resulted in user-friendly interfaces, accessible services, and a focus on improving the quality of life for citizens.
- **Data-Driven Decision-Making:** The Danish government has effectively leveraged data analytics to inform policy decisions and optimize service delivery. This data-driven approach has enabled the government to identify areas for improvement, allocate resources efficiently, and measure the impact of digital initiatives.
- **Strategic Planning:** Denmark has developed a comprehensive digitalization strategy that outlines clear goals, priorities, and investments. This strategy provides a roadmap for government agencies and ensures a coordinated approach to digital transformation.

- **Strong Cybersecurity and Data Privacy:** The Danish government has strongly emphasized cybersecurity and data privacy. This has helped to build trust in government digital initiatives and protect citizens' personal information.

By focusing on these areas, Denmark has created a digital government that is efficient, effective, and responsive to its citizens' needs. The country's success is a model for other nations seeking to improve their digital capabilities. With this progress, the country achieved the full scores of this indicator in the Waseda rankings.

4.3. Online Service [OS]

Denmark has established itself as a global leader in digital public services. The country led with a perfect score in the Online Service Indicator, showcasing its exceptional excellence in digital service delivery. The key components of their digital infrastructure and the positive outcomes are as follows:

- **NemID:** This secure digital identification system serves as the backbone of Denmark's digital ecosystem. It allows citizens to access a wide range of services, both public and private, with a single login. Launched in 1999 and continually updated, NemID has evolved into a user-friendly mobile app offering enhanced security.
- **Digital Post:** This secure digital mailbox ensures reliable communication between government agencies and citizens. It eliminates the need for physical mail and has legal validity for official documents. Additionally, citizens have multiple options for accessing their Digital Post, including a government service and private sector partnerships.
- **NemKonto:** A mandatory bank account for all citizens and businesses, NemKonto streamlines government payouts. Benefits, tax returns, and other payments are automatically deposited into a designated account, eliminating the need for citizens to update their information with each agency.
- **Borger.dk:** This one-stop shop serves as a central hub for accessing all Danish public services. Citizens can navigate life events, from tax filing to marriage registration, with ease. The platform is available in English, catering to the needs of the expatriate community.
- **Mobile Apps:** Recognizing the importance of mobile convenience, Denmark offers a suite of mobile apps for various services. These include apps for accessing NemID, Digital Post, health insurance cards, and driver's licenses.

Denmark's digital public services are designed with user needs at the forefront. These services are not only functional, seamlessly integrating with one another to provide a smooth user experience, but also reliable, accessible 24/7 and equipped to handle high demand through virtual waiting rooms. Additionally, the services prioritize usability, offering a consistent user interface across all platforms and maintaining clear communication channels. To enhance the user experience further, these services are designed to be frictionless, with many functions automated for convenience. This comprehensive approach has resulted in high levels of citizen satisfaction and trust in Denmark's digital government.

4.4. National Portal [NPR]

Denmark's national portal, borger.dk, serves as a central hub for accessing government services. This user-friendly platform offers a wide range of services, from tax filing to applying for a health card. The portal's integration with other digital services, such as NemID and Digital Post, creates a seamless experience for citizens. By providing a one-stop-shop for government interactions, borger.dk has significantly enhanced citizen convenience and satisfaction. While the portal's functionality and accessibility are commendable, ongoing efforts to improve its design and expand its service offerings could further enhance its value to citizens.

To assess Denmark's national portal, borger.dk, comprehensively, it is essential to consider factors beyond its efficiency and user-friendliness. These additional criteria include accessibility, security, innovation, cost-effectiveness, and user feedback. By evaluating the portal's compliance with accessibility standards, data protection measures, integration with emerging technologies, return on investment, and citizen satisfaction, a more comprehensive understanding of its strengths and areas for improvement can be gained. This assessment can provide valuable insights for policymakers and digital service providers seeking to emulate Denmark's success in government digitalization.

4.5. Government CIO [GCIO]

Data regarding the employment of Chief Information Officers (CIOs) at the subnational levels of Danish government is not publicly accessible. The current structure of the Danish government does not include a formal CIO position at the national level. However, the Steering Committee for Joint Government Cooperation (STS) plays a crucial role in facilitating collaboration and information sharing among various government departments involved in e-government initiatives.

Comprised of representatives from different administrative regions, the STS serves as a platform for exchanging knowledge and best practices related to e-government projects. The committee's findings and recommendations are publicly available every two years, providing valuable insights into the progress and challenges of digital transformation in the Danish government. Despite the absence of a specific law outlining the responsibilities of a government CIO in Denmark, the STS and its members effectively contribute to the coordination and implementation of e-government initiatives at the subnational level.

4.6. E-Government Promotion [EPRO]

Denmark has long been recognized as a global leader in digital innovation, which came at the top 1 in the EPRO indicator in the Waseda rankings. The country's commitment to leveraging technology to improve public services, enhance efficiency, and promote economic growth has been instrumental in its success. Denmark has established a robust digital infrastructure, including high-speed broadband networks and advanced data centers. This foundation has enabled developing and delivering innovative digital solutions across various sectors.

Denmark has consistently prioritized the needs and experiences of its citizens in its digitalization efforts. By focusing on user-friendly interfaces, accessible services, and a seamless online experience, the government has fostered trust and acceptance of digital solutions among the population. The Danish government has strategically invested in digital technologies and fostered strong collaborations between government agencies, private sector organizations, and academic institutions. These partnerships have facilitated knowledge sharing, innovation, and the development of effective digital solutions.

Denmark has embraced open data policies, making public data accessible to citizens, businesses, and researchers. This has encouraged innovation and the development of new applications and services. Additionally, the government has prioritized cybersecurity and data protection to ensure the security and privacy of citizens' personal information. Denmark has actively participated in international forums and partnerships to share best practices, learn from other countries, and promote global digital development. This engagement has strengthened Denmark's position as a leader in digitalization.

Denmark's commitment to digital innovation, coupled with its strong foundation, citizen-centric approach, strategic investments, and international collaboration, has positioned the country as a global

leader in digitalization. Its success serves as a model for other nations seeking to leverage technology to improve their public services, enhance efficiency, and promote economic growth.

4.7. E-Participation [EPAR]

Denmark, Switzerland, and the UK all shared the top position in E-Government Participation, each demonstrating exceptional success in engaging citizens through digital platforms. Denmark has a high rate of internet penetration and digital literacy among its population, which is essential for effective e-participation. The Danish government has invested in developing user-friendly digital platforms that make it easy for citizens to access information, participate in decision-making processes, and interact with public services. Denmark is strongly committed to open data, which enables citizens to access and use government data to inform their decision-making and hold public institutions accountable. Danish citizens are actively engaged in e-participation, using online platforms to discuss public issues, provide feedback to the government, and participate in decision-making processes. Denmark is committed to ensuring that its e-participation initiatives are accessible to all citizens, including those with disabilities. The country is constantly working to improve its e-participation efforts based on feedback from citizens and public institutions.

High levels of digital literacy, user-friendly platforms, open data initiatives, active citizen engagement, a focus on accessibility, and a commitment to continuous improvement characterize Denmark's e-participation efforts in 2024. This approach has helped Denmark become a global leader in e-participation and improve its governance quality.

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. The country also stood at the top of the OGD indicator in the Waseda rankings.

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. Its 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. Cyber Security [CYB]

Denmark has established a strong reputation for its cybersecurity measures and proactive approach to mitigating cyber threats. In 2024, the country continued to prioritize cyber defense and invest in advanced technologies to protect its critical infrastructure and digital assets. Key aspects of Denmark's cybersecurity efforts in 2024 include:

- National Cybersecurity Strategy: The Danish government's National Cybersecurity Strategy, implemented in 2022, provided a comprehensive framework for safeguarding the country's digital infrastructure. This strategy focused on enhancing technological resilience, protecting critical government systems, and improving the cybersecurity knowledge and skills of citizens and businesses.
- Public-Private Partnerships: Denmark fostered strong collaborations between government agencies, private sector organizations, and academic institutions to address cybersecurity challenges. These partnerships enabled information sharing, joint research, and the development of innovative solutions.
- Investment in Cybersecurity Technologies: The Danish government allocated significant resources to invest in advanced cybersecurity technologies, such as artificial intelligence, machine learning, and blockchain. These technologies helped improve threat detection, incident response, and overall resilience.
- Cybersecurity Education and Awareness: Denmark emphasized the importance of cybersecurity education and awareness among its citizens and businesses. Programs were implemented to raise awareness about cyber threats, best practices for online safety, and the consequences of cyberattacks.

Despite its robust cybersecurity measures, Denmark, like any other country, faces ongoing challenges from evolving cyber threats. The country continues to adapt its strategies and invest in emerging technologies to maintain a high level of cyber resilience.

4.10. The use of Emerging ICT [EMG]

Denmark has been a pioneer in the adoption and integration of emerging information and communication technologies (ICT) into various sectors of its economy and society. In 2024, the country continued to leverage these technologies to drive innovation, improve efficiency, and enhance the quality of life for its citizens. Artificial Intelligence (AI) has been a key focus in Denmark, with significant investments in research and development. The Danish Technological Institute has been at the forefront of AI initiatives, collaborating with industries like healthcare, agriculture, and manufacturing to develop AI-powered solutions.

Internet of Things (IoT) has been embraced as a means to optimize resource management and improve efficiency. Denmark has implemented smart city initiatives, utilizing IoT sensors to monitor traffic, energy consumption, and environmental conditions. Blockchain technology has gained traction in areas like supply chain management, finance, and energy. The Danish government has supported blockchain initiatives and explored its potential to improve transparency, security, and traceability. Cloud computing has become a cornerstone of Denmark's digital infrastructure, with businesses and government organizations increasingly adopting cloud-based solutions. Danish companies have been leveraging cloud platforms to access computing resources and develop innovative applications. 5G networks have been a priority for Denmark, with investments in deployment and infrastructure. 5G is expected to enable new applications and services in areas like autonomous vehicles, remote healthcare, and smart manufacturing. These emerging ICT technologies are playing a crucial role in Denmark's economic growth and development. The country's commitment to digital transformation and its strong research and development ecosystem have positioned it as a leader in the adoption of emerging ICT.

4. United States

1. General Information

Area: **9,833,520 km2**

Population: **345,976,665**

Government Type: Federal Constitutional Republic

2024 Growth Rate: **2.8%**

GDP (IMF '24): **$28.78 Tn**

GDP Per Capita: **$83,320**

Internet User: **89.4%**

Wired (Fixed Broadband User) per 100 people: **38.1**

Wireless Broadband User per 100 people: **185**
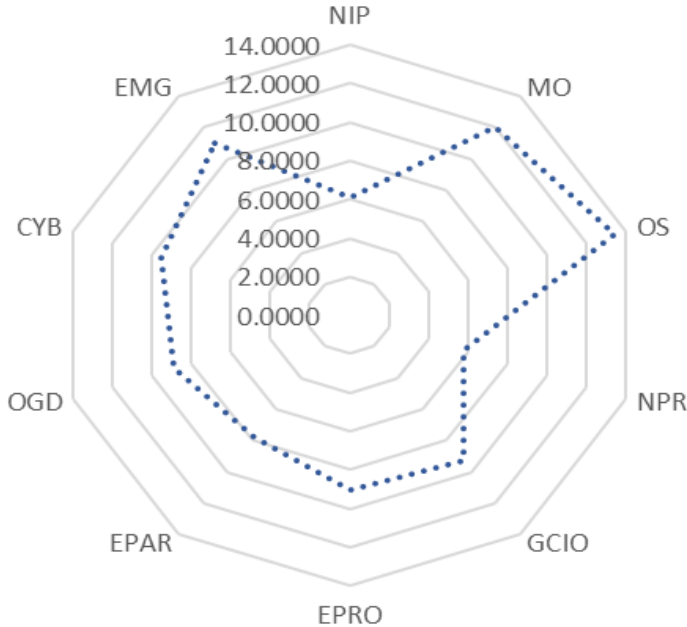
2. Digital Government Development and new trends

2.1. The development

In the year 2024, the United States maintained its position as the worldwide leader in government digitization, achieving significant progress in many fields. The primary objective of the federal government was to improve the accessibility, efficiency, and security of digital services for people. This endeavor placed particular emphasis on open government data and public involvement. In an

effort to modernize government processes, strengthen cybersecurity, and incorporate new technologies like AI and blockchain into public service delivery, the U.S. implemented various programs under the Office of Management and Budget (OMB).

An important milestone was the enlargement of the U.S. Digital Service (USDS), which collaborated with federal departments to enhance digital interfaces and streamline the user experience of government services. By revamping websites like Healthcare.gov and streamlining the tax-filing system, the USDS enhanced the user-friendliness of government services, leading to higher levels of public participation and satisfaction. As part of its commitment to openness, the government has also introduced new online portals that provide residents real-time information on public projects. Due to the significant advancements in government digitization, the United States achieved the 4th position in the Waseda rankings for 2024.

2.2. New Trends

The United States' digitalization strategy in 2024 was guided by the Federal Data Strategy and the President's Management Agenda, which emphasized a government that is more data-driven, accountable, and citizen-focused. The U.S. government's digital transformation efforts were spearheaded by the Office of the Federal CIO (OFCIO), which aimed to enhance digital services while ensuring equitable access for all Americans.

The strategy placed particular focus on expanding broadband access to rural and underserved communities, ensuring that all citizens have the infrastructure necessary to participate in the digital economy. The federal government also prioritized digital equity by establishing the Digital Inclusion Fund, which provided grants to local governments to increase digital literacy and access to government services.

In addition to domestic strategies, the U.S. remained a key player in international digital governance forums, collaborating with countries in the G7 and the OECD to set standards for digital ethics, cybersecurity, and cross-border data flows.

3. Digital Government by Indicators

3.1. Network Infrastructure Preparedness [NIP]

Network infrastructure preparedness was a critical focus for the United States in 2024, especially given the nation's ongoing efforts to close the digital divide. The Infrastructure Investment and Jobs Act (IIJA), passed in 2021, continued to fund significant investments in broadband expansion projects throughout 2024. The Federal Communications Commission (FCC) oversees the deployment of new broadband networks, which aims to bring high-speed internet to millions of unserved Americans, particularly in rural areas.

In 2024, the government reported that 90% of American households had access to broadband internet, a significant improvement from previous years. The Broadband Equity, Access, and Deployment (BEAD) Program provided $42.5 billion in grants to states and local governments to build out broadband infrastructure. The success of these programs was exemplified by the rollout of fiber-optic networks in Appalachia and Native American reservations, bridging the gap between urban and rural digital access.

The government also ramped up efforts to improve the resilience and security of critical network infrastructure. The Cybersecurity and Infrastructure Security Agency (CISA) worked closely with private companies to secure 5G networks and protect key systems from cyber threats, ensuring the integrity and reliability of the nation's communications infrastructure.

3.2. Management Optimization [MO]

The country, with other four countries, got the maximum scores in the Waseda's MO indicator 2024. The United States is acknowledged for its exceptional performance in Management Optimization, which underscores its innovative and efficient resource management strategies. Management optimization in the U.S. government focused on improving the efficiency of federal agencies through the adoption of digital tools and streamlined processes. The Office of Personnel Management (OPM) rolled out the "Government Reimagined" initiative, which aimed to digitize workflows, reduce administrative burden, and promote agile management practices across agencies.

A prime example of this effort in 2024 was the Department of Veterans Affairs (VA), which deployed a new digital records management system that reduced processing times for veterans' benefits claims by 40%. This system utilized automation and machine learning to handle routine tasks, freeing up staff to focus on more complex cases and improving the overall service experience for veterans.

Additionally, the U.S. General Services Administration (GSA) expanded its cloud computing offerings through the Federal Risk and Authorization Management Program (FedRAMP), enabling agencies to more efficiently manage IT services and resources. The move towards cloud-first policies allowed for greater flexibility and cost savings, particularly as the demand for remote work increased in 2024.

3.3. Online Service [OS]

The U.S. government made significant strides in expanding its online service offerings in 2024. The "Reimagine Government" initiative, led by the GSA's Technology Transformation Services, focused on ensuring that citizens could access government services online seamlessly. Key achievements included the development of "GovOne," a unified portal that allows citizens to access federal, state, and local services through a single login.

This year sees the expansion of the Internal Revenue Service's (IRS) online tax services achieve a lot, which enabled over 160 million Americans to file taxes, check refunds, and manage their tax accounts online. The online portal also integrated AI chatbots to assist citizens with their queries, improving the user experience and reducing call center waiting times.

The U.S. Citizenship and Immigration Services (USCIS) also advanced its online services by offering virtual appointments for immigration interviews, resulting in faster processing times and enhanced customer service. The platform sees a record number of users in 2024, contributing to the agency's efforts to digitize its entire service process by 2025.

3.4. National Portal [NPR]

The United States' national portal, USA.gov, continued to serve as a comprehensive digital gateway for citizens in 2024, offering easy access to thousands of government services and resources. USA.gov was redesigned to be more mobile-friendly, ensuring that citizens could access services on the go, regardless of their device. The portal also introduced more personalized features, such as a recommendation search engine that suggests relevant services based on user profiles.

In 2024, the portal sees the addition of real-time data dashboards that allowed citizens to track the progress of federal projects, including infrastructure developments and public health initiatives. For

example, citizens could monitor the progress of the government's vaccine distribution efforts during the flu season, fostering greater transparency and accountability.

The portal also integrated more open government data, allowing users to access datasets related to healthcare, education, and environmental monitoring. These datasets were used by researchers, journalists, and the public to gain insights into government performance and outcomes, strengthening trust in federal institutions.

3.5. Government CIO [GCIO]

The role of the Government Chief Information Officer (GCIO) is further strengthened in 2024, with Dr. Clare Martorana continuing as the Federal CIO, leading efforts to modernize IT systems across federal agencies. Under her leadership, the government placed significant emphasis on cloud adoption, cybersecurity, and the use of data to drive decision-making. The Office of the Federal CIO launched the "Cloud Smart" strategy, encouraging agencies to adopt cloud services that align with security and scalability needs.

The Federal CIO Council, which includes CIOs from all major agencies, plays a critical role in coordinating digital initiatives and ensuring that best practices are shared across departments. In 2024, the Council spearheaded the creation of the "Digital Services Playbook," a set of guidelines that helped agencies streamline their digital transformation efforts and align with federal standards.

Martorana's leadership also focused on workforce development, with initiatives to recruit and retain top digital talent in government through partnerships with academic institutions and private sector firms. The "Tech Forward Fellowship" program is one such initiative, offering government employees advanced training in emerging technologies to better serve the public.

3.6. E-Government Promotion [EPRO]

The U.S. federal government aggressively promoted e-government services in 2024, focusing on improving accessibility, awareness, and usability of digital platforms. The Digital Government Strategy laid out by the Office of Management and Budget emphasized the importance of mobile-first, cloud-enabled services that cater to a diverse population, including those with disabilities and limited digital literacy.

One of the key promotion initiatives is the "Digital Government for All" campaign, which runs nationwide and targeted underrepresented communities, ensuring they had access to online services like healthcare, education, and public benefits. The campaign included digital literacy programs and partnerships with libraries to train citizens on how to navigate government websites and use digital services effectively.

Additionally, the government enhanced its outreach efforts through social media, using platforms like X, Facebook, and YouTube to educate citizens about available services. These promotional campaigns helped increase the usage of online services by 20% in 2024, with programs such as Social Security benefits, Medicare enrollment, and federal student aid application platforms seeing record levels of engagement.

3.7. E-Participation [EPAR]

In 2024, e-participation efforts were enhanced by the expansion of public consultation platforms, allowing citizens to engage directly in the legislative process and government decision-making. The "We the People" platform, which allows users to create petitions and submit them to the White House, saw a revamp with new features, including more advanced data analytics that helped government officials better understand public sentiment on key issues.

The U.S. government also launched new initiatives such as the "Digital Town Halls," where elected officials could engage with their constituents through live streaming and interactive Q&A sessions. This format allowed citizens to voice concerns and provide input on pending legislation, ensuring that the government remained responsive to the public's needs.

Additionally, federal agencies expanded their use of open feedback mechanisms on regulations.gov, where citizens could comment on proposed rules and regulations. In 2024, the Environmental Protection Agency (EPA) used these tools to gather over 1.5 million public comments on climate change policy proposals, directly influencing the formulation of new environmental regulations.

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

The digital transformation of the U.S. government in 2024 focused heavily on leveraging data to drive innovation, improve services, and increase transparency. The Data.gov portal, which serves as the

central repository for federal government datasets, continued to grow, adding new datasets related to public health, energy consumption, and disaster response.

The Department of Health and Human Services (HHS) led several initiatives to make health data more accessible, particularly in the wake of the COVID-19 pandemic. In 2024, HHS launched the HealthData.gov platform, which provided citizens, researchers, and policymakers with access to detailed health statistics and outcomes, including information related to disease outbreaks, vaccination rates, and hospital performance. The platform allowed for data-driven decision-making in both public health policy and research, with real-time data analytics offering valuable insights during crises such as flu outbreaks and public health emergencies.

In the realm of open government data, the U.S. Geological Survey (USGS) also expanded its efforts by releasing comprehensive environmental datasets, including climate change projections and water quality data, which were used by local governments and organizations to address environmental challenges. The federal government's commitment to open data was further underscored by the OPEN Government Data Act, which required federal agencies to make their data accessible and machine-readable by default. These efforts bolstered the transparency and accountability of federal agencies, reinforcing the trust between the government and the public.

3.9. Cyber Security [CYB]

In 2024, cybersecurity remained a top priority for the U.S. government, as the increasing reliance on digital infrastructure necessitated stronger protections against cyber threats. The Cybersecurity and Infrastructure Security Agency (CISA) continues to lead the federal response to cyber threats, focusing on enhancing the resilience of critical infrastructure, securing government networks, and building partnerships with the private sector.

A key development in 2024 was the launch of the National Cybersecurity Strategy, which outlined a comprehensive approach to defending the nation against cyberattacks. This included investments in advanced threat detection technologies, cybersecurity workforce development, and cross-sector collaboration. One notable initiative is the Cyber Talent Initiative, which recruited and trained thousands of cybersecurity professionals to work in federal agencies, addressing the growing talent gap in the field.

Moreover, CISA collaborated with state and local governments to improve the cybersecurity of election systems ahead of the 2024 elections, ensuring the integrity of the democratic process. The Election Infrastructure ISAC (Information Sharing and Analysis Center) played a pivotal role in disseminating threat intelligence and providing real-time support to state and local officials. This initiative helped prevent major cyber incidents, reinforcing public confidence in the security of the election process.

4.10. The use of Emerging ICT [EMG]

The United States' approach to emerging ICT in 2024 was characterized by government-led innovation in areas such as artificial intelligence (AI), quantum computing, and 5G technologies. The National AI Initiative continued to drive federal investments in AI research and development, with a focus on ethical AI deployment in public services. For example, the Department of Transportation (DOT) integrated AI into traffic management systems, reducing congestion and enhancing road safety in major metropolitan areas.

The government also launched the Quantum Internet Initiative, a long-term project aimed at developing secure quantum communication networks. This project, led by the Department of Energy (DOE), aimed to establish the U.S. as a global leader in quantum technologies by fostering collaboration between national labs, universities, and industry partners.

Another key focus was the deployment of 5G technology across the country. The Federal Communications Commission (FCC) oversaw the allocation of spectrum for 5G networks, which facilitated the expansion of high-speed, low-latency communication services. These networks supported emerging applications such as smart cities and autonomous vehicles, driving further innovation in public services and infrastructure management.

5. South Korea

1. General Information

Area: **100,363 km2**

Population: **51,705,700**

Government Type: Presidential Republic

2024 Growth Rate: **2.5%**

GDP (IMF '24): **$1.76 Tn**

GDP Per Capita: **$34,049**

Internet User: **97.2%**

Wired (Fixed Broadband User) per 100 people: **46.6**

Wireless Broadband User per 100 people: **122**

2. Digital Government Overview in Country
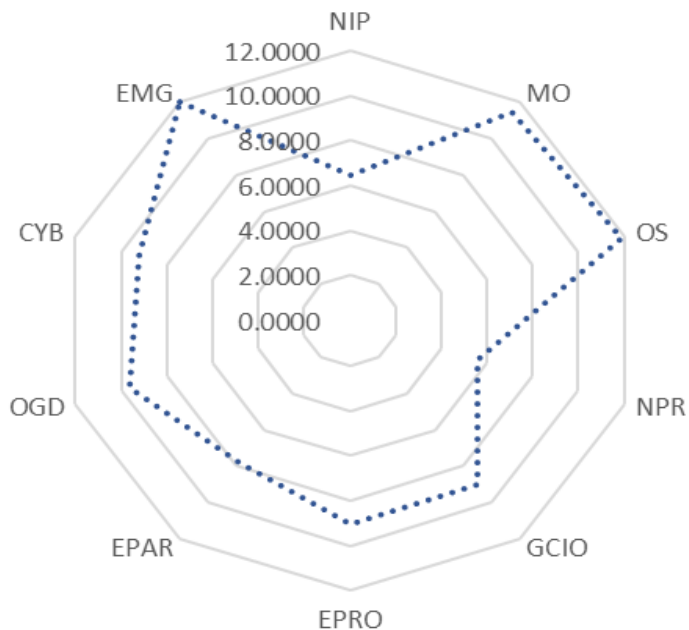
3. Digital Government Development and new trends

3.1. The development

In 2024, South Korea continued to build on its reputation as a global leader in digital government services. Leveraging its strong technological infrastructure, the government focused on expanding digital services across all sectors, with particular emphasis on smart cities, e-participation, and open

government data. Through the Ministry of Interior and Safety's Digital Government Innovation Plan, the government worked to improve both accessibility and transparency of public services.

The implementation of cutting-edge technologies such as AI and blockchain across various ministries and public agencies marked a significant advancement. For example, the government integrated blockchain into land registration services, significantly reducing administrative delays and enhancing transparency in property transactions. South Korea's advanced technological infrastructure enabled the country to rank first in the United Nations' E-Government Development Index (EGDI) for 2024, reaffirming its status as a global leader in digital governance. The country came in the 5th position in the Waseda rankings this year.

3.2. New Trends

South Korea's digital government strategy in 2024 was centered around the "Digital New Deal 2.0," an initiative that aimed to transform the country into a global digital powerhouse. This strategy prioritized the development of data-driven services, artificial intelligence, and smart city technologies to enhance the efficiency and accessibility of public services. The plan also sought to bridge the digital divide by expanding digital infrastructure in rural areas and providing training in digital literacy to citizens.

A key pillar of the Digital New Deal 2.0 was the expansion of the Digital Twin Project, which created virtual replicas of urban environments for better public planning and disaster response. By simulating various scenarios, government agencies could optimize resource allocation and improve infrastructure management. The Ministry of Science and ICT also launched initiatives to bolster South Korea's AI capabilities, such as the AI Government Project, which integrated AI into administrative workflows to streamline processes and enhance decision-making. This year, South Korea stands at the 5th position in the Waseda rankings.

South Korea's strategy also emphasized international collaboration in digital governance. The government played a leading role in the OECD's Digital Government Working Group, sharing best practices with other countries and establishing global standards for the ethical use of AI and data privacy.

4.   Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

South Korea's network infrastructure preparedness in 2024 remained a model for the world, with nearly universal high-speed internet access across the country. The government's "K-Network 2030" initiative focused on upgrading the country's broadband network to support 10 Gbps internet speeds, further solidifying South Korea's leadership in internet connectivity. South Korea occupies the 4th spot in the rankings, highlighting its significant advancements and investments in network infrastructure.

As part of its national 5G expansion, the government allocated significant resources to ensure that all urban and rural areas have access to 5G networks. By 2024, 95% of South Korean households were covered by 5G, allowing for the seamless integration of IoT devices in smart homes, public transportation, and healthcare services. This widespread network availability enabled innovative services such as remote medical consultations, autonomous vehicles, and AI-powered traffic management systems.

The Ministry of Science and ICT also launched pilot programs to explore the deployment of 6G networks, with the goal of achieving commercial rollout by 2028. These initiatives demonstrated the government's commitment to maintaining South Korea's position at the forefront of global telecommunications infrastructure.

4.2. Management Optimization [MO]

Management optimization in South Korea's government focused on increasing efficiency through digital transformation and automation. The "Digital Government Innovation Plan" introduced in 2024 aimed to streamline administrative processes by integrating AI-driven automation and blockchain into government operations. This initiative helped cut bureaucratic red tape and enabled quicker responses to citizens' needs.

One notable example of management optimization is the use of AI in tax administration. The National Tax Service (NTS) implemented an AI-based tax auditing system that automatically detects anomalies in tax filings, significantly reducing processing time and human error. This system not only improved efficiency but also increased tax compliance rates.

Additionally, the Ministry of Personnel Management introduced a new digital platform that streamlined recruitment, performance evaluations, and internal communications across government

agencies. This platform, powered by AI, helped to optimize human resource management by automating repetitive tasks and providing data-driven insights for better decision-making.

4.3. Online Service [OS]

In 2024, South Korea's online services continued to expand and improve, offering citizens seamless access to a wide range of government functions through the "Government 24" portal. This platform provided a one-stop service for over 700 government services, from tax filing and healthcare applications to public education resources and social welfare services.

A major development in online services was the implementation of an AI-powered virtual assistant, which offered personalized recommendations and guided citizens through various government processes. This assistant was particularly useful in navigating complex services, such as applying for housing subsidies or renewing business licenses.

The government also introduced a mobile version of its public services platform, allowing citizens to access services on the go. This mobile platform utilized biometric authentication, such as facial recognition, ensuring secure and convenient access to sensitive services like online voting and banking

4.4. National Portal [NPR]

South Korea's national portal, "Government 24," remained the cornerstone of its digital government strategy in 2024. The portal was revamped to enhance user experience, with a focus on accessibility and mobile-first design. As part of this revamp, the portal adopted AI-powered chatbots to assist users in real-time, helping them navigate government services more efficiently.

The national portal also integrated real-time data tracking for public services. For instance, citizens could monitor the status of public transportation, disaster response efforts, and environmental conditions, promoting transparency and citizen engagement. Additionally, the portal offered personalized dashboards for users to manage all their interactions with the government, from tax records to medical appointments.

The Ministry of Interior and Safety expanded the capabilities of the portal by incorporating more data sets from public institutions, allowing citizens to access open data on government performance, environmental issues, and social services. This open data initiative contributed to greater transparency and allowed for public scrutiny of government activities.

4.5. Government CIO [GCIO]

South Korea's Government Chief Information Officer (GCIO) played a pivotal role in overseeing the nation's digital transformation in 2024. The GCIO led efforts to modernize government IT systems, promote data-driven governance, and ensure the integration of emerging technologies across public sectors.

In 2024, the GCIO spearheaded the implementation of the AI Government Project, which introduced AI-driven automation in government workflows. This project resulted in faster processing times for administrative tasks, such as permit approvals and benefit distributions. The GCIO also coordinated with the Ministry of Science and ICT to develop guidelines for AI ethics, ensuring that the technology was deployed responsibly in public services.

Furthermore, the GCIO collaborated with local governments to implement digital solutions tailored to regional needs. For example, in the city of Busan, the GCIO led a project to integrate IoT and AI in the management of public transportation, reducing traffic congestion and improving air quality.

4.6. E-Government Promotion [EPRO]

The promotion of e-government services was a key focus of the South Korean government in 2024. The "Digital New Deal 2.0" included a nationwide campaign to increase awareness and usage of online services, particularly among older adults and rural populations. The government partnered with community centers to provide digital literacy training, ensuring that all citizens could benefit from the expanded online services.

The Ministry of Interior and Safety launched the "Digital Government for All" initiative, aimed at promoting inclusive digital services by making government websites more accessible for people with disabilities. These efforts resulted in a 15% increase in the use of e-government services in 2024, particularly in rural areas.

Moreover, the government used social media platforms and digital advertisements to raise awareness about new services available through "Government 24." This outreach included tutorials and demonstrations on how to use online services, resulting in a significant increase in user engagement.

4.7. E-Participation [EPAR]

South Korea's e-participation initiatives in 2024 emphasized direct citizen engagement in policy-making and decision-making processes. The "Gwanghwamun 1st Street" online platform was expanded to allow more citizens to submit policy suggestions and engage in discussions on key government initiatives. This platform facilitated communication between the government and the public, allowing citizens to voice their opinions on matters such as climate policy, urban development, and education reforms.

The government also launched digital town hall meetings where citizens could interact directly with public officials through live streaming platforms. These e-participation efforts were particularly successful in fostering public dialogue on major national policies, such as renewable energy development and the country's aging population.

In addition, South Korea introduced an AI-based policy feedback system, which analyzed public sentiment from social media platforms and integrated it into policy discussions. This system allowed government officials to better understand public opinions and adjust policies accordingly.

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

Digital transformation in South Korea is driven by the government's commitment to open data and transparency. In 2024, the government expanded its Open Data Portal, providing citizens, researchers, and businesses with access to thousands of datasets on various aspects of public life, including transportation, health, and environmental data.

One notable initiative was the Smart Healthcare Project, which used open health data to improve public health services and outcomes. By integrating data from hospitals, clinics, and public health institutions, the government is able to enhance preventative care and streamline the management of chronic diseases.

Additionally, the Ministry of Land, Infrastructure, and Transport developed an open data platform for smart cities, allowing developers and urban planners to access real-time data on traffic, air quality, and energy usage. This platform supported South Korea's broader smart city initiative, which aims to create more sustainable and efficient urban environments through data-driven solutions.

4.9. Cyber Security [CYB]

Cybersecurity remained a top priority for the South Korean government in 2024, particularly in light of the increased digitization of public services and the rise of cyber threats. The National Cyber Security Strategy, implemented by the Ministry of Science and ICT, focused on enhancing the security of government networks, protecting critical infrastructure, and safeguarding citizens' data.

In 2024, South Korea established the Cybersecurity Task Force, which worked across various government departments to monitor and respond to cyber threats in real-time. This task force was instrumental in thwarting several cyber-attacks targeting critical government infrastructure, including attempts to breach the Ministry of National Defense's systems.

The government also enhanced its Public Cybersecurity Awareness Campaign, focusing on educating citizens about phishing, ransomware, and data privacy practices. This campaign included online workshops, informational resources on government portals, and collaborations with private cybersecurity firms to improve public understanding of cyber risks.

In a significant development, the K-CERT (Korea Computer Emergency Response Team) was expanded in 2024 to cover more sectors, including healthcare and transportation. K-CERT is tasked with investigating and mitigating cyber incidents, as well as providing support to both government agencies and private organizations in bolstering their cybersecurity defenses.

4.10. The use of Emerging ICT [EMG]

South Korea's digital government strategy in 2024 is heavily influenced by emerging technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT). The government's ongoing AI for Public Services Initiative demonstrated how AI could enhance efficiency and responsiveness in government operations. For instance, the Ministry of Justice deployed AI in its court system to assist with case management and prediction of trial outcomes, reducing backlogs in the judiciary.

Blockchain technology is another area of focus. The government launched blockchain-powered systems in public procurement, reducing fraud and improving transparency in government contracts. Blockchain was also used in electoral processes, with pilot projects exploring its use in secure and verifiable voting systems during regional elections.

South Korea's IoT Development Program is a crucial part of the country's smart city initiatives. The government created more efficient and sustainable urban environments by integrating IoT devices into public transportation, waste management, and energy grids. One of the standout projects is in Songdo International Business District, where IoT technology was used to optimize traffic flow, reduce energy consumption, and automatically manage public services like waste collection. With this progress, South Korea achieved the full score of the EMG indicator in the Waseda rankings this year.

6. Netherlands

1. General Information

Area: **41,865 km2**

Population: **18,265,376**

Government Type: Constitutional Monarchy

2024 Growth Rate: **0.6%**

GDP (IMF '24): **$1.14 Tn**

GDP Per Capita: **$62,676**

Internet User: **92.5%**

Wired (Fixed Broadband User) per 100 people: **43.3**

Wireless Broadband User per 100 people: **123**

2. Digital Government Overview in Country
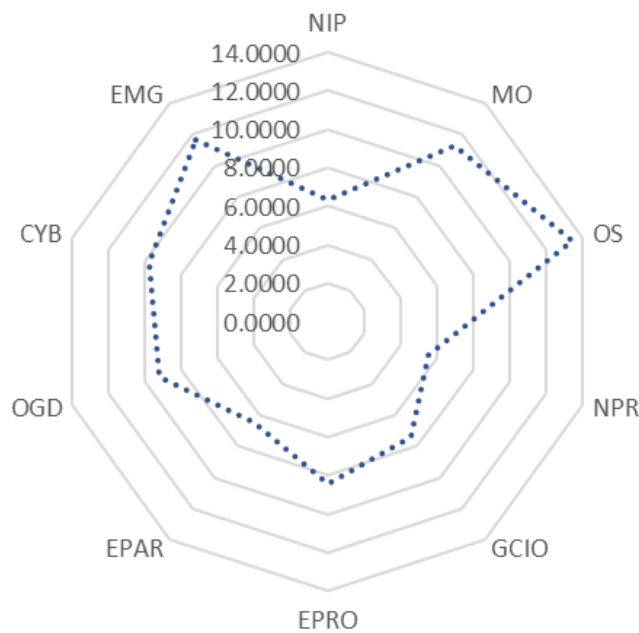
3. Digital Government Development and new trends

3.1. The development

In 2024, the Netherlands continued its leadership in digital governance, focusing on enhancing public services, citizen engagement, and open data initiatives. The country was ranked 6th in the Waseda rankings 2024. The Dutch government implemented key projects under the National Digital

Government Agenda (NDGA), which aimed to improve the accessibility and efficiency of government services through digital means. The country was recognized globally for its strong digital infrastructure and innovative use of technology in public services, placing high in the UN's E-Government Development Index (EGDI) and the Digital Economy and Society Index (DESI).

One notable achievement in 2024 was the rollout of the Digital Identity (DigiD) expansion, which improved secure access to government services for citizens and businesses. This initiative streamlined access to services ranging from healthcare to tax filings by enabling a single sign-on system for all government portals. Another highlight was the government's increased focus on using data and artificial intelligence (AI) to improve policy decisions and public services, with several pilot projects in areas like traffic management and social welfare.

The Netherlands also prioritized environmental sustainability in its digital transformation efforts, integrating digital tools into its Climate Action Plan to monitor and manage energy consumption, transportation, and waste in urban areas. This strategy helped ensure that the country's digital transformation supported both economic growth and sustainability.

3.2. New Trends

The Dutch government's digital strategy in 2024 centered around the National Digital Government Agenda (NDGA), which emphasized improving service delivery, enhancing data-driven decision-making, and promoting inclusivity in digital services. The NDGA outlined specific goals, such as increasing the use of digital identity services, fostering the use of open data, and enhancing cybersecurity to protect critical infrastructure.

The government also focused on bridging the digital divide, ensuring that rural areas and vulnerable populations had access to high-speed internet and digital services. The Digital Inclusion Action Plan was launched to provide digital literacy training for seniors, people with disabilities, and those in lower-income brackets, ensuring that no one was left behind in the digital age.

To further its international cooperation, the Netherlands actively participated in the European Digital Strategy, contributing to the development of standards and policies for digital governance across the EU. The country played a key role in discussions around AI regulation, data privacy, and cross-border digital services, positioning itself as a leader in shaping the future of digital governance in Europe.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

The Netherlands maintained a robust and resilient network infrastructure in 2024, with nationwide high-speed internet coverage and an advanced 5G network. The government continued to invest in upgrading its digital infrastructure under the Broadband Action Plan, which focused on ensuring that even the most remote rural areas had access to high-speed internet.

The 5G Strategy saw significant progress in 2024, with the government partnering with telecom operators to expand 5G coverage across the country. This expanded network supported the deployment of smart city solutions, autonomous vehicles, and other IoT applications, particularly in urban areas like Amsterdam and Rotterdam.

Looking ahead, the Dutch government started preparing for the rollout of 6G technology, with research institutions and telecom companies collaborating on pilot projects aimed at developing the next generation of wireless communications. These efforts positioned the Netherlands as a frontrunner in Europe for network innovation, ensuring that its infrastructure could meet future demands.

4.2. Management Optimization [MO]

In 2024, the Netherlands focused on optimizing its public sector management through digital transformation. The Smart Government Program introduced AI and data analytics tools to improve the efficiency of administrative tasks and decision-making processes across various government departments. One significant example of management optimization was the digitization of the Tax and Customs Administration. The government implemented AI-powered systems to detect tax evasion and streamline tax filings, resulting in more efficient operations and higher compliance rates. The use of AI also reduced the workload on government employees, allowing them to focus on more complex tasks.

Additionally, the Dutch government launched the Digital Skills for Civil Servants Initiative, which provided training for public employees to improve their digital literacy and ensure they could effectively use new digital tools. This initiative helped modernize public sector operations and improved the quality of services provided to citizens.

4.3. Online Service [OS]

The Netherlands continued to enhance its online services in 2024, with a focus on simplifying access to government resources. The expansion of the DigiD system played a central role in providing citizens and businesses with secure access to a wide range of public services, from healthcare to tax filings.

The government introduced an AI-powered chatbot called NL Assistant, integrated into its main public service portals, which provided real-time assistance to users navigating online services. This chatbot significantly improved the user experience by offering personalized guidance, reducing wait times for customer support, and increasing user satisfaction.

In addition, the Dutch government rolled out a mobile version of the MijnOverheid (My Government) platform, enabling citizens to access their personal data, government communications, and service notifications via their smartphones. This initiative increased the accessibility and convenience of digital services, especially for younger and mobile-first users.

4.4. National Portal [NPR]

The Netherlands' national portal, MijnOverheid, remained at the forefront of digital governance in 2024. This portal served as a single point of access for government services, allowing citizens to manage their interactions with various government agencies, check the status of their applications, and access personalized notifications.

In 2024, the portal underwent significant upgrades to improve usability and security. New features included a more user-friendly interface, enhanced data privacy settings, and integration with the DigiD system for easier authentication. Additionally, the government introduced AI-powered data analytics to personalize the user experience, offering recommendations for relevant services based on individual profiles and interactions.

The Open Government Data Platform was also integrated into the national portal, allowing citizens and businesses to access and utilize a wide range of government datasets. This initiative supported transparency and innovation, enabling developers to create new applications based on public data.

4.5. Government CIO [GCIO]

The role of the Government Chief Information Officer (GCIO) in the Netherlands remained critical in driving the country's digital transformation in 2024. The GCIO was responsible for overseeing the

implementation of the National Digital Government Agenda (NDGA) and ensuring that all government agencies adhered to the highest standards of cybersecurity, data privacy, and digital service delivery.

One of the GCIO's major achievements in 2024 was the rollout of the AI for Government Project, which introduced AI into several government processes, such as permit approvals, social services, and public infrastructure management. This initiative resulted in faster service delivery and improved decision-making through data-driven insights.

The GCIO also played a key role in coordinating the government's digital innovation efforts, working closely with ministries, local governments, and private sector partners to promote the adoption of emerging technologies across the public sector.

4.6. E-Government Promotion [EPRO]

The Dutch government continued its efforts to promote e-government services in 2024, with a focus on increasing public awareness and usage of online services. The E-Government Awareness Campaign aimed to educate citizens on the benefits of digital services, particularly targeting older adults and rural communities.

As part of this campaign, the government partnered with local municipalities to hold digital literacy workshops, teaching citizens how to use the DigiD system and access online services securely. These workshops helped increase the adoption of e-government services, particularly in areas with lower digital literacy rates.

The Digital Government Academy, launched in 2024, provided training for public officials and civil servants on the latest trends in digital government, such as AI, blockchain, and data privacy. This initiative ensured that the Dutch public sector remained at the cutting edge of digital transformation.

4.7. E-Participation [EPAR]

The Netherlands made significant strides in enhancing e-participation in 2024, enabling citizens to engage more actively in the policymaking process through digital platforms. The Online Participation Platform allowed citizens to submit ideas, provide feedback, and vote on proposed government initiatives, fostering greater transparency and public engagement in decision-making.

One notable example was the Climate Policy Consultation, where the government used digital tools to gather input from citizens on how to meet the country's ambitious climate goals. Over 100,000 people participated in the online discussions, providing valuable insights that shaped the final policy.

The Dutch government also introduced Digital Town Halls, where citizens could interact directly with government officials through live streaming platforms. These events allowed for real-time discussions on key issues such as healthcare, education, and housing, giving citizens a voice in shaping public policy.

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

The Netherlands remained committed to digital transformation and open government data in 2024, promoting transparency, innovation, and citizen engagement. The government's Open Data Program expanded significantly, with new datasets made available on topics such as public transportation, energy consumption, and environmental monitoring.

A major initiative was the Smart City Open Data Project, which encouraged cities like Amsterdam and Rotterdam to share data on urban infrastructure, traffic management, and environmental sustainability. This open data allowed developers and researchers to create innovative solutions for urban challenges, such as reducing carbon emissions and improving public safety.

The government also invested in data-driven policymaking, using big data analytics to inform decisions on issues like healthcare, education, and public safety. This approach improved the efficiency and effectiveness of government programs, ensuring that resources were allocated where they were needed most.

4.9. Cyber Security [CYB]

Cybersecurity was a top priority for the Dutch government in 2024, especially with the increasing digitization of public services and the rise of cyber threats. The National Cyber Security Strategy focused on strengthening the security of government networks, protecting critical infrastructure, and safeguarding citizens' data.

In 2024, the Dutch government launched the Cybersecurity Response Unit (CRU), which coordinated efforts across government agencies to monitor and respond to cyber threats in real-time. This unit played a key role in preventing several major cyber-attacks targeting critical government

infrastructure, including attempts to breach systems related to healthcare and public transportation. The CRU's rapid response capabilities were vital in minimizing damage and ensuring the continuity of essential public services.

Additionally, the government introduced the Cybersecurity Education Program, aimed at raising public awareness about online threats and promoting best practices for digital security. This program targeted schools, businesses, and the general public, providing resources and training on topics such as data protection, secure online behaviors, and the risks associated with phishing and ransomware attacks. The Dutch Cybersecurity Centre (DCC), established as a central hub for collaboration between the public and private sectors, played a pivotal role in enhancing cybersecurity. In 2024, the DCC expanded its initiatives by facilitating information-sharing between the government, private companies, and research institutions to address emerging cyber threats and develop new security technologies.

4.10. The use of Emerging ICT [EMG]

In 2024, the Netherlands demonstrated a strong commitment to integrating emerging technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT) into its government services. The AI in Public Services Initiative led to the development of AI applications that streamlined government processes such as social welfare management, tax audits, and legal proceedings. For example, AI was used to predict case outcomes in legal disputes, allowing courts to focus resources on more complex cases.

Blockchain technology gained traction in public procurement and supply chain management. The Blockchain for Government Project aimed to enhance transparency and accountability in public contracts by creating immutable records of transactions. Blockchain was also used in the healthcare sector to securely store and share patient data across institutions, improving the efficiency of care delivery while ensuring data privacy.

The government's efforts in IoT were largely centered around smart city initiatives. For example, in Eindhoven, IoT sensors were deployed to monitor traffic patterns, energy consumption, and public safety, enabling the city to optimize its services in real-time. The government also launched the National IoT Action Plan, which supported the deployment of IoT devices in sectors like agriculture, transportation, and environmental management to improve efficiency and sustainability.

7. Estonia

1. General Information

Area: **45,335 km2**

Population: **1,356,671**

Government Type: Parliamentary Republic

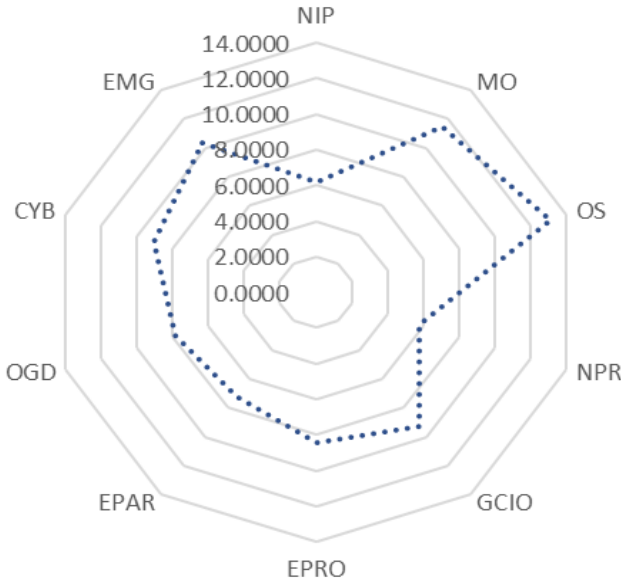2024 Growth Rate: **-0.9%**

GDP (IMF '24): **$43.49 Bn**

GDP Per Capita: **$31,962**

Internet User: **91%**

Wired (Fixed Broadband User) per 100 people: **37.7**

Wireless Broadband User per 100 people: **189**

2. Digital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development

Maintaining its position as a worldwide standard for e-government, Estonia remained at the forefront of digital governance and public sector innovation in 2024. Making public services that are safe, open, and efficient has been the central goal of Estonia's digital government plan. Nearly all Estonian government services, including those pertaining to health, education, taxes, and the law, were made available online under the well-known e-Estonia initiative.

One of Estonia's digital accomplishments in 2024 was the growth of its secure data exchange network, X-Road. This platform connected systems in the public and private sectors, allowing for safe and easy digital communication. X-Road helped boost Estonia's image as an innovative nation by facilitating real-time data exchange, which benefited both individuals and companies using digital services. When it comes to blockchain's potential governmental uses, Estonia has maintained its position as a frontrunner, especially in the fields of healthcare and law.

In 2024, the country's e-Residency program achieved unprecedented heights, with more than 100,000 participants from across the world. As an example of Estonia's attempts to globalize its digital governance paradigm, this initiative enables foreign people to form and run EU-based enterprises using digital identities. According to the Waseda rankings for 2024, Estonia came in at number seven.

3.2. New Trends

Estonia's 2024 digital strategy focused on enhancing cybersecurity, expanding e-services, and leveraging emerging technologies. The Digital Agenda 2030 served as the cornerstone of the government's long-term goals, emphasizing the continued expansion of digital infrastructure, smart governance, and data-driven public services.

One of the government's key strategies was to integrate AI into public services under the AI Estonia Strategy, which aimed to automate routine government tasks, improve decision-making, and optimize resource allocation. AI applications were deployed in areas such as social services, environmental monitoring, and traffic management, improving overall service efficiency.

To further its international presence, Estonia continued to collaborate with other EU nations under the European Digital Single Market, promoting cross-border digital services and interoperability. Estonia's digital diplomacy efforts, such as leading international discussions on digital identity standards and data privacy regulations, further solidified its role as a global leader in e-governance.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Estonia's network infrastructure in 2024 remained robust, supporting the country's advanced digital services. The 5G rollouts, completed in urban and rural areas, provided the necessary infrastructure for the development of smart cities and IoT applications. Estonia's commitment to ensuring universal access to high-speed internet remained strong, with over 99% of the population connected.

The Broadband Development Plan 2024-2028 aimed to extend gigabit-speed internet access to all households, particularly focusing on rural areas. This initiative ensured that Estonia's digital transformation would be inclusive, reaching even the most remote areas of the country.

The government also began preparing for 6G technology, participating in research and international collaboration to ensure that Estonia would remain at the forefront of next-generation telecommunications technologies.

4.2. Management Optimization [MO]

Estonia continued optimizing public sector management through its digital-first approach in 2024. The Digital Government Act, updated in 2024, required all government agencies to digitize their operations and services, ensuring that nearly all interactions with the public could be conducted online. The Estonian government used data analytics to optimize resource allocation in public services. For instance, in the healthcare sector, predictive analytics were used to forecast patient demand, helping to optimize staffing and reduce waiting times in hospitals.

The introduction of AI-driven tools in various departments streamlined bureaucratic processes. For example, Estonia's Tax and Customs Board utilized AI to automate tax audits, improving compliance while reducing the workload on government employees.

4.3. Online Service [OS]

Estonia's online services continued to set the standard globally, with 99% of government services accessible online through the e-Estonia portal. Services such as digital tax filing, e-prescriptions, and online voting were further enhanced in 2024, offering citizens greater convenience and accessibility.

The e-Citizenship Program, which provides citizens with a secure digital identity for accessing government services, expanded its functionality by integrating biometric data for even more secure and seamless authentication. Estonia's digital services were not just comprehensive but also user-friendly, with continuous feedback loops to improve the user experience.

Estonia also launched new online services in 2024, such as digital land registration and e-notary services, simplifying legal processes and making them accessible to citizens remotely. These innovations reflect Estonia's commitment to ensuring that all citizens can interact with the government digitally.

4.4. National Portal [NPR]

The e-Estonia portal continued to serve as the cornerstone of Estonia's digital government, providing a centralized platform for accessing public services. The portal was further upgraded in 2024, incorporating AI-driven personalization features that tailor services to individual citizens' needs based on their previous interactions and data profiles.

Through the portal, citizens could access a range of services, including healthcare, education, social security, and legal services. The State Portal Improvement Program in 2024 focused on making the portal more intuitive, particularly for older adults and people with disabilities, ensuring accessibility for all. Additionally, the portal integrated new security measures in response to evolving cybersecurity threats, utilizing blockchain technology for secure data exchanges and ensuring privacy across all digital interactions.

4.5. Government CIO [GCIO]

Estonia's Government Chief Information Officer (GCIO) played a crucial role in overseeing the implementation of the country's digital agenda. In 2024, the GCIO's office led the AI Governance Task Force, responsible for integrating artificial intelligence into various aspects of public service delivery. The GCIO also worked closely with the Ministry of Economic Affairs and Communications to ensure that Estonia's digital infrastructure and services aligned with the Digital Agenda 2030. The office played a key role in the development and deployment of e-Residency 2.0, a next-generation digital identity program that enhanced security and streamlined processes for e-residents. In addition, the GCIO launched the Digital Skills for Government Employees Program, which aimed to ensure

that all civil servants were proficient in the digital tools necessary for their roles, thereby improving overall government efficiency and service delivery.

4.6. E-Government Promotion [EPRO]

Estonia continued to promote the benefits of e-government services through various initiatives in 2024. The government's Digital Literacy Campaign aimed to educate citizens about the advantages of digital services, focusing on older generations and rural areas where digital adoption was lower. In collaboration with local governments, Estonia launched Digital Service Centers across the country to provide in-person support for citizens unfamiliar with online services. These centers acted as hubs for digital literacy training and facilitated the adoption of e-government services among less digitally savvy populations.

The government also actively promoted Estonia's digital government model on the global stage, participating in international forums and sharing best practices with other countries interested in adopting similar models. Estonia's Digital Government Academy, established in 2024, provided training programs for international public officials, furthering the country's influence in global e-governance.

4.7. E-Participation [EPAR]

Estonia has been a pioneer in e-participation, and 2024 saw further developments in this area. The Rahvaalgatus platform, which allows citizens to propose and vote on legislative changes, was enhanced with new features to improve user engagement and make the process more transparent. In 2024, over 200 proposals were submitted, with several being adopted into law, illustrating the platform's success in enabling direct citizen participation in governance.

The government also launched Digital Deliberation Forums, where citizens could engage in real-time discussions with policymakers on key issues such as climate change and digital rights. These forums helped bridge the gap between citizens and the government, fostering a more participatory and responsive democracy.

Additionally, the i-Voting system, which allows citizens to vote online in national elections, saw record participation in the 2024 parliamentary elections, with over 47% of voters casting their ballots

online. Estonia's successful implementation of secure online voting has become a model for other countries exploring e-participation.

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

Estonia remained at the forefront of digital transformation in 2024, leveraging technology to enhance public services and transparency. The government expanded its Open Data Portal, providing access to over 5,000 datasets across sectors such as healthcare, education, transportation, and the environment. One notable initiative was the Open Healthcare Data Project, which enabled researchers and startups to access anonymized healthcare data for developing new treatments and improving public health services. This initiative fostered innovation while ensuring data privacy and security.

The government's Digital Innovation Fund also supported startups and public-private partnerships focused on developing digital solutions for public services. For example, in 2024, the fund helped launch a project that used AI to optimize energy consumption in government buildings, reducing costs and promoting environmental sustainability.

4.9. Cyber Security [CYB]

Cybersecurity was a top priority for Estonia in 2024, particularly given its reliance on digital services and infrastructure. The Cybersecurity Strategy 2024-2027 focused on enhancing the resilience of government systems against cyber threats, with a particular emphasis on protecting critical infrastructure and ensuring the integrity of public data.

Estonia's Cyber Defence Unit (Kaitseliit), a unique volunteer-based organization, continued to play a vital role in defending the country from cyberattacks. In 2024, the unit successfully thwarted several attempts to disrupt government systems, reinforcing Estonia's reputation as a cybersecurity leader.

Moreover, Estonia led international efforts to improve global cybersecurity standards through its Tallinn Manual 3.0, which provided updated guidelines on the application of international law in cyberspace. This manual became a key reference for nations worldwide, furthering Estonia's influence on the global stage.

4.10. The use of Emerging ICT [EMG]

Estonia continued to pioneer the use of emerging technologies such as AI, blockchain, and IoT in public services in 2024. The government expanded its Blockchain platforms across various sectors, particularly in healthcare and legal services. Estonia's blockchain-based KSI (Keyless Signature Infrastructure) ensured the security and integrity of government data, allowing public services to remain transparent and tamper-proof. By integrating blockchain, Estonia guaranteed data authenticity, which has become a key asset in sectors such as healthcare, legal records, and citizen registries.

In 2024, Estonia also explored the use of Quantum Computing for cryptography, aiming to future-proof the nation's cybersecurity infrastructure. The government established a partnership with private firms and academic institutions to conduct research in quantum cryptography, which has the potential to secure sensitive data against future quantum threats. Moreover, Estonia expanded its IoT-based smart city initiatives. In 2024, the city of Tallinn began rolling out a network of IoT sensors to improve public transportation, waste management, and energy consumption. These efforts were part of a broader Smart City Program, which aimed to improve urban living conditions and make Estonian cities more sustainable and efficient.

8. Saudi Arabia

1. General Information

Area: **2,149,690 km2**

Population: **34,137,809**

Government Type: Absolute Monarchy

2024 Growth Rate: **1.5%**

GDP (IMF '24): **$1.11 Tn**

GDP Per Capita: **$32,566**

Internet User: **100%**

Wired (Fixed Broadband User) per 100 people: **43.6**

Wireless Broadband User per 100 people: **169**

2. Digital Government Overview in Country
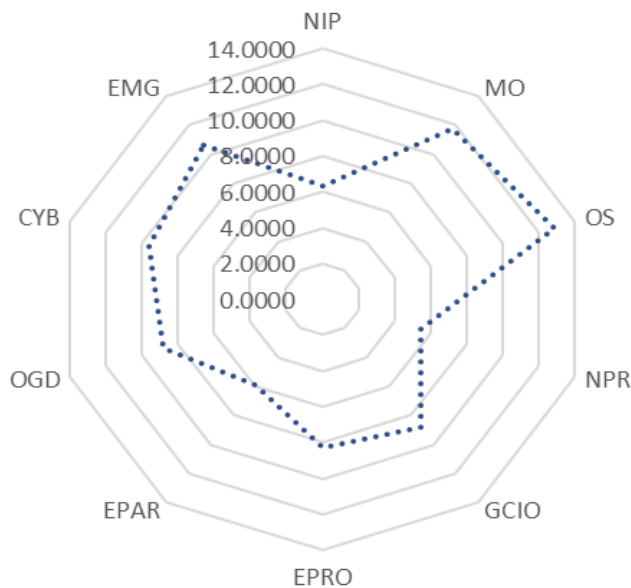
3. Digital Government Development and new trends

3.1. The development

In 2024, Saudi Arabia embarks on one of the most ambitious modernization projects in the region with its digital transformation. The nation made notable progress under Vision 2030, as shown by its

8th rating in the Waseda rankings. The Kingdom is working to create a knowledge-based, diversified economy that prioritizes digitization in every area. A major element of Vision 2030, the National Digital Transformation Program highlights the government's commitment to using technology to raise economic productivity, improve government services, and build a more equitable society.

By 2024, Saudi Arabia has significantly improved its government services and digital infrastructure. Saudi Arabia is able to establish itself as a regional leader in digital governance based on the nation's policy, which places a strong emphasis on innovation, technical advancement, and cybersecurity. The government's advancement in producing effective, citizen-centric digital services is shown by the extensive array of online public services available on the Kingdom's e-government portal, Saudi e-Government Portal (Saudi).

Saudi Arabia has boosted its investments in cutting-edge technologies like 5G, blockchain, and artificial intelligence (AI), demonstrating its ongoing emphasis on digitization. These expenditures have improved the nation's standing internationally and are essential to the Kingdom's development as a major center of innovation and technology.

3.2. New Trends

The Kingdom's digital transformation strategies are deeply rooted in its Vision 2030 initiative, which aims to diversify the economy and reduce the country's reliance on oil revenues. The National Digital Transformation Program, an integral part of this vision, has set ambitious goals to digitize government services, enhance digital infrastructure, and foster innovation across various sectors, including healthcare, education, and finance.

One of the key pillars of the National Digital Transformation Program is the Smart Government Strategy, which aims to increase the efficiency and transparency of public services through the use of digital technologies. The strategy also focuses on promoting e-participation, improving the quality of life for citizens, and ensuring that government services are accessible to all segments of society, regardless of location or socioeconomic status.

Saudi Arabia government is also prioritizing the development of the digital economy through initiatives such as the National Strategy for Data and Artificial Intelligence (NSDAI). This strategy aims to position Saudi Arabia as a global leader in AI by 2030, with a focus on developing AI

capabilities, fostering innovation, and creating a regulatory framework that promotes the ethical use of AI technologies.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

In 2024, Saudi Arabia has made significant strides in enhancing its network infrastructure to support the Kingdom's digital ambitions. The rollout of 5G networks across the country has been a key driver of Saudi Arabia's digital transformation, enabling faster internet speeds, improved connectivity, and the development of smart cities. By 2024, Saudi Arabia has achieved near-universal 5G coverage, making it one of the leading countries in the Middle East in terms of network infrastructure preparedness.

The Kingdom's investments in fiber-optic networks and broadband infrastructure have also paid off, with high-speed internet now accessible to a large majority of the population. This improved connectivity has facilitated the growth of e-commerce, digital services, and the adoption of advanced technologies such as the Internet of Things (IoT). Additionally, the government's focus on enhancing rural connectivity has helped bridge the digital divide, ensuring that citizens in remote areas have access to the same digital services as those in urban centers.

Saudi Arabia's commitment to improving network infrastructure is further evidenced by the government's partnerships with global tech companies. These collaborations have helped the Kingdom accelerate the deployment of cutting-edge technologies and ensure that its network infrastructure is robust enough to support the country's ambitious digital transformation goals.

4.2. Management Optimization [MO]

In 2024, Saudi Arabia government has placed a strong emphasis on management optimization to streamline public administration and enhance service delivery. The use of digital platforms to manage government operations has resulted in more efficient decision-making, reduced bureaucracy, and improved transparency. One of the key initiatives in this area is the Government Resource Planning (GRP) System, which integrates various government functions such as finance, human resources, and procurement into a single digital platform.

The introduction of the Unified National Platform has also played a critical role in optimizing management processes within the government. This platform provides a centralized hub for all government services, allowing citizens and businesses to access a wide range of public services online. By consolidating services into a single platform, the government has been able to reduce duplication of efforts, streamline workflows, and improve the overall efficiency of service delivery.

Saudi Arabia is also leveraging data analytics to enhance management optimization. Through the use of big data, the government is able to monitor the performance of public services, identify areas for improvement, and make data-driven decisions that improve the quality of service delivery. In 2024, these efforts are helping Saudi Arabia create a more agile and responsive government that can better meet the needs of its citizens

4.3. Online Service [OS]

Saudi Arabia has made significant progress in expanding its online services in 2024, offering a wide range of e-government services that cater to citizens, businesses, and expatriates. The Saudi e-Government Portal (Saudi) provides access to over 2,000 government services online, ranging from applying for permits and licenses to paying utility bills and filing taxes. This comprehensive online portal is a testament to the government's commitment to make public services more accessible and convenient for all users.

The Kingdom's focus on enhancing online services is also evident in the healthcare sector, where the Sehhaty app provides citizens with access to a variety of healthcare services, including appointment scheduling, telemedicine consultations, and prescription management. In the education sector, the Madrasati platform has become an essential tool for delivering online learning, ensuring that students have access to high-quality education regardless of their location.

Saudi Arabia's online services are also supported by the Absher platform, which is widely used by citizens and expatriates to access a range of government services, including visa applications, traffic violations, and national ID renewals. In 2024, the expansion of these online services has made it easier for citizens to interact with the government, reducing the need for in-person visits to government offices and improving the overall user experience.

4.4. National Portal [NPR]

Saudi Arabia's national portal, Saudi e-Government Portal (Saudi), serves as the central hub for accessing a wide range of government services online. The portal is designed to be user-friendly, with intuitive navigation and a mobile-responsive design that ensures citizens can access services from any device. In 2024, the portal has expanded to offer over 2,000 services, ranging from civil services to business-related applications, making it one of the most comprehensive e-government platforms in the region.

The Saudi e-Government Portal also integrates various digital identity solutions, such as the Absher platform, allowing citizens to securely access services using their national ID credentials. The portal's emphasis on security and user privacy has helped build trust among users, encouraging more citizens to utilize online services. Additionally, the portal's integration with various government agencies ensures that services are delivered in a seamless and efficient manner.

In 2024, the Saudi e-Government Portal continues to evolve, with new features being added to enhance the user experience. The government is also focused on improving the accessibility of the portal, ensuring that it is available to all citizens, including those with disabilities. These efforts reflect the Kingdom's commitment to creating a more inclusive and efficient digital government that meets the needs of all its citizens.

4.5. Government CIO [GCIO]

Saudi Arabia's Chief Information Officer (CIO) plays a crucial role in driving the Kingdom's digital transformation efforts in 2024. The Ministry of Communications and Information Technology (MCIT) is responsible for overseeing the government's digital agenda, with the CIO acting as a key figure in implementing digital strategies, ensuring that government agencies adopt the latest technologies, and promoting innovation across the public sector. The Governor of DGA, a part of MCIT is actually GCIO.

The role of the CIO has been instrumental in coordinating digital transformation efforts across various government agencies, ensuring that digital initiatives are aligned with the broader goals of Vision 2030. In 2024, the CIO continues to focus on enhancing the efficiency of public services through the use of digital technologies, while also promoting the adoption of emerging technologies such as AI, blockchain, and the Internet of Things (IoT) within the government.

In addition to overseeing digital transformation efforts, the CIO is also responsible for ensuring that government agencies adhere to cybersecurity standards and data protection regulations. In 2024, the CIO is working closely with the National Cybersecurity Authority (NCA) to strengthen the government's cybersecurity posture and protect critical infrastructure from cyber threats. The CIO's efforts are key to ensuring that Saudi Arabia's digital government remains secure, efficient, and innovative.

4.6. E-Government Promotion [EPRO]

Saudi Arabia's government has been proactive in promoting e-government initiatives as part of its broader digital transformation strategy. In 2024, the Kingdom has ramped up efforts to encourage the adoption of e-government services among citizens and businesses. Through awareness campaigns, digital literacy programs, and partnerships with the private sector, the government is working to ensure that all segments of society can benefit from the convenience and efficiency of e-government services.

The e-Government Program (Yesser), which was established to promote the development and adoption of digital government services, continues to play a central role in driving these efforts. In 2024, newly established DGA is focused on expanding the reach of e-government services to rural and underserved areas, ensuring that all citizens have access to essential government services regardless of their location. Furthermore, the government is actively promoting the use of emerging technologies such as AI and blockchain to enhance the efficiency and security of e-government services. In 2024, pilot projects are underway to explore the use of AI-driven chatbots for customer service and blockchain for secure document verification. These initiatives reflect Saudi Arabia's commitment to leveraging cutting-edge technologies to create a more efficient and innovative e-government ecosystem. Additionally, the government has initiated collaborations with universities and research institutions to foster innovation in digital governance, ensuring that Saudi Arabia remains at the forefront of technological advancements in the public sector.

In 2024, Saudi Arabia's e-government promotion efforts have resulted in a significant increase in the adoption of digital services. More citizens and businesses are now utilizing online platforms for accessing government services, reducing the burden on physical government offices and enhancing overall efficiency. These efforts are aligned with Vision 2030's goal of creating a modern, digitally enabled society where the government serves as a model of innovation and technological excellence.

4.7. E-Participation [EPAR]

Saudi Arabia's efforts to promote e-participation have made notable progress in 2024, with the government expanding opportunities for citizens to engage in policy-making and governance through digital platforms. The National E-Participation Platform allows citizens to provide feedback on draft laws, participate in consultations, and engage with government officials on a wide range of issues. This platform is an essential component of the Kingdom's strategy to foster a more inclusive and participatory governance model, encouraging citizens to take an active role in shaping the future of their country.

The government's e-participation initiatives also extend to social media, where government agencies maintain active accounts to engage with citizens and gather feedback on public services. In 2024, Saudi Arabia has embraced digital tools to facilitate greater transparency and accountability in governance, allowing citizens to voice their concerns, contribute ideas, and participate in decision-making processes. This shift toward digital engagement reflects the government's commitment to building a more open and responsive public sector.

Furthermore, Saudi Arabia's e-participation efforts are complemented by digital literacy programs that aim to ensure all citizens have the skills and knowledge to effectively engage with digital platforms. These initiatives are particularly focused on empowering women and marginalized communities, ensuring that all segments of society have a voice in the country's governance. In 2024, Saudi Arabia's e-participation programs are helping to bridge the gap between the government and its citizens, fostering a more inclusive and democratic society.

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

In 2024, Saudi Arabia's digital transformation (DX) efforts continue to drive significant changes across the public and private sectors. The government's National Digital Transformation Program has laid the foundation for a digitally enabled society, where digital technologies are seamlessly integrated into all aspects of daily life. From smart cities to digital healthcare, Saudi Arabia is harnessing the power of emerging technologies to improve efficiency, enhance service delivery, and create new economic opportunities.

A key component of the Kingdom's digital transformation strategy is its focus on Open Government Data (OGD). The Saudi Open Data Portal provides public access to a wide range of government

datasets, promoting transparency, innovation, and data-driven decision-making. In 2024, the government has expanded the availability of open data across various sectors, including education, healthcare, and transportation, allowing researchers, businesses, and citizens to leverage this information for innovation and social good.

Saudi Arabia's open data initiatives are also supporting the development of new digital services and applications that enhance the quality of life for citizens. By making government data more accessible, the Kingdom is fostering a culture of innovation and collaboration between the public and private sectors. These efforts are helping Saudi Arabia transition to a knowledge-based economy, where data and digital technologies play a central role in driving economic growth and social development.

4.9. Cyber Security [CYB]

Cybersecurity remains a top priority for Saudi Arabia in 2024, as the Kingdom continues to strengthen its defenses against cyber threats and protect its critical infrastructure. The government's National Cybersecurity Authority (NCA) has implemented a comprehensive cybersecurity strategy that focuses on safeguarding the country's digital assets, promoting cyber resilience, and enhancing public awareness of cybersecurity risks. In 2024, the NCA has expanded its efforts to address emerging threats, such as ransomware and cyber espionage, by implementing advanced security measures and collaborating with international partners.

The Kingdom's cybersecurity strategy is underpinned by a strong regulatory framework that requires government agencies and businesses to adhere to stringent cybersecurity standards. The Saudi Cybersecurity Framework (SCF) outlines the requirements for securing critical infrastructure, protecting personal data, and ensuring the confidentiality, integrity, and availability of digital services. In 2024, the government continues to enforce these regulations through regular audits and compliance checks, ensuring that organizations are adequately protected against cyber threats.

Saudi Arabia is also investing in cybersecurity education and training to build a skilled workforce capable of defending the nation's digital infrastructure. The establishment of the Saudi Federation for Cybersecurity, Programming, and Drones (SAFCSP) has helped create a pipeline of talent in the fields of cybersecurity and programming, with a focus on preparing the next generation of cyber professionals. In 2024, these efforts are helping to bolster Saudi Arabia's cybersecurity capabilities and ensure that the Kingdom remains secure in an increasingly digital world.

4.10. The use of Emerging ICT [EMG]

In 2024, Saudi Arabia continues to position itself as a regional leader in emerging information and communication technologies (ICT). The government's focus on fostering innovation and adopting cutting-edge technologies is reflected in its investments in artificial intelligence (AI), blockchain, 5G, and the Internet of Things (IoT). These technologies are playing a pivotal role in driving the Kingdom's digital transformation, enabling the development of smart cities, enhancing public services, and creating new economic opportunities.

The Saudi Data and Artificial Intelligence Authority (SDAIA) is at the forefront of the Kingdom's efforts to leverage AI for economic and social development. In 2024, Saudi Arabia has made significant progress in implementing AI-driven solutions across various sectors, including healthcare, education, and transportation. These efforts are helping to improve service delivery, increase efficiency, and enhance the quality of life for citizens.

Saudi Arabia's adoption of 5G technology has also been a key enabler of its digital transformation. In 2024, the Kingdom has achieved near-universal 5G coverage, providing the foundation for the development of smart cities and the proliferation of IoT devices. The government's investments in 5G infrastructure have not only enhanced connectivity but also paved the way for the adoption of new technologies, such as autonomous vehicles and smart grids, that are transforming the way citizens live and work.

9. Germany

1. General Information

Area: **357,569 km2**

Population: **84,469,014**

Government Type: Federal Parliamentary Republic

2024 Growth Rate: **0%**

GDP (IMF '24): **$4.59 Tn**

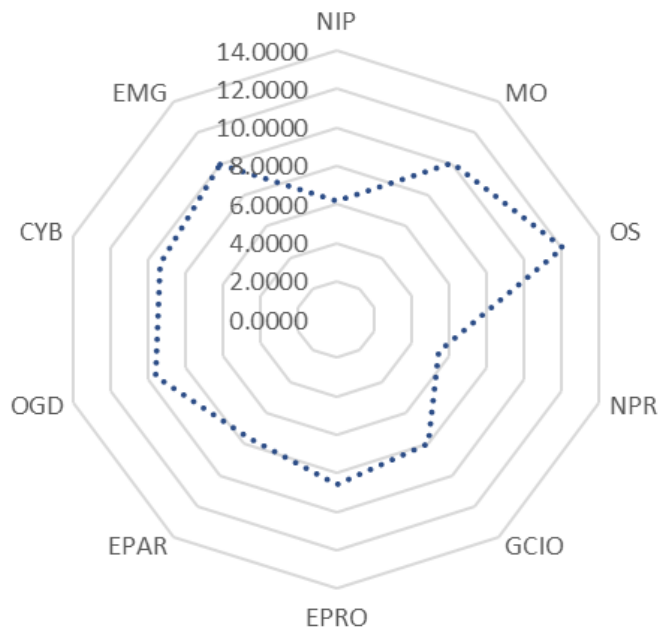GDP Per Capita: **$54,299**

Internet User: **91.6%**

Wired (Fixed Broadband User) per 100 people: **45.4**

Wireless Broadband User per 100 people: **94.4**

2. Digital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development

In 2024, Germany advanced significantly in its digital transformation journey, with a focus on modernizing public administration and improving the efficiency and accessibility of government services, leading to a remarkable position in the top 9 of the 2024 Waseda rankings. As Europe's largest economy and a leading political power, Germany took decisive steps to ensure that its digital infrastructure supported the evolving needs of its citizens and businesses. The Online Access Act (OZG), which aims to digitize more than 575 government services by 2025, gained momentum with increased cooperation across federal, state, and local governments. Public services like registering a business, filing taxes, and applying for benefits could now be completed entirely online, significantly reducing the administrative burden on both citizens and civil servants.

Germany's efforts were not limited to service delivery; the country also prioritized transparency and citizen engagement. Through its Open Data Initiative, the government made a substantial amount of public data available, empowering citizens and businesses alike to innovate using government data. This emphasis on data transparency and public accessibility helped Germany maintain its position as a global leader in e-government, ranking among the top nations in the United Nations E-Government Development Index (EGDI). The combination of service modernization, transparency, and data innovation formed the backbone of Germany's digital governance in 2024.

3.2. New Trends

Germany's digital strategy in 2024 was built on several core pillars: digital sovereignty, infrastructure development, and fostering innovation. At the heart of the strategy was the Digital Strategy 2025, which set ambitious goals for enhancing digital infrastructure, fostering digital innovation in public and private sectors, and ensuring Germany's technological independence from foreign providers. The government, through the Federal Ministry for Economic Affairs and Climate Action (BMWK), launched targeted programs to bolster data sovereignty, including the National Data Strategy. This strategy aimed to protect the privacy of German citizens and ensure that critical national data remained within the control of German institutions, especially in sensitive sectors such as healthcare, energy, and defense.

The strategy also placed a strong emphasis on emerging technologies, such as AI, 5G, and quantum computing. As part of its AI Made in Germany initiative, the government expanded public sector AI deployment, focusing on improving decision-making processes in areas such as urban planning, traffic management, and health diagnostics. Meanwhile, the push for 5G connectivity continued across urban

and rural areas, with investments aimed at bridging the digital divide in underserved regions. This national focus on infrastructure and emerging technologies was complemented by policies that incentivized private-public partnerships, ensuring that Germany remained a leader in global digital innovation while securing the strategic interests of its citizens.

Germany also maintained its leadership in digital governance at the European level, contributing to the development of cross-border digital services under the EU's Digital Single Market Strategy. These cross-border services enabled seamless interactions between German citizens and businesses with other EU member states, further solidifying Germany's role as a driving force in Europe's digital future.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

By 2024, Germany had made substantial progress in improving its network infrastructure, with the government aiming to provide high-speed internet access to 98% of households by the year's end. This was achieved through a combination of private and public investments under the Broadband Initiative, which focused on expanding fiber-optic networks and closing the connectivity gap in rural areas. The government also launched the Gigabit Germany Plan, which aimed to deliver nationwide gigabit-speed connectivity by 2025. This plan ensured that businesses, schools, hospitals, and homes had access to fast and reliable internet, which is crucial for Germany's ambitions to lead in smart city development, digital industry, and e-learning.

In addition to expanding broadband coverage, Germany accelerated its rollout of 5G networks, a key enabler of next-generation technologies such as autonomous vehicles, smart manufacturing, and IoT applications. Major cities like Berlin, Hamburg, and Munich saw extensive deployment of 5G infrastructure, while rural areas benefited from government subsidies that incentivized telecom operators to expand coverage to underserved regions. The focus was not only on coverage but also on network resilience, with the government requiring telecom operators to adhere to strict security protocols to prevent cyber threats. Germany also looked toward the future by investing in research and development for 6G networks. As part of its High-Tech Strategy 2024, Germany allocated significant funding to research institutions and universities to explore the potential of 6G technology in revolutionizing communications, further cementing its position as a global leader in telecommunications innovation.

4.2. Management Optimization [MO]

Germany's management optimization in 2024 focused on the digitization of internal processes within public administration and the deployment of advanced digital tools to improve efficiency. The government expanded its E-Rechnung (e-Invoicing) initiative, mandating that all public procurement processes be conducted digitally. This eliminated the need for paper invoices and manual processing, significantly speeding up transactions and ensuring transparency in government procurement. The shift towards a paperless administration was a major milestone in reducing administrative costs and improving the efficiency of public service delivery.

Another key development was the adoption of Robotic Process Automation (RPA) within various government agencies. RPA was used to automate repetitive tasks, such as data entry and document processing, freeing up government employees to focus on more complex, value-added work. For example, the Federal Employment Agency used RPA to streamline the processing of unemployment benefits, reducing wait times for citizens and minimizing errors in data handling. These optimizations were part of a broader effort to enhance the quality and speed of government services, particularly in areas where efficiency directly impacted citizens' day-to-day lives.

To support the ongoing digital transformation, Germany also launched the Digital Leadership Academy, which provided specialized training for public sector managers and executives. The academy focused on equipping government leaders with the skills necessary to manage digital projects, implement new technologies, and navigate the complexities of digital governance. By investing in digital leadership, Germany ensured that its public sector workforce was prepared to lead the country's digital transformation efforts for years to come.

4.3. Online Service [OS]

Germany made significant strides in expanding and improving its online services in 2024, with the goal of enhancing user experience and ensuring that citizens could complete administrative tasks more efficiently. Citizens could now access a wide range of services, from tax filings and social security applications to driver's license renewals, all through a unified digital platform. This centralization of services under the OZG portal eliminated the need to navigate multiple websites and systems, significantly streamlining the user experience.

A noteworthy example is the digitization of the Kindergeld (child benefit) application process. Previously, parents had to submit paper forms and provide multiple documents in person or by mail, often leading to delays in the processing of applications. In 2024, the entire application process could be completed online, with real-time document verification and status tracking. This transformation drastically reduced processing times and administrative costs while improving transparency and accessibility for families. Similar success was seen in other services, including pension applications and unemployment benefit claims.

Moreover, Germany's commitment to accessibility was demonstrated by its adherence to the EU Web Accessibility Directive, ensuring that all public websites and online services were accessible to individuals with disabilities. This included features like screen reader compatibility, keyboard navigation, and text alternatives for visual and auditory content. These improvements not only made online services more inclusive but also set a standard for other nations in terms of digital accessibility.

4.4. National Portal [NPR]

Germany's national government portal, Bund.de, underwent significant enhancements in 2024 to improve user engagement and service delivery. The portal served as a one-stop gateway for citizens, businesses, and international visitors seeking government services, information, and resources. The platform integrated various state and local government services, allowing users to interact with different levels of government through a single interface. This consolidation improved ease of access and navigation, making it simpler for citizens to find and use the services they needed.

The Bund.de portal also incorporated personalized services through the use of digital identity systems. Citizens could log in with their eID (electronic ID) or Germany's Digital Identity Card, enabling them to save preferences, track the status of their applications, and receive notifications about upcoming deadlines, such as tax filings or permit renewals. This personalization provided a more tailored and convenient user experience, which was particularly beneficial for businesses managing multiple government transactions.

In 2024, the portal expanded its multilingual support, offering services and information in a variety of languages to cater to Germany's growing expatriate community and international businesses. This was particularly important given Germany's position as an economic hub within the European Union. The

integration of chatbots and AI-driven customer service tools also enabled users to receive real-time assistance, further improving user satisfaction and engagement with the portal.

4.5. Government CIO [GCIO]

In 2024, the role of Germany's Federal Government Chief Information Officer (CIO) was pivotal in orchestrating the country's digital transformation. The Federal CIO worked closely with state and local CIOs to ensure that digital initiatives were aligned with national objectives, particularly those outlined in the Digital Strategy 2025. The CIO's office was responsible for leading digital policy development, coordinating digital infrastructure projects, and ensuring cybersecurity resilience across all levels of government.

The Federal CIO also played a key role in managing the integration of emerging technologies into public administration. In 2024, the CIO's office led a successful pilot program to incorporate AI-driven decision support systems in areas such as social welfare and tax compliance. These systems helped government agencies to analyze large datasets, detect fraud, and streamline decision-making processes. The CIO's leadership in these projects demonstrated Germany's commitment to innovation while maintaining strong governance and oversight.

Additionally, the Federal CIO's office prioritizes collaboration with other EU member states through initiatives like the European Interoperability Framework (EIF), which aimed to enhance cross-border digital services. This collaborative approach ensured that Germany's digital services remained compatible with those of its neighbors, facilitating easier transactions for businesses and citizens operating across borders.

4.6. E-Government Promotion [EPRO]

Germany's promotion of e-government initiatives in 2024 was marked by strong public outreach and collaboration with industry stakeholders. The government launched the Digital Germany Tour, a series of nationwide events aimed at educating citizens and businesses about the benefits of e-government services. These events featured workshops, demonstrations, and panel discussions on topics ranging from digital identity to cybersecurity best practices. The Digital Germany Tour helped raise awareness of the country's growing suite of online services and encouraged more citizens to engage with the digital government.

The Federal Ministry of the Interior also launched targeted campaigns to increase adoption of digital services, particularly among older populations who were less familiar with technology. These campaigns included partnerships with local community centers and libraries, where citizens could receive in-person guidance on how to use online services like digital banking, health applications, and government portals. By making these services more accessible to all segments of the population, Germany aimed to foster greater digital inclusion and ensure that the benefits of e-government were distributed equitably.

Another focus of Germany's e-government promotion in 2024 was fostering innovation through public-private partnerships. The government collaborated with tech companies, startups, and universities to develop new digital tools that enhanced public service delivery. For instance, a partnership with Siemens and the Fraunhofer Institute led to the creation of a smart city platform that integrated data from various municipal systems to optimize urban planning, energy use, and traffic management. These collaborations were key to driving innovation within Germany's e-government ecosystem.

4.7. E-Participation [EPAR]

Germany in 2024 placed a strong emphasis on e-participation, encouraging citizen engagement in the policymaking process through digital platforms. The government expanded its e-participation portal, which allowed citizens to submit feedback on legislative proposals, participate in online consultations, and vote on local policy initiatives. This open dialogue helped policymakers better understand the needs and concerns of the public, making governance more transparent and responsive. For instance, the public consultation on Germany's Green Energy Transition allowed citizens to provide input on renewable energy policies and climate initiatives, resulting in a more comprehensive and community-backed energy strategy.

To further encourage citizen involvement, the German government launched a series of e-participation workshops in 2024. These workshops were designed to educate the public on how to effectively use digital platforms to contribute to public discourse. Special emphasis was placed on marginalized communities and those less familiar with digital tools, ensuring that all citizens had an opportunity to engage in the political process. This initiative helped bridge the digital divide, fostering greater inclusivity in policy development.

Additionally, Germany collaborated with other EU nations on the EU e-Participation Network, an initiative aimed at sharing best practices and developing cross-border e-participation tools. This collaboration ensured that Germany's efforts were aligned with European standards and allowed German citizens to engage in transnational discussions on EU policies, further strengthening democratic engagement at the continental level.

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

Digital transformation in Germany was a focal point of its government agenda in 2024, with a strong push towards digitizing administrative services and improving data-driven governance. The Open Data Act, fully operational since its passage in earlier years, continued to make government data accessible to the public. This encouraged transparency and allowed for the development of innovative applications based on government datasets. In 2024, open data related to urban mobility, energy use, and public health was widely used by researchers, developers, and civic organizations to create tools that improved city planning and citizen services.

One key initiative was the expansion of the Germany Data Hub, a centralized platform that provided access to datasets from various government departments. This platform facilitated research and development across multiple sectors, including transportation, healthcare, and environmental management. For example, the open data on public transport schedules and traffic patterns led to the development of new mobility applications that optimized routes and reduced congestion in major cities like Berlin and Frankfurt.

Germany's approach to digital transformation also extended to its collaboration with the EU's Digital Compass 2030 strategy. This cooperation aimed to create a pan-European data space that enabled seamless data sharing between EU nations. Germany's participation in this initiative not only strengthened its own digital infrastructure but also contributed to the broader goal of digital sovereignty across the European Union.

4.9. Cyber Security [CYB]

In 2024, cybersecurity was a critical focus for Germany, reflecting the country's commitment to protecting its digital infrastructure amidst a growing threat landscape. The Federal Office for Information Security (BSI) played a central role in strengthening Germany's cybersecurity posture. The BSI's National Cyber Security Strategy 2024 focused on enhancing the resilience of government

networks, critical infrastructure, and public services against cyber threats. This strategy included regular security assessments, advanced threat detection systems, and incident response plans to mitigate the impact of cyber-attacks.

A notable initiative was the establishment of the Cybersecurity Innovation Hub. This hub served as a collaborative platform for developing cutting-edge cybersecurity solutions. It brought together experts from academia, industry, and government to address emerging cyber threats and create advanced defensive technologies. The hub's efforts led to the development of a new generation of intrusion detection systems and threat intelligence tools that bolstered Germany's ability to detect and respond to cyber incidents in real-time.

Germany also focused on enhancing its cybersecurity workforce through targeted training programs and educational initiatives. The government partnered with universities and research institutions to offer specialized courses and certifications in cybersecurity, aiming to build a skilled workforce capable of addressing the evolving cyber threat landscape. Additionally, Germany participated in international cybersecurity initiatives, such as the EU Cybersecurity Act, which aimed to strengthen cross-border cooperation and information sharing among EU member states to combat cyber threats more effectively.

4.10. The use of Emerging ICT [EMG]

In 2024, Germany's government focused on harnessing emerging technologies to drive digital transformation. The country invested heavily in AI and quantum computing, with the Quantum Future Program aimed at advancing quantum research and applications in areas like encryption and data analysis.

Germany's 5G and IoT Strategy promoted smart city development, with new pilot projects in cities like Hamburg and Munich using IoT sensors to optimize traffic flow and reduce emissions. Additionally, Germany's Blockchain Strategy was expanded to include the digitalization of public records, enhancing transparency and security in areas like property registration and legal contracts.

These initiatives demonstrated Germany's commitment to staying at the forefront of technological innovation while ensuring that emerging technologies were integrated into public services to improve efficiency and accessibility.

10. New Zealand

1. General Information

Area: **268,021 km2**

Population: **5,225,335**

Government Type: Parliamentary Representative Democratic Monarchy

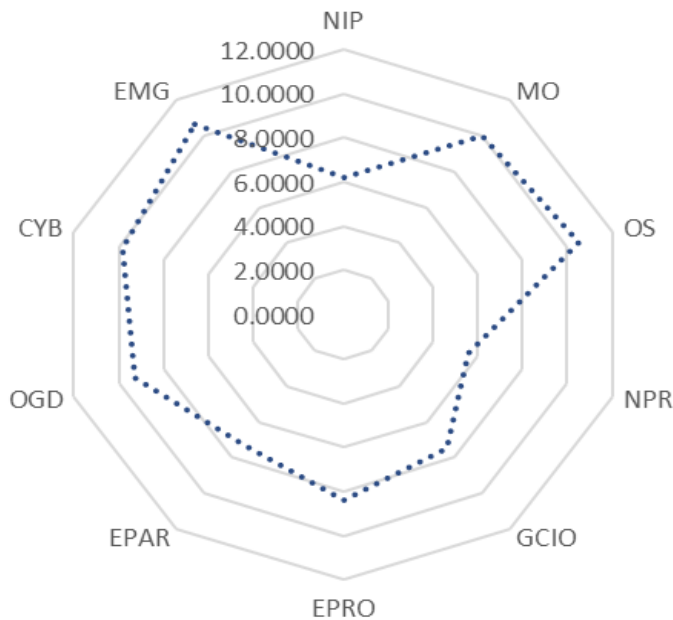2024 Growth Rate: **0%**

GDP (IMF '24): **$257.63 Bn**

GDP Per Capita: **$49,411**

Internet User: **95.91%**

Wired (Fixed Broadband User) per 100 people: **37.3**

Wireless Broadband User per 100 people: **102**

2. gigital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development

In 2024, the government of New Zealand has continued to expand its digital services, with an emphasis on enhancing security and accessibility. The nation came in the 10th position in the Waseda

rankings this year. The "Digital Government Strategy 2024" of the nation emphasizes the establishment of public trust by implementing transparent data management, seamless online services, and robust cybersecurity measures. RealMe, the digital identity verification service, is a prominent example of this. It now provides secure access to over 150 government and private sector services, including online banking and social welfare applications.

New Zealand's global prominence in digital governance is noteworthy. The country's efficient deliverance of public services and advanced digital infrastructure were reflected in its ranking in the top 15 of the United Nations E-Government Development Index (EGDI) in 2024. In addition, New Zealand demonstrated exceptional digital participation, as evidenced by the increased engagement of citizens on e-participation platforms such as "Shape Your Future," which offer interactive tools for providing feedback on policy proposals.

New Zealand has made a commitment to digital inclusion, as evidenced by the "Digital Boost" program, which provides small enterprises with complimentary access to online training in digital skills. The program has facilitated the transition of nearly 100,000 small and medium-sized enterprises (SMEs) into the digital economy, thereby fostering broader economic resilience and development.

3.2. New Trends

The New Zealand Digital Strategy outlines the government's commitment to maximizing the country's potential in the digital age. The strategy is built on three pillars:

1. **Mahi Tika - Trust:** This pillar emphasizes the importance of building and maintaining public trust in digital technologies. It aims to ensure that New Zealanders feel safe online, with digital infrastructures that are secure and trustworthy. Initiatives like the Algorithm Charter and Digital Identity Services Trust Framework are key components of this pillar. The strategy also includes ambitious goals, such as minimizing the economic impact of cyber incidents compared to other nations.
2. **Mahi Tahi - Inclusion:** The strategy focuses on digital inclusion, ensuring that all citizens have the tools, skills, and confidence to participate in a digital society. It highlights the importance of bridging both the general and digital divides, with significant investments in rural and remote connectivity. While embracing digital services, the strategy also

acknowledges the importance of maintaining face-to-face interactions for those who prefer or need them.

3. **Mahi Ake - Growth:** This pillar aligns with New Zealand's Economic Strategy and Emissions Reduction Plan. It aims to boost innovation and productivity across all sectors through digital and data-driven technologies. The strategy aspires to make digital and ICT exports New Zealand's leading export earners, supported by nurturing talent and advancing the Digital Technologies Industry Transformation Plan. The strategy includes initiatives like the Digital Boost program to enhance small businesses' digital engagement.

Overall, the New Zealand Digital Strategy envisions a future where New Zealand is a world-leading, trusted digital nation, with a focus on trust, inclusion, and sustainable growth.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

New Zealand's digital transformation has been underpinned by substantial investments in network infrastructure. In 2024, the government completed its Ultra-Fast Broadband (UFB) program, delivering fiber optic connectivity to over 87% of households and businesses. This initiative, which began over a decade ago, has revolutionized internet access in both urban and rural areas. The success of this program is evident in the rise of home-based businesses, with 65% of new startups in 2024 operating digitally from remote regions.

Additionally, New Zealand has made significant strides in deploying 5G technology, with major cities like Auckland, Wellington, and Christchurch achieving near-complete 5G coverage. This has facilitated the development of smart city projects, including real-time traffic monitoring and autonomous vehicle trials. The Christchurch City Council, for example, has utilized 5G networks to support its smart parking system, which has reduced congestion and increased parking availability in the city center.

Another important initiative is the "Rural Connectivity Group," a public-private partnership that aims to address digital divide issues in rural and remote areas. In 2024, the program connected an additional 10,000 households and businesses to reliable broadband, enabling them to participate more fully in the digital economy. This investment is especially critical for New Zealand's agricultural sector, where IoT-enabled smart farming tools are becoming essential for increasing productivity.

4.2. Management Optimization [MO]

In 2024, the New Zealand government made significant progress in optimizing management processes through digital tools. One of the most impactful innovations was the adoption of automated decision-making systems in key areas of public administration. For instance, the Ministry of Social Development (MSD) implemented AI-driven tools to streamline welfare benefit assessments. This system now automatically processes low-risk applications, reducing the time it takes for applicants to receive benefits by 40%. Moreover, case workers can now focus on more complex cases, leading to better outcomes for vulnerable populations.

The introduction of the "MyIR" portal allows individuals and businesses to manage their tax affairs entirely online. In 2024, this system was upgraded with predictive analytics that help taxpayers identify potential deductions and tax-saving opportunities. As a result, tax compliance rates have improved, and the government has reported a 15% reduction in tax processing costs. The Department of Conservation (DOC) also implemented digital tools to optimize its resource management. Using satellite data and AI, the DOC now monitors environmental conditions in real time, allowing for more precise management of natural resources. This technology has helped the department reduce operational costs and improve conservation outcomes, particularly in protected marine areas.

4.3. Online Service [OS]

New Zealand's focus on delivering accessible and efficient online services to its citizens has been evident in the expansion of its digital government platforms. In 2024, the country enhanced its RealMe digital identity system, allowing citizens to access a growing number of services with a single secure login. RealMe now supports over 150 services, including driver's license renewal, applying for housing assistance, and opening a bank account. This expansion has streamlined interactions with government and private sector services, with 2 million active RealMe users reported in 2024.

In addition to RealMe, the government's Service Innovation Lab has developed and deployed the "OneGov" platform, which provides a unified portal for accessing public services. In 2024, OneGov was updated with AI-driven personalization features that tailor the user experience based on an individual's profile and previous interactions. For example, the system now proactively suggests services such as child care subsidies or health checks based on life events like the birth of a child or approaching retirement age. The Ministry of Health's "My Health Account" is another online service

that has seen significant uptake. In 2024, the platform was integrated with telemedicine services, allowing citizens to consult with healthcare professionals online and access their medical records securely. This integration, combined with a public awareness campaign, led to a 25% increase in digital healthcare consultations, alleviating pressure on physical healthcare facilities.

4.4. National Portal [NPR]

New Zealand's national portal, Govt.nz, serves as a central hub for accessing a wide range of government services. In 2024, significant improvements were made to the portal's usability and functionality. The introduction of AI-powered chatbots now provides 24/7 assistance to users, answering common queries and guiding them through government processes. This has led to a 30% reduction in calls to government helplines, improving the efficiency of public service delivery. A new feature of the portal is the integration of geospatial services, allowing users to access interactive maps that show local government services, such as healthcare facilities, schools, and public transportation. This has been particularly beneficial for new immigrants and citizens relocating within the country, as they can easily find relevant information based on their location.

The portal also includes a personalized dashboard where users can track the status of their applications, payments, and other interactions with the government. In 2024, this feature was expanded to include notifications and reminders for important deadlines, such as tax filings and visa renewals. This proactive approach to service delivery has significantly improved user satisfaction, with 85% of portal users reporting positive experiences in a government survey conducted that year.

4.5. Government CIO [GCIO]

New Zealand's Government Chief Information Officer (GCIO) plays a pivotal role in driving the country's digital transformation. In 2024, the GCIO's office prioritized the implementation of a cross-agency data sharing framework designed to improve the coordination and delivery of services across government departments. This framework allows agencies to securely share anonymized data, enabling more effective policy-making and service delivery. For example, data sharing between the Ministry of Education and the Ministry of Social Development has led to better-targeted interventions for at-risk youth.

The GCIO also oversaw the adoption of open-source software across government agencies, reducing costs and improving collaboration between departments. The transition to open-source solutions has

saved the government millions of dollars in software licensing fees, while also providing more flexibility for customizing digital services. The GCIO's office has also worked to build public sector digital capability through regular training and certification programs, with over 3,000 government employees completing cybersecurity and digital service design courses in 2024.

Another key initiative led by the GCIO was the development of the Government Cloud Strategy, which mandates that new digital services be built on cloud infrastructure unless there are specific security or performance concerns. This strategy has led to a more agile and scalable IT environment, with over 80% of government services now hosted on cloud platforms.

4.6. E-Government Promotion [EPRO]

In 2024, New Zealand made significant improvement in promoting e-government adoption among its citizens. One of the flagship initiatives was the expansion of the "Digital Inclusion Blueprint," which aims to ensure that all New Zealanders can participate in the digital economy. This program focuses on providing affordable internet access, digital literacy training, and support for vulnerable groups, including low-income families and older citizens. By the end of 2024, over 95% of the population had access to the internet, and digital literacy rates had improved across all age groups.

To further promote e-government services, the government launched a nationwide awareness campaign called "Go Digital NZ." The campaign, which included television ads, social media outreach, and community workshops, encouraged citizens to use online services for tasks such as paying taxes, renewing passports, and accessing healthcare services. The "Go Digital NZ" campaign proved to be highly effective, leading to a 25% increase in the use of digital services across all government sectors. For example, online tax filing through the Inland Revenue Department's "MyIR" portal saw a record 90% adoption rate in 2024.

The creation of regional digital hubs provided hands-on support for individuals and businesses unfamiliar with using online services. These hubs were especially beneficial in rural areas, where digital literacy rates had previously lagged behind urban centers. The government's focus on digital inclusion, combined with strong promotional efforts, has positioned New Zealand as a global leader in citizen engagement with e-government services.

4.7. E-Participation [EPAR]

New Zealand's commitment to fostering e-participation was a major focus in 2024, with new platforms and tools empowering citizens to have a voice in governmental decision-making. The "Shape Your Future" platform, which allows citizens to engage in consultations, provide feedback on draft legislation, and participate in online polls, saw an expansion this year. In 2024, the platform incorporated AI-driven sentiment analysis to better understand public opinion on various policies, resulting in more nuanced policy adjustments. A notable example was the public consultation on environmental policies, where citizen input directly influenced the creation of stricter regulations on carbon emissions.

Additionally, e-participation was enhanced through the deployment of localized digital democracy tools. In partnership with local councils, the central government launched "Community Voices," a platform where citizens can directly communicate with their local representatives, suggest community projects, and vote on budget allocations. This grassroots engagement model has led to the successful implementation of over 100 community-driven projects across the country in 2024.

Moreover, New Zealand's e-participation efforts were further strengthened by the use of blockchain technology to ensure transparency and security in online voting. In 2024, the government piloted blockchain-based voting in local elections, which not only improved voter confidence but also saw a 15% increase in voter turnout compared to previous years. This success has set the stage for broader adoption of blockchain voting in future national elections.

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

New Zealand's digital transformation in 2024 focused heavily on leveraging open data to foster innovation, transparency, and better decision-making. The government's Open Data Program, which mandates that all non-sensitive data be made publicly available, has significantly expanded the amount of data accessible to the public. In 2024, new datasets were added to the Open Data NZ portal, including detailed information on transportation, health outcomes, and environmental monitoring. These datasets have been used by private developers to create innovative applications, such as real-time public transport apps and environmental impact trackers.

Additionally, the government launched the "Data-Driven Policy Lab," a collaborative space where policymakers, data scientists, and technologists work together to harness open data for evidence-based policymaking. In 2024, the Lab produced valuable insights that helped shape the country's pandemic

response, including the targeted allocation of resources to areas with the highest healthcare needs. The success of the Lab has led to an increase in data-driven policies across various sectors, including education and housing.

Furthermore, digital transformation efforts have been particularly evident in the health sector. The integration of open government data with private sector health technologies has resulted in more personalized healthcare services. For example, the Ministry of Health partnered with local startups to develop AI-powered health apps that use open data to provide users with tailored health recommendations based on their medical history and lifestyle factors. This approach has not only improved individual health outcomes but also alleviated pressure on the healthcare system by promoting preventive care.

4.9. Cyber Security [CYB]

Cybersecurity has been a top priority for New Zealand in 2024, driven by an increase in global cyber threats. The "Cyber Resilience 2024" strategy, launched by the government, outlined comprehensive measures to protect public sector systems and citizen data. One of the key components of this strategy was the establishment of the National Cyber Security Centre (NCSC), which provides centralized oversight and coordination of cybersecurity efforts across government agencies. In 2024, the NCSC reported that it had successfully neutralized over 500 cyber threats targeting government networks, ensuring the integrity of critical services.

The government also made significant investments in public sector cybersecurity training. A mandatory cybersecurity certification program was rolled out across all government departments, with over 10,000 public servants completing the program in 2024. This initiative has resulted in a 35% reduction in phishing incidents and other cyber threats that typically exploit human error. In the private sector, the government introduced new regulations under the "Cyber Security Act 2024," requiring businesses to implement minimum cybersecurity standards. Non-compliance results in penalties, incentivizing organizations to invest in more robust cybersecurity measures. This regulatory framework, combined with public-private collaboration on cybersecurity best practices, has strengthened New Zealand's overall cyber resilience and reduced the country's vulnerability to large-scale cyberattacks.

4.10. The use of Emerging ICT [EMG]

New Zealand's emerging ICT sector has been thriving in 2024, with significant advancements in fields such as artificial intelligence (AI), blockchain, and augmented reality/virtual reality (AR/VR). The government has actively supported the growth of these sectors through various innovation grants and partnerships. One of the standout initiatives in 2024 was the creation of the "Innovation NZ Fund," which allocated $100 million to startups and research institutions working on cutting-edge technologies. This fund has already supported over 200 projects, ranging from AI-driven healthcare solutions to blockchain-based supply chain management systems.

Furthermore, New Zealand's emerging ICT sector has seen significant developments in AR/VR applications. In 2024, the Ministry of Tourism partnered with local tech firms to create immersive virtual reality experiences that promote the country's natural attractions to international tourists. These VR experiences allow potential visitors to explore New Zealand's national parks and heritage sites from the comfort of their homes, driving tourism interest even amid travel restrictions. This initiative highlights the government's forward-thinking approach to leveraging emerging technologies for economic and social benefits.

11. Japan

1. General Information

Area: **377,975 km2**

Population: **123,568,346**

Government Type: Constitutional Monarchy

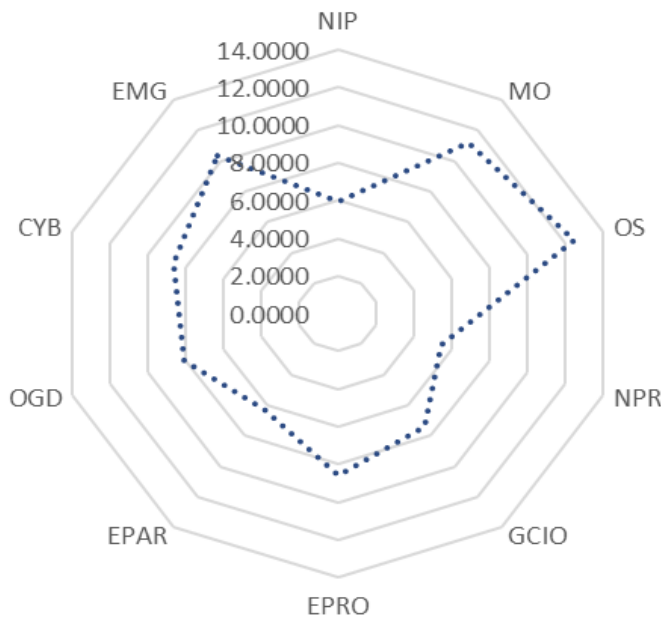2024 Growth Rate: **0.3%**

GDP (IMF '24): **$4.11 Tn**

GDP Per Capita: **$33,215**

Internet User: **84.9%**

Wired (Fixed Broadband User) per 100 people: **38.5**

Wireless Broadband User per 100 people: **246**

2. Digital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development

In 2024, Japan's digital transformation has been distinguished by a dedication to the integration of advanced technologies into public services, the improvement of citizen engagement, and the enhancement of operational efficiency. The Digital Government Strategy 2024 of the Japanese government delineates a vision for the creation of a digital ecosystem that is both responsive and highly connected. This approach prioritizes the utilization of modern technologies, including artificial intelligence (AI), blockchain, and the Internet of Things (IoT), to enhance the quality of services provided to citizens and modernize government operations. Japan occupies the 11th position in the Waseda rankings.

Japan accomplished substantial milestones in its digital transformation in 2024. The nation was acknowledged on a global scale for its innovative public service delivery approach and advanced digital infrastructure. Japan's exceptional performance in service innovation and digital participation was evident in its 13-place ranking in the United Nations E-Government Development Index (EGDI). The Digital Japan Platform, a critical initiative within this strategy, has been instrumental in facilitating seamless interactions between government agencies and citizens, thereby improving transparency and accessibility.

The successful introduction of the My Number Card System, which seeks to consolidate citizen identification and expedite access to various government services, also underscored Japan's ongoing efforts in digital governance. This initiative has been a fundamental component of Japan's digital transformation, facilitating the interaction between citizens and government agencies and the accessibility of essential services online.

3.2. New Trends

Japan's digital transformation strategy for 2024 is guided by the Priority plan for realizing a digital society, which focuses on three main pillars: enhancing digital infrastructure, fostering innovation, and improving public service delivery. This strategy seeks to create a comprehensive digital ecosystem that integrates advanced technologies and promotes efficient governance.

A major component of this strategy is the Smart Japan Initiative, which aims to harness the potential of AI, blockchain, and IoT to improve public sector operations. For instance, Japan has implemented AI-powered analytics to optimize traffic management in urban areas, reduce energy consumption, and

enhance disaster response capabilities. The Blockchain for Public Services project explores the use of blockchain technology to improve transparency and security in public transactions and record-keeping.

Furthermore, Japan is committed to advancing digital inclusivity through its Digital Divide Reduction Plan. This plan focuses on providing digital literacy training, expanding internet access in underserved regions, and ensuring that all citizens can benefit from digital services. The government's collaboration with tech companies and educational institutions has been crucial in achieving these goals and fostering a digitally inclusive society.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

In 2024, Japan continued to advance its network infrastructure to support its digital transformation goals. The government's investment in 5G technology has been a significant driver of this progress. The nationwide rollout of 5G networks has enabled faster data transmission, improved connectivity, and enhanced the capabilities of smart technologies. Major urban centers like Tokyo and Osaka are now equipped with high-speed 5G networks, facilitating innovations in smart city initiatives and IoT applications.

Japan has also focused on upgrading its cybersecurity infrastructure to protect its digital assets and maintain trust in its digital services. The National Center of Incident readiness and Strategy for Cyber security (NISC) has been actively involved in developing and implementing robust cybersecurity measures to safeguard critical infrastructure and public services. This includes enhancing threat detection systems, conducting regular security audits, and promoting best practices in cybersecurity.

Additionally, Japan's investment in data centers and cloud computing infrastructure has supported the growing demand for digital services. The government's Cloud Japan Initiative aims to provide scalable and secure cloud solutions for public sector agencies, improving their ability to manage and store data efficiently. This initiative has been instrumental in supporting the digital transformation of government operations and enhancing service delivery.

4.2. Management Optimization [MO]

Japan's approach to management optimization in 2024 involves the integration of digital tools and data-driven decision-making processes across government agencies. The Digital Government

Management Framework provides a structured approach to optimizing public administration through technology. This framework emphasizes the use of data analytics to improve decision-making, streamline processes, and enhance service delivery.

One notable example of management optimization is the implementation of AI-powered administrative tools. These tools assist in automating routine tasks, such as document processing and data entry, freeing up valuable time for public servants to focus on more strategic activities. The use of AI has led to significant improvements in efficiency and accuracy within government operations.

Additionally, Japan has introduced the e-Government Dashboard, a comprehensive platform that provides real-time insights into the performance of various government services. This dashboard allows policymakers and administrators to monitor service delivery metrics, track progress on digital initiatives, and identify areas for improvement. By leveraging this data, Japan aims to enhance transparency, accountability, and overall effectiveness in public sector management.

4.3. Online Service [OS]

Japan's online services have seen significant advancements in 2024, driven by the government's commitment to providing convenient and accessible digital solutions for citizens. The My Number System has been a central component of this effort, streamlining access to government services and enhancing the efficiency of administrative processes.

The government has also expanded its e-Government Portal, offering a wide range of online services to meet the needs of citizens and businesses. This portal provides access to services such as online tax filing, business registration, and public record requests. The user-friendly design and comprehensive functionality of the e-Government Portal have made it a valuable resource for individuals and organizations interacting with the government.

To further enhance the accessibility of online services, Japan has introduced digital service kiosks in public spaces such as train stations and shopping centers. These kiosks provide citizens with easy access to government services, including the ability to update personal information, apply for permits, and access information on public services. The expansion of digital service kiosks reflects Japan's commitment to ensuring that digital services are readily available to all citizens.

4.4. National Portal [NPR]

The Japan National Portal serves as a central hub for accessing government services and information. Launched as part of Japan's broader digital strategy, the portal offers a comprehensive range of services, including access to administrative forms, public records, and government announcements. The portal's user-centric design aims to provide a seamless experience for citizens navigating various government services.

One key feature of the National Portal is its integrated search functionality, which allows users to quickly find relevant information and services based on their needs. This functionality has been enhanced with the use of AI algorithms that provide personalized recommendations and streamline the search process. The portal also includes a chatbot service that assists users with common inquiries and provides guidance on accessing government services.

The National Portal has been instrumental in promoting transparency and accountability in government operations. By providing easy access to information on government activities, budgets, and performance metrics, the portal helps ensure that citizens are informed and engaged in the democratic process. The government's ongoing efforts to improve the portal's functionality and accessibility reflect its commitment to delivering high-quality digital services.

4.5. Government CIO [GCIO]

In 2024, Japan's government CIO role has been pivotal in steering the country's digital transformation efforts. The Government Chief Information Officer (GCIO) is responsible for overseeing the implementation of digital strategies, managing IT infrastructure, and ensuring the alignment of technology initiatives with government priorities. The GCIO plays a critical role in driving innovation and maintaining the effectiveness of digital services.

Takashi Asanuma serves as the Digital Supervisor at the Digital Agency, which was established in 2021 and is the cornerstone of Japan's digital government promotion. The Digital Supervisor has two roles.

The first is to advise the Digital Minister on important matters related to the Digital Agency's responsibilities, and to submit opinions to the Digital Minister at the Digital Minister's orders. The second is to assist the Digital Minister, organize the agency's affairs, and oversee the affairs of each department and institution of the Digital Agency.

Currently, the government is working hard to improve efficiency by consolidating each ministry's IT budget into the Digital Agency, such as through the IT budget lump-sum accounting system.

One of the GCIO's major achievements in 2024 has been the successful rollout of the Digital Government Framework, which provides a structured approach to managing IT projects and ensuring the effective use of technology. This framework includes guidelines for project management, risk assessment, and performance evaluation, helping to ensure that digital initiatives are delivered on time and within budget.

4.6. E-Government Promotion [EPRO]

Japan's promotion of e-government initiatives in 2024 has been characterized by a strong focus on public outreach and engagement. The government launched the Digital Japan Campaign, a nationwide effort to raise awareness about the benefits of digital services and encourage citizen participation. This campaign included a series of public events, informational seminars, and online resources designed to educate citizens about the various e-government services available to them.

The government also partnered with technology companies and educational institutions to enhance digital literacy and support the adoption of e-government services. For example, collaborations with major tech firms such as Sony and NEC led to the development of educational programs and resources aimed at helping citizens navigate digital platforms and understand the benefits of online services.

4.7.E-Participation [EPAR]

Japan has made significant strides in e-participation in 2024, enhancing citizen engagement through digital platforms. The government expanded its e-Participation Platform, which allows citizens to provide feedback on policy proposals, participate in public consultations, and engage in online discussions with policymakers. This platform has been instrumental in fostering a more inclusive and transparent decision-making process.

One notable example of e-participation in Japan is the Citizen's Digital Forum, an online space where citizens can engage in discussions on various topics, from local community issues to national policy debates. The forum has facilitated meaningful interactions between citizens and government officials, helping to ensure that diverse perspectives are considered in the policymaking process. For instance, a recent forum discussion on urban development in Tokyo led to the incorporation of citizen

suggestions into the city's new public transportation plan, reflecting the government's commitment to integrating public input into its strategies.

In addition to the Citizen's Digital Forum, Japan has implemented online petitions and feedback mechanisms through the government's official website. These tools allow citizens to propose new policies or express concerns directly to policymakers. For example, a petition calling for improved accessibility measures in public buildings garnered substantial support and resulted in a government review and subsequent enhancement of accessibility standards across the country. To further encourage engagement, Japan has also introduced virtual town halls where government officials hold live online sessions with the public. These sessions offer a platform for real-time dialogue, allowing citizens to ask questions, provide feedback, and discuss policy matters with their representatives. This approach has been successful in fostering greater transparency and building trust between the government and its citizens.

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

In 2024, Japan's commitment to digital transformation was exemplified by its ambitious projects and advancements in open government data. The government continued to expand the Open Data Japan Initiative, which aims to make a wide range of government datasets available to the public. This initiative supports transparency and enables the development of innovative applications that benefit both citizens and businesses.

One significant development was the launch of the Japan Open Data Portal, a comprehensive platform where users can access and download datasets related to various sectors, including healthcare, transportation, and environment. For example, the portal provides detailed data on air quality, which has been used by researchers to analyze pollution patterns and by developers to create apps that inform citizens about air quality in real-time. This open access to data has empowered citizens and businesses to make informed decisions and fostered a culture of transparency.

Japan's digital transformation also included the deployment of smart technologies in public services. The government introduced AI-driven analytics to enhance service delivery and decision-making processes. For instance, AI systems were utilized to optimize disaster response efforts by analyzing real-time data from various sources, including weather forecasts and social media, to provide timely and accurate information to emergency services. Japan's collaboration with international

organizations on digital transformation projects has been instrumental in shaping its approach. The country participated in the Global Open Data Index, contributing to and benefiting from a global exchange of best practices in open data management and utilization.

4.9. Cyber Security [CYB]

Cybersecurity has been a critical focus for Japan in 2024, reflecting the country's dedication to safeguarding its digital infrastructure and maintaining public trust. The National Center of Incident Readiness and Strategy for Cybersecurity (NISC) has been at the forefront of Japan's cybersecurity efforts, overseeing the implementation of comprehensive strategies to protect against cyber threats. The NISC's Cybersecurity Strategy 2024 includes initiatives to enhance threat detection, improve incident response capabilities, and strengthen national cyber defenses. For example, the NISC has introduced advanced AI-based threat detection systems that monitor network activity for signs of malicious behavior and provide real-time alerts to mitigate potential risks. These systems have been crucial in preventing and responding to cyber-attacks targeting critical infrastructure.

In addition to improving technology, Japan has emphasized the importance of cybersecurity training and awareness. The government launched the Cybersecurity Education Program, which provides training for public sector employees, businesses, and citizens on best practices for online security. This program includes workshops, online courses, and simulated cyber-attack exercises to help participants recognize and respond to potential threats.

4.10. The use of Emerging ICT [EMG]

Japan's commitment to emerging ICT in 2024 has driven significant advancements in various technology sectors, reflecting the country's position as a global leader in digital innovation. The Japanese government's strategic investments and collaborations have fostered growth in areas such as artificial intelligence (AI), robotics, and 5G technology. A key area of focus has been AI development. Japan has made substantial progress in integrating AI into public services and industries. The government launched the AI Japan Initiative, aimed at accelerating AI research and application across multiple sectors. For instance, AI-powered solutions are being employed in healthcare to enhance diagnostic accuracy and personalize patient care. Projects such as the AI-Assisted Medical Diagnosis System have demonstrated the potential of AI to support medical professionals in

identifying diseases and recommending treatment plans based on large datasets of medical records and research.

In the realm of robotics, Japan continues to lead with innovative applications and research. The government supports the development of advanced robotics through the Robotics Innovation Program, which funds projects focused on creating robots for various purposes, including manufacturing, healthcare, and disaster response. Notably, Japan has deployed humanoid robots in eldercare facilities to assist with daily activities and provide companionship to elderly residents. These robots have been well-received and are seen as a solution to address the challenges of Japan's aging population.

The deployment of 5G technology has been another significant achievement for Japan. The country has rolled out nationwide 5G networks, which offer faster internet speeds and greater connectivity. This technology has enabled new applications in smart cities, such as intelligent transportation systems and enhanced public safety solutions. For example, the Smart Tokyo Project utilizes 5G to support real-time traffic management and improve emergency response times, making urban environments more efficient and safer. Japan's efforts in quantum computing also highlight its focus on emerging ICT. The government has invested in quantum research centers and international collaborations to advance quantum technology, which holds the potential to revolutionize data processing and cryptography. The development of quantum computers is expected to drive breakthroughs in various fields, including cryptography, materials science, and complex system simulations.

12. Canada

1. General Information

Area: **9,984,670 km2**

Population: **39,860,774**

Government Type: Parliamentary Democracy

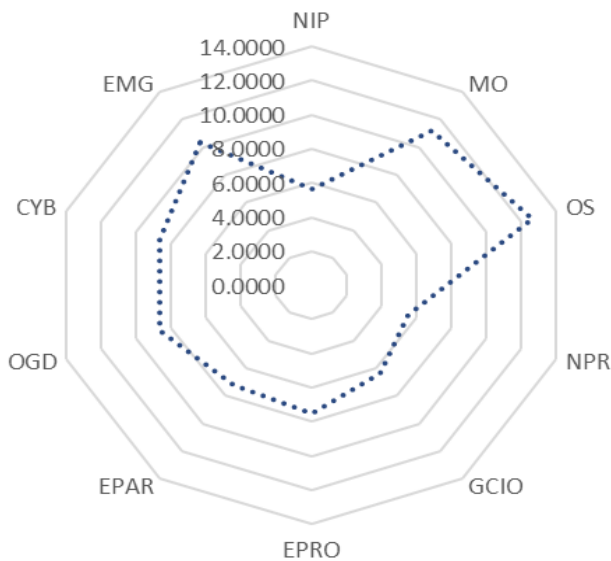2024 Growth Rate: **1.3%**

GDP (IMF '24): **$2.24 Tn**

GDP Per Capita: **$56,418**

Internet User: **94%**

Wired (Fixed Broadband User) per 100 people: **43.2**

Wireless Broadband User per 100 people: **87.8**

2. Digital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development

In 2024, the Government of Canada continues to prioritize the modernization of its digital services to better meet the needs of Canadians. Recent initiatives include the establishment of Shared Services Canada for streamlined digital service delivery, new senior leadership roles to oversee digital

transformation, and digital identity pilot programs in Alberta and British Columbia. Additionally, the introduction of GC Notify has improved communication capabilities across government departments.

The Canadian Digital Service, established in 2017, remains a key player in driving digital improvements, focusing on modernizing legacy systems and implementing new initiatives such as the Next Generation HR and Pay program. A new Minister of Citizens' Services role was created in July 2023 to further these efforts. Despite progress, challenges persist, including inconsistent service access and the use of outdated paper-based processes for some services.

Financial tracking of digital transformation efforts remains fragmented, with limited centralized information on total expenditures and savings. Canada faces unique digital transformation challenges due to its large, diverse geography and bilingual nature. Facing lots of obstacles, this year, the country was ranked 12th in the Waseda rankings.

3.2. New Trends

Modernizing government processes under Canada's Digital Transformation Strategy will help to provide a safe, dependable, and user-friendly digital environment. Upgrading digital foundations, guaranteeing the security and privacy of services, and encouraging interoperability are three main elements of this approach. The government has instituted multi-factor authentication to improve security and guard private information: transparency and encryption help to emphasize privacy by means of rules. Standardizing data formats and communication protocols helps interoperable systems to facilitate smooth information flow across departments.

Another important point is incorporating digital priorities into governance. Driven by new rules and digital standards, digital components are fundamental to all government initiatives. While responsibility systems provide uniformity in user interfaces, data management, and service delivery, periodical reviews help to monitor project goals and results. Decentralized leadership helps government agencies to be empowered therefore enabling customized digital initiatives and a digital culture. Along with initiatives to attract and keep qualified personnel vital for the transition, departments receive training, support for innovation, and resources. With this all-encompassing strategy, perhaps a strong digital infrastructure and a forward-looking government will be developed.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Digital infrastructure resilience in Canada is crucial for maintaining functional and secure technologies amidst disruptions like extreme weather, human error, and cyber-attacks. Given the complexity and constant evolution of technology, ensuring resilience is a challenging task that requires collaboration from all stakeholders, including individuals, companies, and the government. Each group plays a role in sustaining a reliable digital economy and society.

To achieve effective digital infrastructure resilience, a thorough understanding of relevant technologies and their interactions is essential. Since the ICT industry primarily develops these technologies and standards, its involvement is vital. Currently, the Government of Canada lacks a centralized coordination center for critical infrastructure resilience, making it difficult to address cross-departmental challenges and improve digital infrastructure resilience comprehensively.

To address these gaps, it is recommended that the Government of Canada establish a Critical Infrastructure (CI) Resilience Centre. This center should address both infrastructure and cyber resilience, linking its efforts to the National Infrastructure Assessment. The success of this center will depend on whether it operates under a unified strategy, complements existing agency activities, and fosters collaboration with various stakeholders, including provincial governments, infrastructure operators, and international partners.

4.2. Management Optimization [MO]

In 2024, the Canadian government is focused on optimizing its digital transformation strategy to keep pace with rapid technological advancements and evolving public expectations. The shift towards digital services has become integral to daily life in Canada, with citizens demanding access to government services anytime, anywhere, and through any device. The government has committed to modernizing outdated IT systems and ensuring that high-speed internet is accessible to all Canadians, reflecting its dedication to improving digital service delivery and addressing privacy and security concerns. As Canada continues to play a leadership role internationally in digital government, it has also emphasized aligning its digital strategy with environmental goals through the Greening Government Strategy.

Despite significant progress, the Canadian government faces challenges in accelerating its digital transformation. The complexity and outdated nature of many IT systems create barriers to quick adaptation and effective service delivery. There are also ongoing issues with siloed operations and

institutional barriers that hinder the integration and accessibility of government services. The government is working to overcome these obstacles by investing in new technologies and removing systemic barriers, while striving to provide inclusive, user-centric services and address the needs of diverse populations. The Digital Government Strategy and the 2021–2024 Digital Operations and Service Plan are key to guiding these efforts, aiming to enhance the efficiency and responsiveness of government operations in the face of future disruptions.

4.3. Online Service [OS]

The central digital portal, MyGov.ca, remained a key element, offering a variety of services such as tax filing, passport applications, and access to government benefits. Additionally, investments in user-friendly mobile applications facilitated easier access to information and services, while open data initiatives encouraged innovation and public engagement by releasing extensive datasets for public use.

Cybersecurity was a major priority, with the government implementing robust measures to protect sensitive data and prevent cyberattacks. Despite these advancements, challenges persisted, particularly in ensuring equitable access to digital services for rural and marginalized communities, and addressing concerns about data privacy and cybersecurity. Moving forward, the Canadian government plans to continue enhancing its digital infrastructure, expand online service offerings, and bolster cybersecurity measures to create a more efficient, accessible, and transparent government for all citizens.

Key Developments in 2024:

- **MyGov.ca:** The government's central digital portal, MyGov.ca, continued to be a focal point for online services. It offered a wide range of services, including tax filing, applying for passports, and accessing government benefits.
- **Enhanced Mobile Services:** Canada invested in developing user-friendly mobile apps for various government services, making it easier for citizens to access information and complete tasks on the go.
- **Open Data Initiatives:** The government continued to promote open data initiatives, releasing large datasets for public use. This encouraged innovation and citizen engagement.
- **Cybersecurity Focus:** As digitalization progressed, cybersecurity became a top priority. The government implemented measures to protect sensitive data and prevent cyberattacks.

4.4. National Portal [NPR]

Canada's national portal, MyGov.ca, has been a cornerstone of its digital transformation efforts. It offers a wide range of government services, from tax filing to applying for passports, making it a convenient one-stop shop for citizens. The portal's user-friendly interface and mobile accessibility have contributed to its popularity and widespread use.

One unique aspect of MyGov.ca is its focus on incorporating Indigenous perspectives into the design and development of the platform. This includes features that support Indigenous languages and cultural practices, ensuring that all Canadians can access and use the portal effectively. Additionally, MyGov.ca has played a crucial role in facilitating communication between the government and Indigenous communities, promoting reconciliation and fostering a more inclusive society.

4.5. Government CIO [GCIO]

In 2024, the Chief Information Officer of Canada presented an update on the Digital Ambition, a key strategy guiding the country's digital government transformation. This strategy, introduced to enhance the delivery of government services in the digital age, is centered on four strategic themes that prioritize outcome-driven and action-oriented approaches to digital modernization. The Ambition outlines the need for a forward-looking, three-year enterprise-wide plan to manage services, information, data, IT, and cybersecurity effectively. The focus remains on modernizing aging IT systems and transitioning to secure, user-centric, and transparent digital services, essential for maintaining public trust.

The strategy emphasizes the importance of integrating a digital mindset across government policies and programs. Key priorities for 2024 include ensuring safe and reliable operations amidst evolving cyber threats, advancing multi-year programs to modernize technology and processes for key government services, and implementing foundational technology for a unified service experience. Additionally, there is a strong push towards transitioning from analog to digital environments, fostering a culture of digital-first thinking, and building a diverse and skilled digital workforce. The overarching goal is to continue improving service delivery, address systemic barriers, and leverage digital opportunities to better serve Canadians, all while upholding privacy and accessibility.

4.6. E-Government Promotion [EPRO]

As President of the Treasury Board, the mandate focuses on leading Canada's digital government transformation to enhance service delivery to Canadians. The Digital Ambition, central to this vision, outlines strategies for advancing e-government in 2024. Amidst a rapidly evolving digital landscape, including advancements in quantum computing and artificial intelligence, Canada is committed to a digital-first approach. This involves simplifying interactions between citizens and the Government of Canada by delivering services that are user-friendly, secure, and privacy-focused, while ensuring high quality and accessibility.

The Digital Ambition provides a framework for achieving modern digital services through several key strategies. These include optimizing technology investments across government departments, improving data sharing and service delivery for clients and employees, establishing clear policies for safe and reliable operations, and refining approaches to project funding and talent recruitment. Recent progress in aligning government organizations with this vision is encouraging, with ongoing collaboration with provincial, territorial, and municipal counterparts driving the effort forward. Despite the challenges ahead, the commitment remains to leveraging this momentum to enhance the digital service experience for all Canadians.

4.7. E-Participation [EPAR]

In 2024, Canada continued to strengthen its commitment to digital engagement and open government through active participation in international forums and initiatives. As a member of the Digital Nations since 2018, Canada has been instrumental in promoting best practices and innovations in digital service delivery. The country not only hosted the first virtual Digital Nations Ministerial Summit in

2020 but also led efforts to explore sustainable IT practices by launching a working group focused on greening government IT operations. These activities underscore Canada's dedication to advancing technology-driven improvements in public service and resilience.

Furthermore, Canada's longstanding involvement in the Open Government Partnership (OGP) highlights its role in promoting transparency and citizen participation. As a co-chair of the OGP, Canada has championed the principles of open government by ensuring that government data and coding are accessible while maintaining strict privacy and security standards. This leadership role has allowed Canada to collaborate with other nations, enhance accountability, and share best practices in fostering an open and transparent government. Through these efforts, Canada continues to set an example in the global e-participation landscape, driving forward digital engagement and governance reforms.

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

Since 2011, Canada's Open Government Portal has been a pivotal resource, providing centralized access to the government's open data, information, and maps. This platform, utilizing open-source tools and a cloud-based architecture, ensures that data is both scalable and adaptable to meet growing demands. For example, the portal allows users to explore datasets that drive innovation and improve decision-making, such as economic data used by businesses or environmental statistics utilized by researchers. The portal's evolution reflects a commitment to making government data more accessible and useful to the public.

The Open Government Portal also supports proactive publication of key documents and information. This includes mandatory reporting documents like annual reports to Parliament, as well as summaries of access to information requests. For instance, the portal publishes summaries of completed access to information requests, which provide insights into previously requested government data. Such measures enhance transparency and allow Canadians to better understand and engage with government operations. By making documents like contracts over $10,000 and grants and contributions readily available, the portal ensures accountability and public oversight.

Furthermore, the Federal Geospatial Platform (FGP) extends the portal's capabilities by providing access to comprehensive geospatial data, including maps and geographic information from various levels of government. This data supports national priorities such as disaster response and

environmental protection. For example, during flooding emergencies, geospatial data from the FGP can be used to assess affected areas and coordinate response efforts. The Open Government Portal's integration of such data not only facilitates informed decision-making but also demonstrates Canada's commitment to leveraging open data for public benefit and innovation.

4.9. Cyber Security [CYB]

The Government of Canada's new Enterprise Cyber Security Strategy, unveiled by the Honourable Anita Anand, President of the Treasury Board, represents a crucial step in addressing the evolving cyber threat landscape. This strategy, backed by a $11.1 million investment over five years from Budget 2024, aims to enhance the government's ability to detect, disrupt, and prevent cyber threats. It outlines four key objectives: articulating cyber risks, improving attack prevention and resistance, strengthening government-wide resilience, and attracting skilled cybersecurity professionals. The initial phase focuses on establishing a centralized evaluation system, creating a federated risk management platform, and developing a government-wide vulnerability management program.

The strategy also introduces a new Purple Team to proactively test and address security gaps and emphasizes collaboration with Shared Services Canada and the Communications Security Establishment. The goal is to ensure secure and reliable digital services for Canadians while maintaining robust cybersecurity practices. As noted by key officials, including Minister of National Defence Bill Blair and Minister of Public Services and Procurement Jean-Yves Duclos, this strategy is essential for managing cyber risks, enhancing resilience, and protecting Canadians' information in an increasingly digital world.

4.10. The use of Emerging ICT [EMG]

The Canadian ICT sector, vital to the national economy, is characterized by high trade dependence and a robust domestic industry. In 2022, Canada imported ICT goods worth US$43.2 billion, with the United States being a key supplier, and exported US$12.5 billion globally, predominantly to the U.S. Despite its trade imbalance, the sector shows promising growth, driven by substantial government investment and a diverse range of emerging technologies. The Canadian ICT market includes over 43,200 companies, with the majority being small enterprises focused on software and computer services. Ontario, British Columbia, Québec, and Alberta lead in ICT imports, while the federal

government remains the largest purchaser of ICT goods and services, spending approximately $5 billion annually.

Notable trends in Canadian ICT for 2023 include significant advancements in cybersecurity, cloud services, AI, robotics, and AR/VR. Cybersecurity is a major focus due to increasing global threats, with companies investing heavily in new defenses and technologies. Cloud computing continues to evolve, with trends such as AI serverless cloud and edge computing gaining prominence. AI remains a critical investment area, leveraging real-time data and 5G for enhanced analytics and operational efficiency. The shift towards automation, accelerated by the pandemic, is evident in the growth of robotics, including Robotic Process Automation and Autonomous Mobile Robots. AR/VR technologies are transforming various sectors by enhancing experiences and providing innovative solutions. These trends highlight Canada's dynamic ICT landscape, with opportunities for growth in security and AI-driven innovations.

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.

13. Ireland

1. General Information

Area: **70,273 km2**

Population: **5,271,033**

Government Type: Parliamentary Democracy

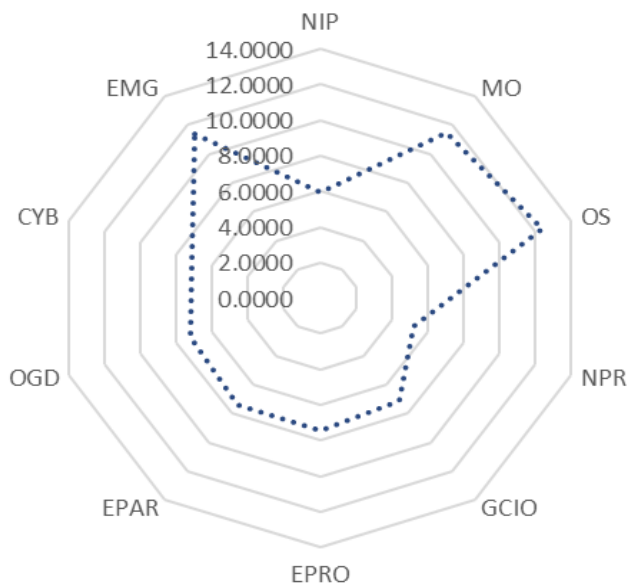2024 Growth Rate: **-0.2%**

GDP (IMF '24): **$564.02 Bn**

GDP Per Capita: **$107,330**

Internet User: **92%**

Wired (Fixed Broadband User) per 100 people: **31.8**

Wireless Broadband User per 100 people: **118**

2. Digital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development

As of 2024, Ireland has made significant progress in its digital transformation efforts, establishing itself as a frontrunner in digital government. As of 2024, the nation maintained the 13th spot in the Waseda rankings. At the core of these efforts lies the Digital Government Strategy, which aims to augment service delivery, optimize efficiency, and promote more citizen participation via technology.

The underlying principle of this approach is to enhance the accessibility, transparency, and responsiveness of government services.

An outstanding accomplishment of Ireland's digital strategy is the gov.ie website, which has evolved into a centralised center for accessing government services. This platform provides a consolidated interface for individuals to engage with a range of governmental services, including as tax submission, social assistance applications, and company registrations. The integration has significantly optimized procedures, therefore alleviating administrative workloads and enhancing the user experience. For instance, the incorporation of digital identity verification via the MyGov.ie website has streamlined access to many services by enabling users to securely oversee their engagements with the government from a unified platform.

The efforts of Ireland have garnered worldwide recognition, as the country has consistently maintained a robust position in many international benchmarks. Based on its strong digital infrastructure and innovative public services, Ireland was placed 6th in the United Nations E-Government Development Index (EGDI) for 2024. Furthermore, Ireland's achievement in the European E-Government Benchmark highlights its dedication to digital transformation, including in domains such as digital public services and online participation.

3.2. New Trends

Ireland's digital transformation strategy for 2024 is driven by the Digital Government Strategy 2024, which outlines a comprehensive framework for integrating technology into public administration. This strategy emphasizes several key areas:

- Digital Inclusion: Ensuring that all citizens have access to and can effectively use digital services. This is supported by the Digital Skills for All Program, which offers training and resources to improve digital literacy across the population. The program includes workshops, online courses, and community support to help individuals and businesses navigate the digital landscape. For example, the Digital Skills for SMEs initiative provides tailored training for small and medium-sized enterprises to enhance their digital capabilities.
- Data Management and Utilization: Enhancing the management and use of data to improve decision-making and service delivery. The National Data Strategy aims to promote the use of data in policy formulation and service design. Initiatives such as the Open Data Ireland

Initiative provide access to government datasets, fostering transparency and enabling data-driven innovation. One notable example is the Transport for Ireland Open Data Portal, which offers real-time public transit information to support the development of commuter applications.

- Smart Government Services: Developing and implementing smart technologies to enhance public services. The Smart Dublin Program leverages technologies like IoT and 5G to create smart city solutions, such as intelligent traffic management systems and real-time environmental monitoring. The Dublin Smart Traffic System uses 5G-enabled sensors to optimize traffic flow, reduce congestion, and improve air quality.

The eGovernment Action Plan complements the Digital Government Strategy by setting specific targets and actions for improving digital services. This plan includes developing the National Digital Services Platform, which aims to provide a single point of access for a wide range of government services. The platform is designed to enhance user experience by simplifying service access and reducing the need for multiple interactions with different government departments.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Ireland's commitment to enhancing its network infrastructure has been a cornerstone of its digital strategy. The country has made significant investments in expanding broadband coverage and deploying 5G technology, which are crucial for supporting its growing digital needs.

- Broadband Expansion: The National Broadband Plan has been a key initiative in extending high-speed internet access to rural and underserved areas. By 2024, the plan has successfully connected thousands of homes and businesses to high-speed broadband, improving connectivity and bridging the digital divide. For example, the rollout of fiber-optic networks in remote areas has enabled residents to access fast and reliable internet services, supporting both personal and professional activities.
- 5G Deployment: The introduction of 5G technology has been another significant advancement. The Smart Dublin Initiative uses 5G to implement smart city solutions that enhance urban living. Projects like the Dublin Smart Traffic System utilize 5G-enabled sensors to manage traffic flow and reduce congestion. The deployment of 5G also supports

other applications, such as smart infrastructure and public safety systems, contributing to a more connected and efficient urban environment.

- Data Centers and Cloud Computing: Ireland has invested in the development of data centers and cloud computing infrastructure to support the growing demand for digital services. The Cloud Computing Strategy outlines plans for adopting cloud technologies across government departments, improving data management and scalability. The establishment of state-of-the-art data centers has provided secure and efficient data storage and processing capabilities, supporting the government's digital initiatives.

4.2. Management Optimization [MO]

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 in order 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 in an effort to entice and keep IT specialists in their employ, and they provide funding to the Housing, Planning, Community, and Local Government Department in order 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]

Ireland has made significant advancements in online services in 2024, improving accessibility and convenience for citizens. The gov.ie platform has become the central hub for accessing government services and information, providing a seamless experience for users. The MyGov.ie service, in particular, offers a personalized experience, allowing users to manage their interactions with the government from a single portal. This service features personalized notifications, online forms, and secure messaging with government departments. For example, users can track the status of their tax returns, manage their social welfare applications, and communicate directly with government agencies through MyGov.ie.

In addition to MyGov.ie, the development of mobile applications has further enhanced access to public services. The Revenue Mobile App, for instance, allows users to file tax returns, check their tax status,

and receive updates from the Revenue Commissioners. These applications provide a convenient way for citizens to interact with government services on the go, making it easier to access essential services anytime, anywhere.

The integration of various online services has also streamlined processes and reduced administrative burdens. The Digital Service Integration Program focuses on connecting different service platforms and automating workflows, resulting in more efficient service delivery and a better user experience. This program has led to the creation of a more cohesive digital service ecosystem, where users can access multiple services through a unified interface, reducing the need for repeated interactions with different government departments.

4.4. National Portal [NPR]

The gov.ie portal serves as Ireland's primary national portal, offering a comprehensive gateway to government services and information. The portal has been continuously updated to improve usability and functionality. Recent enhancements have focused on user experience, with a redesigned interface that includes improved navigation and search capabilities. These updates have made it easier for users to find the information and services they need. For instance, the introduction of an advanced search function helps users quickly locate specific forms, documents, and service information.

Accessibility features have also been a key focus of the portal's updates. The gov.ie portal includes features such as text-to-speech and adjustable font sizes to ensure that all users, including those with disabilities, can access government services. These features enhance usability for individuals with visual impairments and contribute to a more inclusive digital environment.

The integration of various services into the gov.ie portal has further streamlined access for users. By consolidating services from multiple government departments into a single access point, the portal reduces the need for multiple interactions with different departments. This integration simplifies the process of accessing services, making it more convenient for citizens to interact with the government.

4.5. Government CIO [GCIO]

The role of the Chief Information Officer (CIO) of the Government is crucial in overseeing Ireland's digital transformation efforts. The current CIO, David Phelan, plays a key role in shaping the country's digital strategy and ensuring the effective implementation of technology initiatives. As the leader of

Ireland's digital transformation efforts, Phelan is responsible for setting the strategic direction for digital initiatives and overseeing their execution.

The CIO oversees the Digital Transformation Office, which coordinates digital initiatives across government departments. This office ensures alignment with the national digital strategy and supports the successful execution of digital projects. The office plays a critical role in driving innovation and improving service delivery by managing and implementing key digital initiatives.

Collaboration and innovation are central to the CIO's role. Phelan fosters partnerships between government agencies, technology providers, and other stakeholders to advance digital innovation. This includes working with industry partners to explore new technologies and solutions that can enhance public services. Through these collaborations, the CIO supports the development and deployment of innovative solutions that improve the efficiency and effectiveness of government services.

4.6. E-Government Promotion [EPRO]

Ireland's e-Government Promotion efforts aim to increase awareness and adoption of digital services among citizens and businesses. The Digital Services Awareness Campaign is a key initiative in this regard, focusing on informing citizens about the availability and benefits of digital services. This campaign includes online advertisements, informational videos, and social media outreach. For example, the campaign features success stories of individuals who have benefited from digital services, highlighting the convenience and efficiency of online interactions with the government.

In addition to the awareness campaign, Ireland has implemented outreach programs to engage with various communities and sectors. The Digital Services Roadshow, for instance, travels to different regions to demonstrate digital services and provide hands-on assistance to users. This initiative helps to bridge the gap between digital and non-digital users, ensuring that all citizens are informed about and can access government services.

Furthermore, Ireland's focus on digital inclusion is reflected in the support provided to businesses and organizations. The Digital Business Support Program offers resources and guidance to help businesses adopt digital tools and technologies. This program aims to enhance the digital capabilities of businesses, contributing to a more digitally savvy and connected economy.

4.7. E-Participation [EPAR]

E-Participation in Ireland has seen significant advancements in 2024, with a strong emphasis on enhancing citizen engagement through digital platforms. The Participate.ie platform is a key component of Ireland's e-participation strategy, enabling citizens to contribute to policy discussions and decision-making processes. This platform offers tools for public consultations, surveys, and feedback mechanisms, allowing citizens to voice their opinions on a range of issues. For example, the platform was used to gather public input on the National Climate Action Plan, providing valuable insights that informed the development of climate policies.

The Public Consultation Hub is another significant initiative aimed at fostering citizen engagement. This hub provides a centralized location for accessing information about ongoing consultations and providing feedback on proposed policies. It offers features such as interactive maps and discussion forums, facilitating meaningful engagement and dialogue between citizens and government officials.

Ireland has also implemented initiatives to encourage civic participation through digital channels. The Digital Civic Engagement Program focuses on promoting the use of digital tools for community involvement and volunteerism. This program supports various projects that leverage technology to connect citizens with local initiatives and opportunities for civic engagement. For example, the program has supported the development of community-based apps that connect volunteers with local organizations in need of support.

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

Ireland's digital transformation efforts in 2024 are characterized by the extensive adoption of emerging technologies and the promotion of open government data. The country's commitment to digital transformation is evident in the implementation of advanced technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT) in public services. For instance, the Smart Dublin Program utilizes IoT and AI to create smart city solutions, including intelligent traffic management systems and real-time environmental monitoring.

The government's focus on open data is reflected in the Open Data Ireland Initiative, which aims to make government datasets publicly accessible and usable. This initiative promotes transparency and supports data-driven innovation by providing access to a wide range of datasets, including information on public transportation, environmental metrics, and economic indicators. For example, the Transport

for Ireland Open Data Portal offers real-time public transit information, enabling the development of commuter applications and improving the efficiency of public transport systems.

Digital transformation also includes the development of new digital services and platforms. The National Digital Services Platform is a key project that aims to provide a unified access point for government services, improving user experience and simplifying service delivery. This platform integrates various digital services and automates workflows, enhancing efficiency and accessibility for citizens.

4.9. Cyber Security [CYB]

Cybersecurity is a critical component of Ireland's digital strategy, with significant efforts dedicated to protecting government systems and data from cyber threats. The National Cyber Security Strategy 2024 outlines the country's approach to safeguarding digital infrastructure and ensuring the resilience of government systems. This strategy includes measures to enhance threat detection, improve incident response, and strengthen overall cybersecurity posture.

The establishment of the National Cyber Security Centre (NCSC) plays a central role in implementing the cybersecurity strategy. The NCSC provides support and guidance to government departments, businesses, and other organizations in managing cyber risks. It coordinates responses to cyber incidents and works to improve the overall security landscape through initiatives such as vulnerability assessments and threat intelligence sharing.

Ireland's commitment to cybersecurity is further demonstrated by the adoption of robust security frameworks and standards. The Cyber Essentials Certification program encourages organizations to implement basic cybersecurity measures to protect against common threats. The program provides a structured approach to cybersecurity, helping organizations to safeguard their systems and data from potential breaches.

4.10. The use of Emerging ICT [EMG]

In 2024, Ireland has made significant strides in integrating emerging information and communication technologies (ICT) to advance its digital landscape. The government's focus on adopting cutting-edge technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT) has driven innovation and improved public services. For instance, the AI for Government Program has

been launched to harness the power of AI in various sectors, including healthcare, transportation, and public safety. The program supports the development and deployment of AI-driven solutions that enhance service delivery and operational efficiency. One notable example is the use of AI in predictive analytics for healthcare, which helps in identifying trends and improving patient care.

Blockchain technology is being explored for its potential to enhance transparency and security in government processes. The Blockchain for Public Services Initiative aims to pilot blockchain applications in areas such as land registration, supply chain management, and digital identity verification. For example, the initiative has been used to test blockchain-based land registries, which offer greater security and reduce the risk of fraud in property transactions.

The Internet of Things (IoT) is also playing a crucial role in Ireland's digital transformation. The Smart Cities Program leverages IoT to create more efficient and responsive urban environments. This program includes projects such as smart traffic management systems, which use real-time data from sensors to optimize traffic flow and reduce congestion. Another example is the deployment of smart environmental monitoring systems, which provide real-time data on air quality and other environmental factors, contributing to better urban planning and public health outcomes. Ireland's commitment to embracing emerging ICT demonstrates its proactive approach to digital innovation and its dedication to leveraging technology to improve public services and enhance the quality of life for its citizens.

14. Sweden

1. General Information

Area:**450,295 km2**

Population: **10,622,043**

Government Type: Parliamentary Democracy

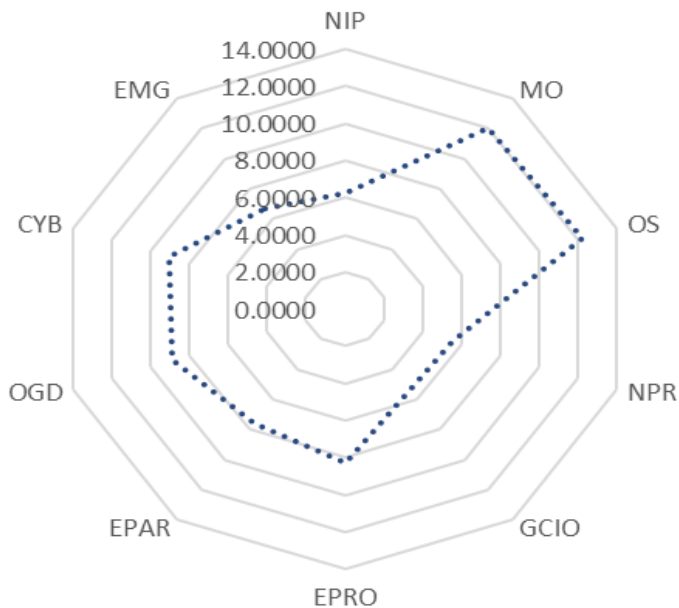2024 Growth Rate: **0.9%**

GDP (IMF '24): **$623.05 Bn**

GDP Per Capita: **$58,739**

Internet User: **95%**

Wired (Fixed Broadband User) per 100 people: **40.7**

Wireless Broadband User per 100 people: **132.00**

2. Digital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development

In 2024, Sweden is making significant strides in digital governance, solidifying its position as a global leader in e-government and digital innovation. The Swedish government's digital agenda is centered

on leveraging technology to enhance public services, increase transparency, and engage citizens more effectively. Key initiatives include the expansion of digital identity solutions, the modernization of e-government services, and the integration of advanced technologies such as artificial intelligence (AI) and blockchain into public sector operations. These efforts are driven by the overarching goal of creating a more efficient, accessible, and secure digital environment for all Swedes.

Sweden's dedication to digitalization is underscored by its impressive performance in international digital governance rankings. The country's achievements in digital governance are also highlighted by its 14th position in the Waseda rankings, where Sweden has been noted for its advanced digital administration and management practices. The country consistently ranks high in the United Nations E-Government Development Index (EGDI), reflecting its strong digital infrastructure and innovative public services. In 2024, Sweden was recognized for its exemplary digital services and high level of e-participation, maintaining its place among the top global performers.

3.2. New Trends

Sweden's digitalization strategy for 2024 is guided by the Digital Strategy for Sweden 2025, which outlines a comprehensive approach to leveraging technology for societal benefit. The strategy focuses on three primary objectives: fostering innovation, ensuring digital inclusion, and enhancing public sector efficiency. To achieve these goals, Sweden is investing in digital infrastructure, supporting research and development in emerging technologies, and promoting policies that encourage the adoption of digital solutions across various sectors.

A central element of Sweden's strategy is the Innovation Partnership Program, which aims to create a collaborative ecosystem involving government agencies, academic institutions, and the private sector. This program is designed to stimulate technological advancements and foster innovative solutions for public services. For instance, the program has supported initiatives such as smart city projects, which use digital technologies to improve urban management and quality of life. Additionally, the program has facilitated the development of digital health solutions, including telemedicine platforms and electronic health records, which enhance healthcare delivery and accessibility.

Sweden's strategy also emphasizes the importance of digital inclusion, ensuring that all citizens have access to digital services and the skills needed to use them effectively. The government has launched

initiatives to address the digital divide, including programs to provide digital literacy training and affordable access to technology for underserved communities. These efforts aim to ensure that the benefits of digitalization are shared broadly across society, promoting equitable access to public services and opportunities.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Sweden's network infrastructure is a key enabler of its digital transformation efforts, with a focus on ensuring robust and resilient connectivity across the country. The government's investment in network infrastructure is driven by the goal of providing high-speed, reliable internet access to all citizens, regardless of location. The Broadband Expansion Program is a major initiative aimed at extending high-speed internet coverage to rural and underserved areas. This program involves the deployment of fiber-optic networks and the enhancement of mobile connectivity to ensure that all Swedes have access to fast and reliable internet services.

In addition to broadband expansion, Sweden has made significant advancements in 5G technology. The rollout of 5G networks is expected to enhance connectivity and support the development of new digital applications and services. The 5G Rollout Strategy outlines the government's plan to deploy 5G infrastructure across the country, with a focus on urban areas and high-demand regions. The strategy includes partnerships with telecom operators and technology providers to accelerate the deployment of 5G networks and ensure that they meet the needs of businesses and consumers.

Sweden's network infrastructure preparedness is also supported by its focus on cybersecurity and resilience. The government has implemented measures to protect critical infrastructure from cyber threats, including the development of a national cybersecurity framework and the establishment of the National Cybersecurity Center. This center provides support and guidance to organizations in managing cyber risks and ensuring the security of network infrastructure.

4.2. Management Optimization [MO]

In 2024, Sweden achieves a top score in the Management Optimization rankings, showcasing its leading-edge techniques in efficient management and optimization. Sweden has made notable progress in optimizing management practices within the public sector through the adoption of digital technologies. A key component of this effort is the Digital Government Transformation Program,

which focuses on modernizing administrative processes and improving efficiency. The program includes the implementation of digital tools and platforms that streamline operations and enhance service delivery. For example, the e-Procurement System has been introduced to automate procurement processes, reducing administrative burden and improving transparency in public purchasing.

The Performance Management Framework is another important initiative aimed at optimizing public sector management. This framework provides tools and metrics for evaluating the performance of government programs and services, supporting data-driven decision-making and continuous improvement. The framework includes features such as performance dashboards and benchmarking tools, which help agencies monitor progress and identify areas for enhancement. One example of its application is the evaluation of digital service initiatives, allowing the government to assess their impact and effectiveness.

Digital tools such as Robotic Process Automation (RPA) have also been employed to improve management practices. RPA has been used to automate routine administrative tasks, such as processing applications and managing records. This has resulted in faster processing times and reduced manual errors. For instance, RPA has been implemented in the processing of social benefits applications, streamlining the workflow and improving the efficiency of service delivery.

4.3. Online Service [OS]

Sweden has made significant advancements in online services in 2024, focusing on enhancing accessibility and user experience. The Swedish Digital Services Portal serves as the primary access point for government services, providing a unified interface for citizens to interact with various public services. The portal offers a range of services, including online applications for permits, tax filings, and social benefits. Recent updates have improved the portal's functionality, with features such as personalized dashboards, advanced search capabilities, and streamlined application processes.

The e-ID System is another key component of Sweden's online services, enabling secure authentication and authorization for digital transactions. The BankID service, widely used for online banking and public services, provides a reliable and secure method for verifying identity. In 2024, the e-ID system has been expanded to include new features, such as biometric authentication and enhanced security protocols, to further protect users' personal information and prevent fraud.

Mobile applications have also been developed to enhance access to government services. The Swedish Mobile Services App offers a convenient way for citizens to manage their interactions with the government from their smartphones. The app includes features such as real-time notifications, online appointment scheduling, and access to digital documents. For example, users can receive updates on the status of their applications, schedule appointments for in-person services, and access electronic versions of important documents.

4.4. National Portal [NPR]

Sweden's national portal, Sweden.se, serves as a comprehensive gateway to government services and information. The portal has undergone significant enhancements in 2024, with improvements to its design and functionality aimed at providing a more user-friendly experience. The redesigned interface features intuitive navigation, making it easier for users to find relevant information and services. The portal includes a range of digital services, from tax filings and social benefits to health services and educational resources.

The Sweden.se portal also emphasizes accessibility and inclusivity, with features designed to support users with different needs. For example, the portal includes options for text-to-speech, adjustable font sizes, and language translations to accommodate users with visual impairments or language barriers. These features enhance the usability of the portal and ensure that all citizens can access government services effectively.

Integration of services within the national portal has streamlined access to public services and reduced the need for multiple interactions with different departments. By consolidating various services into a single platform, the portal provides a seamless experience for users and reduces administrative overhead. For instance, citizens can access a range of services, including health insurance, tax information, and public transportation updates, through a unified interface, improving convenience and efficiency.

4.5. Government CIO [GCIO]

The role of the Chief Information Officer (CIO) in Sweden is pivotal in steering the country's digital transformation efforts. The current CIO, Anna Eriksson, is responsible for overseeing the implementation of digital strategies and ensuring that technology initiatives align with the

government's objectives. Under Eriksson's leadership, the CIO's office has been instrumental in driving the digital agenda and supporting the development of innovative solutions for public services.

The CIO's office manages several key initiatives, including the Digital Transformation Office, which coordinates digital projects across government agencies. This office ensures that digital initiatives are aligned with the national digital strategy and provides support for their successful implementation. One notable project managed by the office is the Digital Government Services Platform, which integrates various digital services and facilitates efficient service delivery.

Collaboration with industry partners and technology providers is a key aspect of the CIO's role. Eriksson fosters partnerships to explore new technologies and solutions that can enhance public services. For example, the CIO's office has worked with technology firms to develop and deploy advanced AI and blockchain solutions for government applications. These collaborations contribute to the development of innovative digital services and support the overall goal of improving government operations.

4.6. E-Government Promotion [EPRO]

Sweden's e-Government Promotion efforts in 2024 focus on increasing awareness and adoption of digital services among citizens and businesses. The Digital Engagement Campaign is a major initiative aimed at promoting the benefits of digital services and encouraging their use. This campaign includes a variety of activities, such as online advertisements, informational workshops, and public outreach events. For example, the campaign has featured success stories of individuals and businesses that have benefited from digital services, highlighting their positive experiences and the convenience of online interactions with the government.

The E-Government Outreach Program includes targeted outreach efforts to underserved and marginalized groups, ensuring that they have the support needed to access and use digital services. For instance, the program organizes community workshops and training sessions to help individuals in remote or low-income areas become familiar with digital tools and platforms. Additionally, partnerships with local organizations and community centers help in reaching out to populations that may have limited access to technology or internet services. These efforts are crucial in bridging the digital divide and ensuring that all citizens can benefit from the government's digital services.

The Swedish government also promotes e-government through its annual Digital Innovation Awards, which recognize and celebrate successful digital projects and innovations across public sector agencies. These awards highlight outstanding examples of digital transformation, such as the development of new e-services or the implementation of innovative technologies that improve service delivery. By showcasing these achievements, the awards inspire other agencies and organizations to pursue their own digital initiatives and contribute to the broader goal of digital modernization.

4.7. E-Participation [EPAR]

The Digital Democracy Initiative is a significant effort designed to increase public involvement in government processes. This initiative includes the development of online platforms that allow citizens to participate in consultations, submit feedback, and contribute to policy discussions. For example, the Democracy Portal provides a space for citizens to engage with ongoing government consultations, where they can provide input on proposed policies and legislation. This portal has been instrumental in gathering diverse perspectives and ensuring that policy decisions reflect the needs and preferences of the public.

Another key component of Sweden's e-participation strategy is the Citizen Engagement Platform, which facilitates direct interactions between government officials and the public. This platform includes features such as online forums, live Q&A sessions, and digital town halls, where citizens can ask questions, share opinions, and engage in discussions with policymakers. For instance, the platform has hosted virtual town hall meetings on topics such as urban development and environmental policies, allowing residents to voice their concerns and suggestions in real time.

Sweden's commitment to e-participation is also reflected in its use of digital tools to enhance transparency and accountability. The Open Data and Feedback Mechanism enables citizens to access government data and provide feedback on public services. By making data on government performance and service delivery publicly available, the government promotes transparency and empowers citizens to hold public officials accountable. Additionally, feedback mechanisms allow users to report issues, suggest improvements, and track the progress of their contributions, fostering a more interactive and responsive relationship between the government and its citizens.

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

Sweden's commitment to digital transformation (DX) is evident in its ongoing efforts to modernize public sector operations and enhance service delivery through the use of advanced technologies. The Digital Transformation Strategy outlines a comprehensive approach to integrating digital tools and platforms across various government departments. Key initiatives include the adoption of cloud computing, data analytics, and AI-driven solutions to streamline processes and improve decision-making. For example, the use of AI in predictive analytics has been implemented to optimize public services, such as emergency response and urban planning.

Open government data is a cornerstone of Sweden's digital transformation efforts, promoting transparency and enabling data-driven innovation. The Open Data Initiative supports the publication of government data sets in machine-readable formats, allowing developers, researchers, and citizens to access and use the data for various purposes. The initiative includes a central open data portal where users can find and download data related to topics such as transportation, health, and environmental statistics. For instance, the Sweden Open Data Portal provides access to real-time data on public transportation schedules and air quality measurements, facilitating greater public engagement and research opportunities.

Sweden's approach to digital transformation also includes a focus on digital inclusion and accessibility. The government has implemented measures to ensure that digital services are accessible to all citizens, including those with disabilities or limited digital skills. The Accessibility Standards Framework establishes guidelines for designing and developing digital services that meet accessibility requirements, such as screen reader compatibility and keyboard navigation. These standards help to ensure that digital services are usable by a diverse range of individuals and contribute to the goal of an inclusive digital society.

4.9. Cyber Security [CYB]

Cybersecurity is a critical focus for Sweden as it continues to advance its digital infrastructure. The Swedish government has implemented a robust cybersecurity framework to protect critical infrastructure, safeguard sensitive information, and ensure the resilience of digital services. The National Cybersecurity Strategy outlines key priorities for managing cyber risks and responding to threats. This strategy includes the development of a comprehensive cybersecurity policy, the establishment of a national cybersecurity center, and the promotion of best practices for cybersecurity across government agencies and private sector organizations.

The Swedish National Cybersecurity Center (NCSC) plays a central role in coordinating cybersecurity efforts and providing support to organizations in managing cyber threats. The NCSC offers guidance on cybersecurity measures, conducts threat assessments, and provides incident response support. One example of the NCSC's work is its role in managing the response to cyberattacks on government systems and critical infrastructure. The center's expertise and resources help to mitigate the impact of cyber incidents and ensure that essential services remain operational.

Sweden's cybersecurity efforts also include initiatives to enhance public awareness and preparedness. The Cybersecurity Awareness Campaign aims to educate citizens and businesses about cybersecurity risks and best practices. This campaign includes educational materials, online resources, and public workshops to help individuals and organizations understand how to protect themselves from cyber threats. For instance, the campaign provides guidance on topics such as password security, phishing prevention, and secure online practices.

4.10. The use of Emerging ICT [EMG]

Sweden is at the forefront of integrating emerging information and communication technologies (ICT) into its public services and digital infrastructure. The government's focus on leveraging advanced technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT) has driven innovation and improved service delivery. One of the key initiatives is the AI for Public Services Program, which explores the potential of AI to enhance various aspects of public service delivery. For example, AI is used in predictive analytics for healthcare, enabling better resource allocation and patient care.

Blockchain technology is also being explored for its potential to improve transparency and security in government operations. The Blockchain for Public Services Initiative is testing blockchain applications in areas such as land registration and supply chain management. This initiative includes pilot projects to evaluate the benefits of blockchain in reducing fraud and improving the efficiency of public transactions.

The Internet of Things (IoT) plays a significant role in Sweden's digital transformation, particularly in the context of smart city initiatives. The Smart Cities Program leverages IoT technology to create more efficient and responsive urban environments. For example, smart traffic management systems use real-time data from sensors to optimize traffic flow and reduce congestion. Additionally, smart

environmental monitoring systems provide data on air quality and other environmental factors, contributing to better urban planning and public health outcomes.

15. Iceland

1. General Information

Area: **103,000 km2**

Population: **394,936**

Government Type: Parliamentary Republic

2024 Growth Rate: **0.6%**

GDP (IMF '24): **$33.34 Bn**

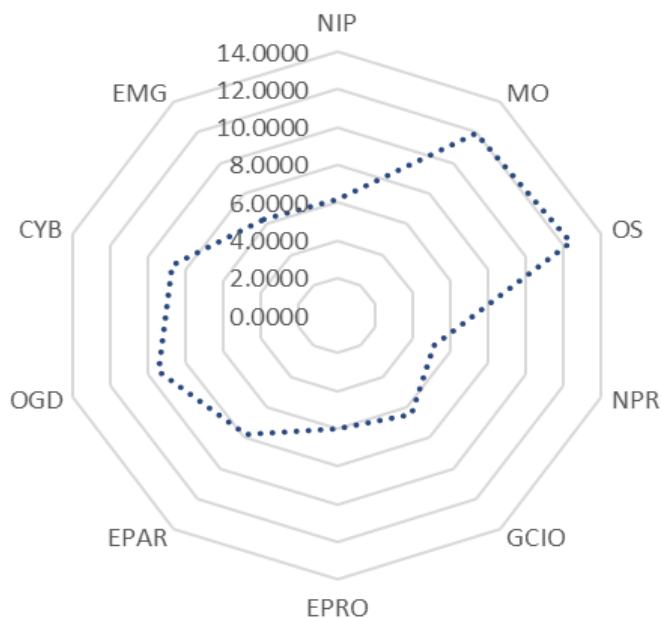GDP Per Capita: **$84,744**

Internet User: **99.7%**

Wired (Fixed Broadband User) per 100 people: **37.4**

Wireless Broadband User per 100 people: **125**

2. Digital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development

In 2024, Iceland made significant efforts to implement digital transformation in public services, positioning itself as one of global leaders in e-governance. The country ranked 15th in the Waseda

University International Digital Government Rankings, a testament to its continuous commitment to digitalization. One of Iceland's key achievements is its comprehensive e-government portal, Ísland.is, which provides citizens seamless access to a wide range of public services, including healthcare, taxation, and social welfare. By expanding digital identity verification systems, citizens can now securely access almost all government services online, increasing efficiency and a more user-friendly experience.

Moreover, Iceland has made impressive progress in integrating advanced technologies like AI and blockchain into public administration. The use of AI-powered chatbots and virtual assistants has streamlined interactions between citizens and government agencies. At the same time, blockchain technology ensures transparency and security in services such as land registries and financial transactions. Iceland's focus on inclusive digital services extends to rural areas, where the National Broadband Initiative ensures near-universal access to high-speed internet. This initiative has been instrumental in bridging the digital divide and ensuring that all citizens, regardless of location, benefit from the country's digital transformation. As a result, Iceland solidified itself as a global digital leader in 2024.

3.2. New Trends

The Icelandic Digital Government Strategy 2024-2028 lays out the country's vision for a fully digital government by 2028. Key pillars of the strategy include enhancing service delivery through digital platforms, improving data governance, and securing national infrastructure from cyber threats. The government has set clear goals for ensuring that 90% of all public services are available online by 2025. This includes integrating digital identity systems and creating a more citizen-centric approach to service delivery. The Digital Services Act of 2023 mandates that government agencies must adopt interoperable systems to ensure seamless access to services across all platforms.

Iceland is also working on expanding digital literacy among citizens. The Digital Skills for All program launched in early 2024 aims to equip citizens, particularly those in rural areas, with the skills to access and utilize online government services effectively. The government also actively collaborates with the private sector to promote adopting innovative digital solutions in governance.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Iceland's robust network infrastructure is one of the key enablers of its digital government ambitions. The country has invested heavily in its National Broadband Initiative, which aims to provide ultra-fast internet to 99% of the population by 2025, ensuring all citizens have equal access to digital services, irrespective of location. In 2024, Iceland completed its nationwide rollout of 5G networks, further enhancing its digital infrastructure. The government is also expanding its investment in fiber optic networks to rural and remote areas, ensuring seamless connectivity across the country. This level of preparedness supports Iceland's efforts to provide high-quality digital services to all citizens while also making it easier for businesses and the public sector to engage in the digital economy. Furthermore, the government is working with the Nordic Digital Infrastructure Council to enhance its data center capabilities. Iceland's favorable climate and renewable energy resources make it an ideal location for sustainable data centers, crucial for managing the vast amounts of data generated by e-government services.

4.2. Management Optimization [MO]

Management optimization in Iceland's public sector has been a key focus area in 2024. Through the implementation of e-governance principles, the government is enhancing the efficiency of public administration. Iceland's management optimization approach includes using digital tools for decision-making, workflow automation, and resource allocation. One example is the introduction of AI-based administrative tools that automate routine tasks such as processing licenses, permits, and tax filings. This has significantly reduced the workload for public officials and shortened the response time for citizens. In addition, Iceland has embraced cloud-based solutions for document management and communication across government agencies, enabling more streamlined collaboration.

The Public Sector Efficiency Initiative launched in 2023 continues to focus on reducing bureaucracy by digitizing records and automating administrative processes. As a result, Iceland has reported a 15% reduction in administrative costs in 2024, with more resources redirected toward improving citizen services.

4.3. Online Service [OS]

Iceland's e-government portal, Ísland.is, remains central to its online service delivery strategy. In 2024, the portal saw major upgrades in user interface and service integration, making it easier for citizens to access a broad range of services in areas such as healthcare, education, taxation, and social welfare.

Through digital identity verification, users can securely log into the platform to perform tasks like renewing passports, accessing medical records, or applying for housing subsidies. The government's efforts to simplify online interactions have resulted in a significant increase in the use of e-services, with over 85% of citizens regularly using Ísland.is for their public service needs.

Iceland's e-services for businesses also experienced enhancements in 2024. The Digital Business Registration system allows entrepreneurs to register new businesses online within a matter of hours, contributing to the country's business-friendly environment. Similarly, tax filings and financial disclosures for companies can now be handled entirely online, further reducing the burden on businesses.

4.4. National Portal [NPR]

Ísland.is is the official national portal for government services in Iceland, and in 2024, it expanded its functionality to encompass even more services, particularly in sectors like healthcare and education. This platform acts as a one-stop-shop for accessing all government-related services, from paying taxes to enrolling children in school. The portal now integrates AI-driven assistance to help citizens navigate services more efficiently. Virtual assistants and chatbots provide real-time guidance, making the user experience smoother and more intuitive. These AI-driven systems have handled over a million queries in 2024, significantly reducing the workload of human customer service agents.

Additionally, Iceland has focused on improving accessibility, ensuring that Ísland.is is user-friendly for all citizens, including those with disabilities. New features such as voice commands, text magnification, and real-time translation services were added to cater to the needs of diverse populations.

4.5. Government CIO [GCIO]

In 2024, Iceland's Chief Information Officer (CIO) of Government, under the Ministry of Finance and Economic Affairs, continues to lead the nation's digital transformation efforts. The CIO's office is responsible for coordinating and overseeing the integration of digital technologies across all government departments, ensuring that digital initiatives align with the broader goals of efficiency, transparency, and citizen engagement.

One of the CIO's major projects in 2024 is the National Digital Identity Program, which has expanded to cover more sectors and services. This program is key to Iceland's digital transformation efforts, as it enables citizens and businesses to interact with the government securely and efficiently. The CIO also leads the Interoperability Framework, which ensures that all government agencies use standardized systems, allowing for seamless communication and data sharing across departments.

4.6. E-Government Promotion [EPRO]

The E-Government Outreach Program has been expanded to engage with citizens and inform them about the available digital services. Workshops, online tutorials, and nationwide media campaigns have been implemented to educate citizens on how to use online services effectively. Furthermore, the government has launched a series of initiatives aimed at increasing the adoption of e-government services in rural areas, where digital literacy has traditionally been lower. The Digital Inclusion Program provides free training sessions on how to access and use e-services, ensuring that no segment of the population is left behind in Iceland's digital transformation journey. In collaboration with international organizations such as the Nordic Council, Iceland continues to promote e-government as a tool for improving transparency, reducing corruption, and fostering public trust in government institutions.

4.7. E-Participation [EPAR]

Iceland's commitment to fostering e-participation is evident in its numerous initiatives aimed at enhancing citizen engagement in governance. In 2024, the government expanded its e-participation platform, Betri Reykjavik, which allows citizens to propose ideas, provide feedback on public policies, and vote on local issues. This platform has been widely adopted, with thousands of proposals submitted by citizens on topics ranging from environmental sustainability to public transportation.

The government also launched a National Digital Referendum System in 2024, enabling citizens to vote on key policy decisions electronically. This system was first used to gather public input on proposed climate change legislation, ensuring that citizens could participate in shaping laws that directly affect their lives. In addition to these platforms, Iceland has embraced the use of social media as a tool for public engagement. Government agencies regularly use platforms like Facebook and Twitter to communicate with citizens, solicit feedback, and provide updates on ongoing projects.

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

The Digital Iceland Strategy focuses on integrating emerging technologies such as AI and blockchain into government processes. A notable example is the use of blockchain technology in public registries, including land titles and financial disclosures, which ensures greater transparency and security. On the open data front, Iceland's Open Data Portal provides access to a wide range of datasets, including environmental data, transportation statistics, and government spending records. The government actively promotes the use of open data by businesses, researchers, and civil society to drive innovation and enhance public accountability. In 2024, the portal was upgraded to include real-time data, particularly in climate monitoring and traffic management, helping citizens and businesses make more informed decisions.

4.9. Cyber Security [CYB]

Iceland continues to prioritize cybersecurity in 2024. The National Cyber Security Strategy focuses on protecting critical infrastructure, securing government data, and enhancing public sector resilience against cyber threats. The government's Cyber Defense Unit works closely with the private sector and international organizations to mitigate risks and respond to cyber incidents. In 2024, Iceland launched the Public Sector Cybersecurity Training Initiative, which aimed to enhance the cybersecurity awareness and skills of government employees. Additionally, the government partnered with the European Union Agency for Cybersecurity (ENISA) to implement the Cyber Risk Management Framework, which helps government agencies assess and mitigate risks effectively.

4.10. The use of Emerging ICT [EMG]

Emerging ICT plays a crucial role in Iceland's digital government strategy. In 2024, the government continued its exploration of artificial intelligence (AI), particularly in the realm of service delivery and public administration. AI-powered chatbots and virtual assistants are increasingly used to handle citizen inquiries and automate routine tasks, improving service efficiency and reducing costs.

Iceland is also investing in 5G networks and Internet of Things (IoT) technologies, particularly for smart city projects in Reykjavik. The Reykjavik Smart City Initiative includes the use of IoT sensors to monitor air quality, manage traffic, and optimize energy usage. Additionally, Iceland is exploring the potential of quantum computing for complex data analysis tasks, which could revolutionize public sector capabilities in areas like climate modeling and financial forecasting.

16. Norway

1. General Information

Area: **323,802 km2**

Population: **5,592,267**

Government Type: Constitutional Monarchy

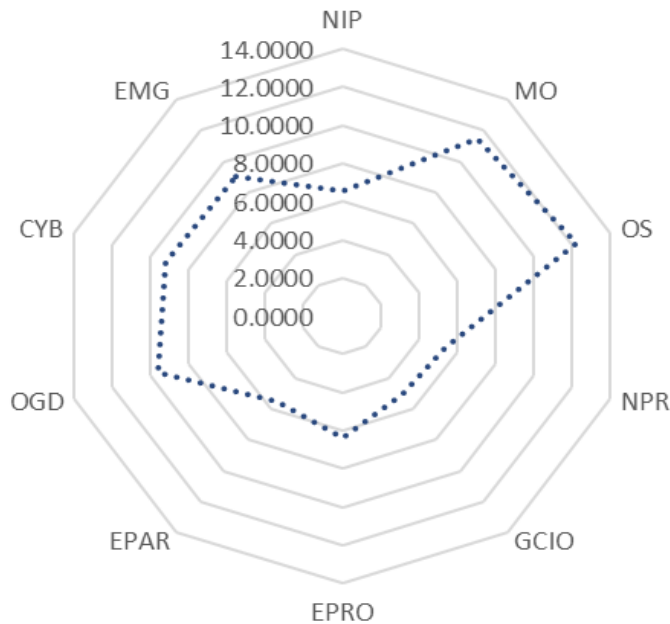2024 Growth Rate: **1.5%**

GDP (IMF '24): **$526.95 Bn**

GDP Per Capita: **$94,492**

Internet User: **99%**

Wired (Fixed Broadband User) per 100 people: **45.7**

Wireless Broadband User per 100 people: **117**

2. Digital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development

By 2024, Norway had solidified its status as a digital governance pioneer with a bold plan to incorporate cutting-edge tech into its government services. According to the Waseda rankings, the

nation came in at number sixteen this year. Improving service delivery, operational efficiency, and public involvement are the primary goals of the Norwegian government's digital transformation plan, which aims to use cutting-edge technology. A key component of these endeavors is the Digital Norway Strategy, which lays out a thorough plan to update governmental procedures and make them more accessible to all residents.

Among Norway's notable digital accomplishments this year is the introduction of a unified digital identification system that allows for frictionless communication between the public and public agencies. Accessing a variety of governmental services, including as healthcare appointments and tax filings, is made easy and safe using the Norwegian Digital ID (DID) system, which uses biometric authentication and secure digital credentials. In addition to streamlining administrative tasks, this program enhances security and decreases the likelihood of fraud.

In addition, the Open Government Data Program has helped Norway improve openness and accountability. To promote openness and allow data-driven decision-making, this initiative backs the release of public datasets from the government in easily consumable forms. With its high position in worldwide open data indices, Norway demonstrates its commitment to open data and its desire to provide relevant information to stakeholders and people.

3.2. New Trends

Norway's digital strategy for 2024, detailed in the National Digitalization Strategy, is centered around several key objectives aimed at transforming public services and boosting digital innovation. The strategy emphasizes the creation of a cohesive digital ecosystem that integrates various government functions into a single, streamlined platform. This platform, known as the Norwegian Digital Service Hub, is designed to offer a unified interface for accessing government services, thereby improving the user experience and reducing bureaucratic complexities.

The strategy also focuses on enhancing digital infrastructure to support the increasing demand for online services. Significant investments have been made in upgrading data centers and expanding broadband connectivity throughout the country. The Broadband Expansion Initiative aims to ensure that high-speed internet is available in even the most remote areas, promoting digital inclusion and enabling equal access to government services.

In addition to infrastructure improvements, the strategy includes measures to foster digital literacy and skills development among both government employees and the general public. The Digital Skills Training Program provides targeted training and resources to help public sector employees adapt to new technologies and improve their digital competencies. By investing in workforce development, Norway aims to build a digitally savvy public sector capable of driving innovation and delivering high-quality services.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Norway's commitment to enhancing its network infrastructure is evident through substantial investments in broadband expansion and the development of state-of-the-art data centers. The Broadband Expansion Program focuses on deploying fiber-optic networks and next-generation connectivity solutions to improve internet access across the country. This program has been particularly successful in extending high-speed internet to rural and underserved areas, ensuring that all citizens have access to reliable and fast connectivity.

In addition to broadband expansion, Norway has invested in modernizing its data center infrastructure to support the growing demand for digital services. The Norwegian Data Center Initiative involves the construction of advanced, energy-efficient data centers equipped with cutting-edge technologies to handle large volumes of data and ensure high availability of services. These data centers play a crucial role in supporting government applications, cloud services, and big data analytics, contributing to the overall efficiency of public sector operations.

The government's efforts in network infrastructure are complemented by initiatives to enhance cybersecurity and protect digital assets. The Cybersecurity Enhancement Program includes measures to strengthen network security, implement advanced threat detection systems, and ensure the resilience of critical infrastructure against cyberattacks. By investing in robust security measures, Norway aims to safeguard its digital infrastructure and maintain the integrity of government services.

4.2. Management Optimization [MO]

Management optimization within Norway's public sector is a key focus of the government's digital transformation efforts. The introduction of the e-Government Management System (EGMS) represents a significant advancement in streamlining administrative processes and improving

operational efficiency. The EGMS integrates various management functions, including project management, resource allocation, and performance monitoring, into a centralized digital platform. This system enables government agencies to manage their operations more effectively, track progress, and make data-driven decisions. Norway excels with a perfect score in Management Optimization, indicating its advanced and effective management strategies.

A notable example of management optimization is the Unified Administrative Services Platform, which consolidates multiple administrative functions into a single, user-friendly interface. This platform allows government employees to access and manage various administrative tasks, such as procurement, budgeting, and human resources, from one location. By reducing the complexity of administrative processes and automating routine tasks, the platform enhances efficiency and reduces administrative burdens.

The Norwegian government also focuses on optimizing management through the use of data analytics and performance metrics. The Government Performance Dashboard provides real-time insights into the performance of government services and operations. This dashboard enables agencies to monitor key performance indicators, identify areas for improvement, and implement data-driven strategies to enhance service delivery and achieve strategic objectives.

4.3. Online Service [OS]

Norway has made significant progress in expanding its online services, offering a wide range of digital solutions to meet the needs of citizens and businesses. The Digital Public Services Initiative is at the core of this effort, providing a comprehensive suite of online services across various sectors, including health, education, and social services. The initiative includes the development of user-friendly portals and mobile applications that allow citizens to access and manage services conveniently from their devices.

One of the standout examples of Norway's online services is the Digital Health Portal, which provides patients with access to medical records, appointment scheduling, and telemedicine consultations. This portal streamlines the healthcare experience, enabling patients to manage their health needs efficiently and securely. Additionally, the e-Services for Business Portal offers a range of digital tools for businesses, including online tax filing, business registration, and compliance management.

The government's focus on user experience is evident in the design of its online services, which prioritize accessibility and ease of use. The User Experience Design Guidelines ensure that digital services are intuitive and accessible to all users, including those with disabilities. By adhering to these guidelines, the Norwegian government aims to provide a seamless and inclusive digital experience for all citizens.

4.4. National Portal [NPR]

The Norwegian National Portal serves as a central hub for accessing a wide array of government services and information. This portal, known as Altinn, is designed to provide a one-stop-shop for citizens and businesses to interact with the government. The portal offers features such as personalized dashboards, streamlined application processes, and easy access to information on public services.

Altinn's integrated approach allows users to access services related to various aspects of their lives, including tax reporting, social security, and permit applications. The portal's user-centric design ensures that services are organized logically and are easy to navigate, enhancing the overall user experience. For instance, the Altinn Mobile App extends the portal's functionality to mobile devices, enabling users to access services on the go and receive real-time notifications.

The National Portal also includes a comprehensive Knowledge Base that provides information and guidance on various government services and procedures. This resource helps users understand their rights and obligations, navigate complex processes, and find answers to common questions. By centralizing information and services, the portal improves accessibility and reduces the need for in-person visits to government offices.

4.5. Government CIO [GCIO]

The role of the Chief Information Officer (CIO) in Norway is pivotal in driving the country's digital transformation agenda. The Norwegian CIO Council plays a central role in overseeing and coordinating IT strategies across government agencies. The council is responsible for setting standards, providing strategic guidance, and ensuring alignment with national digitalization goals.

The position of the Chief Information Officer is held by Hanne Sætre, who is responsible for leading the government's IT initiatives and ensuring the successful implementation of digital projects. Under her leadership, the CIO Council has focused on several key areas, including the development of digital

infrastructure, the promotion of IT best practices, and the facilitation of cross-agency collaboration. Sætre's role is crucial in driving the government's IT strategy and ensuring that digital initiatives are effectively managed and executed.

The CIO Council also supports the development of Digital Governance Frameworks, which provide guidelines and best practices for managing IT resources and projects within the public sector. These frameworks help to ensure that digital initiatives are aligned with strategic objectives, adhere to standards, and deliver value to citizens and businesses.

4.6. E-Government Promotion [EPRO]

The promotion of e-government services in Norway is driven by the E-Government Promotion Strategy, which aims to increase awareness and adoption of digital services among citizens and businesses. This strategy includes a range of activities designed to encourage the use of online services and highlight the benefits of digital interactions with the government. One of the key components of the promotion strategy is the National E-Government Campaign, which uses various media channels to reach a broad audience. The campaign features advertisements, informational videos, and social media content that explain the advantages of e-government services and provide guidance on how to access and use digital platforms. For example, recent advertisements have showcased the convenience of online tax filing and the ease of managing health appointments through digital portals.

The Norwegian government also engages in Public Engagement Initiatives to gather feedback and address concerns related to e-government services. These initiatives include public consultations, surveys, and focus groups that allow citizens to share their experiences and suggestions for improving digital services. By actively listening to user feedback, the government can make informed decisions and implement changes that enhance the overall user experience.

Additionally, the promotion strategy includes partnerships with local organizations and community groups to reach underserved populations and promote digital inclusion. The Digital Inclusion Partnerships program collaborates with libraries, community centers, and non-profit organizations to provide training and support for individuals who may have limited access to technology or digital skills. These efforts help to ensure that all citizens can benefit from e-government services and participate fully in the digital economy.

4.7. E-Participation [EPAR]

One of the key initiatives under this strategy is the Norwegian Public Consultation Platform, which provides an online forum for citizens to contribute their opinions on proposed legislation, policy changes, and other government initiatives. This platform allows users to access consultation documents, submit feedback, and participate in discussions with policymakers. For instance, recent consultations have involved topics such as environmental regulations and urban planning, providing citizens with an opportunity to influence policy outcomes that affect their communities.

The government also promotes e-participation through Digital Democracy Tools, which include online voting systems and interactive platforms for engaging with elected representatives. The Norwegian Digital Voting System enables citizens to vote in local and national elections securely online, increasing accessibility and convenience for voters. Additionally, the Interactive Town Hall Meetings allow residents to engage directly with government officials and express their views on various issues through live-streamed events and online Q&A sessions.

To support and enhance e-participation, the government has implemented the Digital Engagement Initiative, which focuses on increasing awareness and digital literacy among the public. This initiative includes campaigns to educate citizens about the benefits of e-participation and provide training on how to use digital tools effectively. For example, the government has partnered with community organizations to offer workshops and online tutorials that help individuals understand how to navigate e-participation platforms and contribute to public consultations.

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

Digital transformation (DX) in Norway is marked by a comprehensive approach to integrating technology across government operations and services. The Digital Transformation Initiative focuses on leveraging emerging technologies to improve efficiency, enhance service delivery, and drive innovation. Key projects under this initiative include the implementation of artificial intelligence (AI) for data analysis, blockchain for secure transactions, and the Internet of Things (IoT) for smart infrastructure management.

One notable example of digital transformation is the Smart City Project, which utilizes IoT sensors and AI to optimize urban services such as traffic management, waste collection, and energy consumption. By harnessing these technologies, Norway aims to create more efficient and sustainable cities, enhancing the quality of life for residents and reducing environmental impact.

The government's commitment to open data is demonstrated through the Norwegian Open Data Portal, which provides access to a wide range of government datasets. This portal supports transparency and enables citizens, researchers, and businesses to use data for various purposes, including research, innovation, and policy analysis. The portal's comprehensive dataset catalog includes information on topics such as public transportation, environmental data, and economic statistics.

Additionally, the Data Sharing and Innovation Program encourages collaboration between government agencies and external stakeholders to develop new applications and services using open data. This program supports projects that leverage government data to address societal challenges and drive innovation, fostering a culture of data-driven decision-making and innovation.

4.9. Cyber Security [CYB]

Cybersecurity is a critical focus for Norway as it continues to advance its digital capabilities. The National Cyber Security Strategy outlines the government's approach to protecting digital infrastructure, safeguarding sensitive information, and ensuring the resilience of critical systems against cyber threats. The strategy emphasizes the importance of building robust security frameworks, enhancing threat detection capabilities, and fostering collaboration with national and international partners.

The Norwegian Cyber Security Center (NCSC) plays a key role in coordinating national efforts to address cyber threats and respond to incidents. The NCSC provides guidance and support to government agencies, businesses, and individuals on best practices for cybersecurity, including risk management, incident response, and secure software development. For example, the center offers regular training sessions and workshops to enhance the cybersecurity skills of public sector employees and private sector professionals.

Norway has also implemented the Secure Digital Identity Program, which focuses on enhancing the security of digital identities used for accessing government services. This program includes the use of multi-factor authentication, encryption, and biometric verification to ensure that digital transactions and communications are secure. The program aims to prevent unauthorized access and protect against identity theft and fraud.

Additionally, the government invests in Cyber Resilience Initiatives to strengthen the ability of public sector organizations to recover from cyber incidents and maintain critical operations. These initiatives

include the development of incident response plans, regular security assessments, and the establishment of collaboration frameworks with international cybersecurity organizations. By focusing on resilience, Norway aims to ensure that its digital infrastructure remains secure and operational in the face of evolving cyber threats.

4.10. The use of Emerging ICT [EMG]

Norway is at the forefront of integrating emerging Information and Communication Technologies (ICT) into its public sector operations, leveraging these advancements to drive innovation, efficiency, and improved service delivery. The government's approach to emerging ICT focuses on harnessing technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT) to enhance public services and infrastructure.

One of the most notable initiatives is the Smart City Oslo Project, which exemplifies the application of IoT and AI technologies to create a more efficient and sustainable urban environment. This project involves the deployment of sensors throughout Oslo to monitor various aspects of city life, including traffic flow, air quality, and energy usage. The data collected by these sensors is analyzed using AI algorithms to optimize traffic management, reduce energy consumption, and improve overall urban planning. For example, smart traffic lights adjusted in real-time based on traffic patterns have significantly reduced congestion and emissions in the city.

In addition to smart cities, Norway has been actively exploring the potential of blockchain technology to enhance transparency and security in public administration. The Blockchain for Public Services Initiative aims to integrate blockchain solutions into areas such as land registration, voting systems, and supply chain management. For instance, a pilot project in land registration uses blockchain to create immutable records of property transactions, reducing fraud and increasing trust in the land management process.

The National Digital Infrastructure Strategy highlights the government's investment in cutting-edge technologies to support the digital transformation of public services. This includes expanding high-speed broadband networks to support advanced ICT applications and investing in next-generation data centers that utilize AI for predictive maintenance and efficient resource management. The strategy also emphasizes the development of digital platforms that support interoperability and integration across various government systems, enabling seamless and efficient service delivery.

Furthermore, the government's Innovation and Technology Fund supports research and development projects focused on emerging ICT. This fund provides financial support to startups and research institutions working on innovative technologies with potential applications in the public sector. Recent projects funded by this initiative include advancements in machine learning for predictive analytics and the development of secure communication protocols using quantum encryption.

17. Finland

1. General Information

Area: **338,424 km2**

Population: **5,620,369**

Government Type: Parliamentary Republic

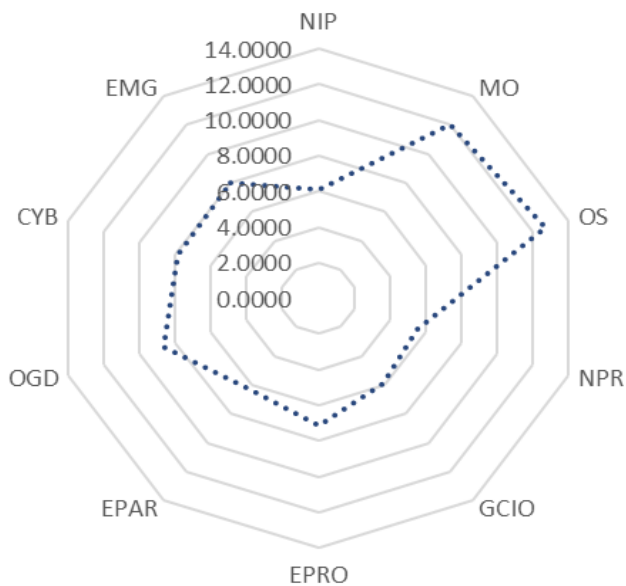2024 Growth Rate: **-0.2%**

GDP (IMF '24): **$308.06 Bn**

GDP Per Capita: **$54,840**

Internet User: **93%**

Wired (Fixed Broadband User) per 100 people: **35.3**

Wireless Broadband User per 100 people: **159**

2. Digital Government Development and new trends

3. Digital Government Development and new trends

3.1. The development

In 2024, Finland has further solidified its reputation as a leader in digital governance and innovation. The Finnish government's digitalization efforts are anchored in the Digital Finland Program, a strategic initiative designed to enhance public sector efficiency, transparency, and accessibility. This

program has facilitated the integration of advanced technologies into public services, making it easier for citizens to interact with the government and access essential services.

A notable achievement this year is the launch of the Finland Digital Hub, which serves as a centralized platform for accessing a broad range of government services and information. This digital hub represents a significant step towards creating a more user-friendly and integrated digital experience for Finnish citizens. By consolidating various services into a single platform, the government aims to streamline processes, reduce bureaucratic barriers, and improve overall service delivery.

Finland's digital progress is also reflected in its high rankings on international indices. The country was ranked 17th in the Waseda rankings in 2024, further emphasizing its global standing in digital governance. According to the Digital Economy and Society Index (DESI) 2024, Finland continues to excel in digital connectivity, skills, and public services. The country's emphasis on digital transformation has led to significant improvements in areas such as e-government services and digital inclusion, further solidifying Finland's position as a global leader in digital innovation.

3.2. New Trends

Finland's digital strategy for 2024 is guided by the Digital Finland Strategy 2025, which outlines the country's vision for leveraging digital technologies to drive economic growth, enhance public services, and foster innovation. The strategy emphasizes a comprehensive approach to digital transformation, focusing on the integration of emerging technologies and the development of a digital-first mindset across all sectors.

The National AI Strategy is a cornerstone of Finland's digital approach, aiming to harness the power of artificial intelligence to improve public services and drive innovation. This strategy includes the development of AI-powered tools for various applications, such as predictive analytics in healthcare, where AI algorithms are used to anticipate patient needs and optimize treatment plans. Additionally, AI is being integrated into administrative processes to automate routine tasks and enhance efficiency.

The Digital Infrastructure Enhancement Plan is another key component of Finland's digital strategy. This plan aims to expand high-speed internet access across the country, including rural and remote areas, to ensure that all citizens can benefit from digital services. Investments in 5G technology, fiber-optic networks, and next-generation data centers are central to this plan, with the goal of providing reliable and high-speed connectivity throughout Finland.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Finland's network infrastructure is well-prepared to support the country's digital ambitions, thanks to significant investments in upgrading and expanding its digital capabilities. The National Broadband Strategy is a key initiative aimed at achieving near-universal coverage with high-speed internet. By the end of 2024, Finland expects to have extensive 5G network coverage, enhancing connectivity and enabling the deployment of advanced technologies such as IoT and smart city solutions.

The Smart Infrastructure Development Program focuses on integrating advanced technologies into Finland's public infrastructure. This program includes the implementation of smart grids, intelligent transportation systems, and advanced telecommunications networks. For example, the deployment of smart meters and sensors in energy grids has improved the efficiency of energy distribution and management, while intelligent transportation systems have enhanced traffic flow and safety.

Additionally, Finland's commitment to digital infrastructure is reflected in the ongoing development of Next-Generation Data Centers, which leverage cutting-edge technologies for efficient resource management and improved data processing capabilities. These data centers play a crucial role in supporting the country's digital services and applications, ensuring that they operate smoothly and efficiently.

4.2. Management Optimization [MO]

This year, Finland earned the highest possible score in Management Optimization, showcasing its leading-edge strategies in optimizing management systems. Finland has implemented several initiatives to optimize management within the public sector, aiming to enhance efficiency, transparency, and service delivery. The Public Sector Digital Transformation Program focuses on modernizing administrative processes and adopting digital tools to streamline operations.

One significant initiative is the Digital Government Platform, which provides a unified system for managing public sector services and data. This platform integrates various government functions, enabling seamless coordination and reducing administrative overhead. For example, the platform has been used to streamline the processing of permits and licenses, making it easier for citizens and businesses to access these services.

The Government Data Management Framework is another key component of Finland's management optimization efforts. This framework provides guidelines and best practices for managing and utilizing government data effectively. It emphasizes the importance of data quality, security, and interoperability, ensuring that data is used efficiently to support decision-making and service delivery.

In addition, Finland has introduced the Digital Skills Development Program to enhance the capabilities of public sector employees. This program includes training and professional development opportunities to help government staff acquire the skills needed to navigate and utilize digital tools effectively. By investing in the digital skills of its workforce, Finland aims to improve the overall efficiency and effectiveness of its public sector operations.

4.3. Online Service [OS]

Finland has made significant advancements in online services, focusing on improving accessibility, usability, and integration. The Finland Digital Hub is a central platform that provides access to a wide range of government services, including tax filing, social security benefits, and healthcare services. This platform aims to create a more user-friendly and streamlined experience for citizens interacting with the government.

The e-Health Platform is a notable example of Finland's commitment to enhancing online services in the healthcare sector. This platform enables citizens to access their health records, schedule appointments, and receive telemedicine consultations online. The integration of AI and data analytics into the e-Health Platform has improved the efficiency of healthcare delivery and personalized patient care.

Additionally, the Online Business Services Portal provides a comprehensive suite of tools for businesses to manage administrative tasks, such as registering a company, filing tax returns, and applying for permits. This portal aims to reduce the bureaucratic burden on businesses and simplify the process of interacting with government agencies.

4.4. National Portal [NPR]

The Finland National Portal serves as a central access point for government services and information. Launched as part of the Finland Digital Hub, the portal consolidates various government services into a single, user-friendly platform. It provides citizens with easy access to essential services, including

healthcare, education, and social services. The portal's design emphasizes simplicity and accessibility, with features such as personalized dashboards, intuitive navigation, and responsive design. This ensures that users can quickly find and access the services they need, regardless of their digital literacy or device.

In addition to providing access to services, the National Portal also serves as a hub for information on government initiatives, policies, and events. It includes features such as news updates, public consultations, and interactive tools for engaging with government representatives. By centralizing access to information and services, the portal aims to enhance transparency and citizen engagement.

4.5. Government CIO [GCIO]

The role of the Government Chief Information Officer (GCIO) in Finland is crucial to driving the country's digital transformation efforts. The Office of the Government CIO is responsible for overseeing the implementation of digital strategies, coordinating IT projects, and ensuring alignment with national goals.

The GCIO plays a key role in setting strategic priorities for digital development, including the adoption of emerging technologies, the enhancement of digital infrastructure, and the optimization of public sector management. The office also provides guidance and support to government agencies in the implementation of digital initiatives, ensuring that projects are executed efficiently and effectively.

In 2024, the GCIO has been instrumental in advancing key projects such as the Finland Digital Hub and the National AI Strategy. The office works closely with other government departments, industry stakeholders, and academic institutions to drive innovation and achieve the country's digital objectives.

4.6. E-Government Promotion [EPRO]

Finland's approach to e-Government promotion focuses on increasing the adoption of digital services and enhancing public engagement. The Digital Finland Promotion Strategy aims to encourage the use of digital tools and platforms among citizens and businesses. The Finland Digital Services Campaign is an initiative to raise awareness about the benefits of digital services. This campaign includes outreach activities, informational materials, and training sessions to help citizens understand and utilize digital government services effectively. The Government Digital Services Award is another

initiative designed to recognize and promote best practices in e-government. This award highlights successful digital projects and innovations, encouraging the adoption of effective solutions across various public sector domains.

4.7. E-Participation [EPAR]

E-participation in Finland is a critical aspect of the country's digital strategy, aimed at enhancing citizen engagement and involvement in governance. The E-Participation Framework encourages the use of digital tools to facilitate public consultation, feedback, and collaboration.

The Finland Public Consultation Platform is a key component of this framework, providing an online space for citizens to participate in consultations on policy proposals and legislative changes. This platform allows users to access consultation documents, submit feedback, and engage in discussions with policymakers. For example, recent consultations have focused on topics such as environmental policies and urban development, enabling citizens to influence decisions that impact their communities.

Finland also promotes e-participation through Digital Democracy Tools, such as online voting systems and interactive platforms for engaging with elected representatives. The Finland Digital Voting System enables citizens to cast their votes securely online, increasing accessibility and convenience. The Interactive Citizen Engagement Portal provides a platform for citizens to engage with government officials, participate in town hall meetings, and contribute to public discussions.

To support e-participation, the government has implemented the Digital Literacy Initiative, which aims to increase public awareness and skills related to digital engagement. This initiative includes educational campaigns, workshops, and online resources to help citizens understand how to use digital tools and participate in the democratic process effectively.

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

Finnish DX relies on government digital services integration, with the Finland Digital Services Platform providing a single gateway. It streamlines user interactions by combining one interface of tax filings, social benefits, and administrative operations. Citizens may now access different government services without switching platforms, enhancing user experience and operational efficiency.

Public Sector Innovation Labs like Digital Innovation Lab Finland are vital to digital transformation. Government agencies, technology suppliers, and academic institutions work together to develop cutting-edge solutions in these laboratories. Recent developments include AI-powered chatbots for regular questions and predictive analytics tools for resource allocation. Such innovations improve service delivery and make Finland a digital governance leader. Digital Transformation Acceleration Program promotes public sector use of new technology. This initiative encourages digital innovation, public sector training, and technology pilots. Pilots investigating VR for public sector training and AR for citizen engagement are notable.

However, Finland's openness and public engagement approach relies on Open Government Data. The Open Data Finland Initiative promotes government data accessibility. Citizens, corporations, and academics may obtain government records on transportation, health, and environmental statistics via the Open Data Portal. The Finland Transport Data Hub delivers real-time data on public transportation, traffic, and infrastructure to improve decision-making and transportation innovation. Standardized formats, metadata quality, and data interoperability facilitate data accessibility and usability under the National Open Data Strategy. The Data Standards Development Project creates data format and API standards to make government data simpler to integrate and use across platforms. Public Sector Data Innovation Projects show open data in action. The Helsinki Smart City Data Platform uses open data to innovate traffic management and environmental monitoring. This platform lets developers construct real-time data-based apps to enhance municipal services and residents' quality of life.

4.9. Cyber Security [CYB]

Cyber security remains a top priority for Finland's digital strategy, with significant efforts dedicated to protecting public sector information and infrastructure. The National Cyber Security Strategy outlines Finland's approach to safeguarding digital assets and ensuring the resilience of critical infrastructure. The Cyber Security Centre plays a central role in monitoring and responding to cyber threats. This center provides threat intelligence, incident response support, and security advisories to government agencies and critical infrastructure operators. For example, it has been instrumental in addressing recent ransomware threats targeting public sector organizations.

Secure Digital Infrastructure Initiatives include the implementation of advanced security measures for government networks and data centers. This includes deploying encryption technologies, multi-factor

authentication, and intrusion detection systems to protect sensitive information and maintain the integrity of digital services.

Additionally, the Public Awareness Campaign aims to educate citizens and businesses about cyber security risks and best practices. This campaign includes resources on safe online behavior, recognizing phishing attempts, and securing personal information, contributing to a more informed and resilient digital community.

4.10. The use of Emerging ICT [EMG]

Finland is at the forefront of integrating emerging ICT into its public sector operations. The Emerging Technologies Strategy focuses on leveraging technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT) to enhance service delivery and innovation.

The Smart City Helsinki Project exemplifies the use of IoT and AI in urban management. This project involves deploying sensors and smart technologies to monitor and manage city services, such as traffic flow, energy use, and waste management. For instance, smart traffic lights adjust in real-time based on traffic conditions, improving traffic flow and reducing congestion. Blockchain Technology is being explored for applications such as secure digital identities and transparent public records. The Finland Blockchain Initiative aims to pilot blockchain-based solutions for enhancing transparency and security in public services, such as land registration and voting systems.

Finally, the AI Innovation Lab supports research and development in AI applications for public sector use. This lab collaborates with academic institutions and industry partners to advance AI technologies and explore new ways to apply them in areas such as healthcare, transportation, and administrative processes.

18. Thailand

1. General Information

Area: **513,120 km2**

Population: **71,655,697**

Government Type: Constitutional Monarchy

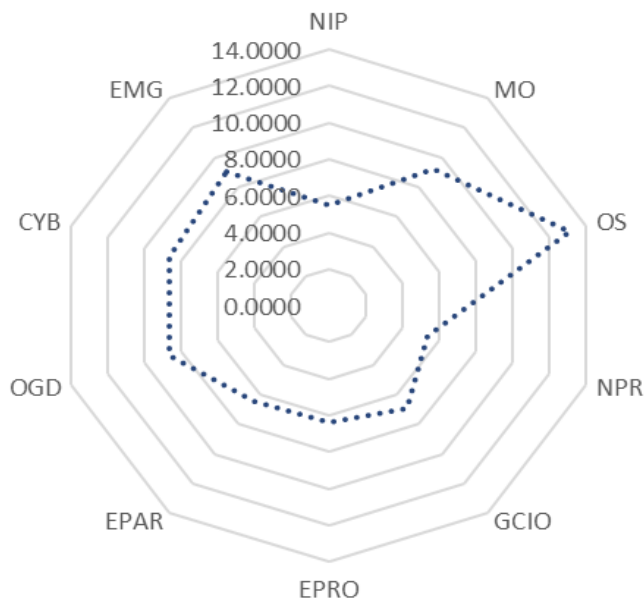2024 Growth Rate: **2.8%**

GDP (IMF '24): **$548.89 Bn**

GDP Per Capita: **$7,659**

Internet User: **88%**

Wired (Fixed Broadband User) per 100 people: **16**

Wireless Broadband User per 100 people: **124**

2. Digital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development

Thailand's government Digitalization initiatives in 2024 are characterized by substantial progress in enhancing its digital infrastructure, public services, and citizen participation. The Thailand 4.0 project, implemented by the Thai government, seeks to convert the nation into a digital economy by encouraging innovation, enhancing productivity, and advancing sustainable development. This conceptualization of a digital future embodies a more extensive endeavor to shift from an economy centered on manufacturing to one that flourishes via innovation, technology, and creativity.

Thailand's national dedication to digital transformation has garnered international recognition, as shown by its 18th place in the Waseda rankings for 2024. This very significant rating underscores the country's achievements in expanding digital services, enhancing cybersecurity, and promoting digital inclusiveness. Thailand has successfully integrated digital technologies into several sectors, improving governance, transparency, and efficiency by updating administrative procedures and strengthening e-participation methodologies. The government's partnership with private technology companies and international organizations has expedited the implementation of emerging technologies, like artificial intelligence, 5G, and blockchain, that have improved public services and stimulated innovation across the economy.

Thailand's commitment to cultivating a digital government is well shown by its efforts to enhance its digital identification systems, broaden online service provision, and advocate for accessible government data. Through these endeavors, Thailand is striving to establish a more comprehensive digital society, guaranteeing that individuals and enterprises may effortlessly interact with the government via digital channels.

3.2. New Trends

The Digital Government Plan 2020–2024 is the foundation of Thailand's digitalization strategy in 2024. It delineates the primary objectives for the transformation of public administration and service delivery. The plan is founded on five fundamental principles: cybersecurity, citizen-centered government, integrated public services, data-driven decision-making, and the cultivation of digital talent. These objectives are consistent with the overarching Thailand 4.0 initiative, which underscores the importance of digital innovation as a critical factor in the advancement of economic and social development.

The government is currently working to advance its National Digital Economy and Society Development Plan in 2024. The plan is designed to enhance digital infrastructure, promote digital literacy, and increase the adoption of ICT in both public and private sectors. The objective of the strategy is to enhance the quality of life for Thai citizens and increase productivity through targeted investments in 5G networks, cloud computing, and smart city initiatives. The government has also prioritized policies that promote the development of e-commerce, fintech, and digital entrepreneurship, which are considered essential components of Thailand's future economy.

Additionally, the government's digital strategy encompasses substantial initiatives to advance e-government services throughout the nation, with a particular emphasis on rural and underserved regions. The Pracharat Internet Project is a critical component of this strategy, as it is designed to ensure that all citizens can access high-speed internet in remote villages, thereby ensuring that all citizens can benefit from the government's digital services. Furthermore, the Thai government has formed partnerships with international organizations and regional bodies, including ASEAN, to facilitate the development of cross-border digital initiatives, cybersecurity measures, and digital trade agreements.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Thailand's network infrastructure has seen major improvements in 2024, particularly in the deployment of 5G technology and the expansion of broadband internet access. The country has made significant progress in implementing its 5G Master Plan, which aims to position Thailand as a leader in the ASEAN region for 5G connectivity. With nationwide 5G coverage expected by the end of 2024, the network is set to support various sectors, including healthcare, agriculture, and manufacturing, through IoT solutions and AI-powered applications.

Broadband penetration has also improved, with Thailand's Pracharat Internet Project extending high-speed internet to more rural areas. By providing affordable and reliable internet access, the government aims to reduce the digital divide between urban and rural populations. In 2024, more than 90% of Thai households have access to the internet, ensuring that citizens across the country can participate in the digital economy and access online government services.

Thailand's efforts to upgrade its network infrastructure are also supported by strategic investments in data centers and cloud computing capabilities. The government has been working to strengthen its digital infrastructure to support the increasing demand for digital services, data storage, and processing. The expansion of cloud infrastructure is enabling more efficient government operations, as well as improving data-sharing capabilities between government agencies, enhancing service delivery, and promoting more data-driven policymaking.

4.2. Management Optimization [MO]

In 2024, Thailand's digital government initiatives have focused on optimizing the management of public services by leveraging digital tools and data analytics. One of the key components of this effort is the integration of various government services through a centralized digital platform, allowing citizens and businesses to interact with different government agencies more efficiently. The development of the GovChannel portal, which consolidates multiple government services into a single platform, is an example of how Thailand is streamlining administrative processes.

Thailand's government is also implementing data-driven decision-making practices to improve the efficiency and effectiveness of its public services. By utilizing big data analytics and AI, government agencies can analyze patterns and trends in citizen behavior, enabling more proactive and responsive governance. For instance, the Ministry of Finance has employed data analytics to enhance tax collection processes and identify potential areas of tax evasion, leading to more accurate and equitable revenue generation.

The government is also optimizing internal management through digital tools that enhance transparency, accountability, and resource allocation. Initiatives such as the e-Budgeting System and e-Procurement Platform have been rolled out across government agencies to ensure that public funds are managed more effectively and that procurement processes are transparent and competitive. These tools are helping Thailand's public sector operate more efficiently, reduce costs, and improve the delivery of services to citizens.

4.3. Online Service [OS]

In 2024, Thailand has made significant progress in expanding the availability and quality of online government services, providing citizens and businesses with easier access to a wide range of public services. The GovChannel platform is central to this effort, offering services such as online tax filing,

business registration, and social security management through a single digital portal. Citizens can now complete administrative tasks online without needing to visit government offices, reducing bureaucratic hurdles and saving time.

Thailand's National e-Payment System is another major milestone in its digitalization journey, enabling citizens to make secure digital payments for government services, taxes, and utilities. The government has partnered with banks and fintech companies to enhance the accessibility and security of digital transactions, particularly in rural areas where access to banking services may be limited. The expansion of e-payment services has increased financial inclusion and streamlined interactions between citizens and the government.

Healthcare services are also benefiting from digital transformation. The Smart Health Platform enables citizens to access medical records, schedule appointments, and receive telemedicine services online. This is especially important in 2024 as Thailand continues to address the healthcare needs of its aging population. By integrating online healthcare services with the national health insurance system, the government is improving access to healthcare and enhancing the efficiency of the healthcare system overall.

4.4. National Portal [NPR]

Thailand's national government portal, GovChannel, serves as a key hub for e-government services in 2024, providing citizens, businesses, and foreign residents with a centralized platform for interacting with the government. The portal offers over 200 e-services across various departments, including tax filings, social security services, business licensing, and land registration. It is designed to simplify the user experience by allowing citizens to access multiple services through a single account, reducing the need for in-person visits and paperwork.

In 2024, Thailand continues to enhance the accessibility and functionality of GovChannel. The portal has been optimized for mobile access, reflecting the high smartphone penetration in the country. Additionally, the government has introduced new AI-powered chatbots and virtual assistants to guide users through the platform, providing real-time support for navigating services and resolving issues. These enhancements are part of Thailand's efforts to make digital government services more user-friendly and efficient.

Transparency is another key focus of Thailand's national portal. Through the Open Government Data section of the portal, citizens can access a wide range of government datasets, including economic statistics, environmental reports, and public spending records. This open data initiative supports Thailand's broader goals of promoting transparency, encouraging public participation, and fostering innovation by allowing developers to create new applications and services based on government data.

4.5. Government CIO [GCIO]

Thailand's approach to government digitalization is supported by the role of the Government Chief Information Officer (GCIO), who is responsible for driving digital transformation initiatives across public sector institutions. In 2024, the GCIO continues to play a pivotal role in implementing Thailand's digital government strategy, ensuring that public sector ICT projects are aligned with national priorities, such as the Thailand 4.0 vision and the Digital Government Plan 2020–2024. The GCIO is instrumental in coordinating efforts between different ministries, local governments, and private sector partners to foster an integrated and coherent approach to digital transformation.

The GCIO also oversees the implementation of policies that promote the use of emerging technologies such as artificial intelligence (AI), blockchain, and data analytics across government agencies. In 2024, these efforts are further enhanced by the creation of dedicated digital transformation offices within key ministries. These offices, under the guidance of the GCIO, are tasked with identifying areas for digital innovation, managing digital projects, and ensuring that digital solutions are efficiently deployed to improve public services. The GCIO has been actively involved in capacity-building programs aimed at enhancing the digital literacy of public servants, thus empowering them to leverage new technologies effectively.

Moreover, the GCIO is a key advocate for cybersecurity resilience within the public sector. With the increasing reliance on digital platforms and the rising threat of cyberattacks, the GCIO is responsible for ensuring that robust cybersecurity measures are in place across all government institutions. In 2024, the GCIO's office continues to strengthen government-wide cybersecurity protocols, promoting a secure digital environment that protects sensitive government data and ensures the integrity of public services.

4.6. E-Government Promotion [EPRO]

Thailand's promotion of e-government in 2024 is characterized by a broad push to increase the accessibility and efficiency of government services through digital platforms. Central to this effort is the Digital Government Development Agency (DGA), which has spearheaded initiatives to make digital services more accessible, particularly for rural and underserved populations. The agency has rolled out awareness campaigns and training programs aimed at boosting digital literacy, ensuring that all citizens are equipped to engage with e-government services regardless of their technical skills or geographic location.

One of the primary goals of e-government promotion in 2024 is to expand the reach of online services to all regions of Thailand. The government's Smart Village initiative exemplifies this effort, integrating digital tools into rural development programs to enhance local governance and provide communities with better access to public services. The program includes the deployment of internet-connected kiosks in remote areas, which allow residents to access government services such as business registrations, land records, and social welfare applications without needing to travel to urban centers.

In addition to expanding service access, Thailand is focusing on improving the quality of e-government interactions. The GovChannel platform continues to evolve in 2024, with the addition of personalized services that cater to the specific needs of different user groups, such as small business owners, elderly citizens, and students. The government is also utilizing data analytics to monitor the performance of its digital services, allowing for continuous improvements in service delivery and user experience. These efforts are making Thailand a regional leader in e-government, as the country demonstrates the tangible benefits of digital transformation for citizens and businesses alike.

4.7. E-Participation [EPAR]

E-participation in Thailand has taken center stage in 2024 as the government seeks to foster greater civic engagement and collaboration with its citizens. The government has embraced digital platforms to facilitate public input on key policy issues, with the aim of creating a more transparent and responsive government. The Thai National e-Consultation Platform is one such initiative, allowing citizens to provide feedback on proposed laws, policies, and public projects. This platform serves as a channel for dialogue between the government and its citizens, ensuring that public opinions are considered in decision-making processes.

In 2024, Thailand continues to expand the scope of its e-participation initiatives, making it easier for citizens to engage with the government on a variety of issues. The government has introduced online voting mechanisms for local referendums, enabling greater participation in the democratic process. Social media has also become a key tool for government agencies to communicate with the public, gather feedback, and respond to concerns in real-time. This two-way communication has enhanced government transparency and accountability, as citizens are empowered to voice their opinions and hold public officials accountable for their actions.

To further strengthen e-participation, the Thai government is integrating artificial intelligence and data analytics into its engagement platforms. These technologies allow for more efficient analysis of public feedback, helping the government identify trends and address issues more effectively. By leveraging digital tools, the Thai government is fostering a more inclusive and participatory governance model that empowers citizens to play an active role in shaping public policy.

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

Thailand's digital transformation efforts in 2024 are closely tied to its push for open government data and the broader use of digital tools across all sectors of the economy. The government recognizes that open data is a powerful driver of innovation, transparency, and public trust. As such, the Open Government Data Platform, launched in previous years, continues to be a central element of Thailand's digital strategy. By 2024, the platform hosts thousands of datasets from various government departments, covering areas such as transportation, healthcare, education, and public finance.

Thailand's Digital Transformation [DX] Strategy in 2024 places a strong emphasis on fostering collaboration between the public and private sectors to drive innovation. Through public-private partnerships, the government is encouraging the development of new digital solutions that leverage open data to improve public services and stimulate economic growth. Startups and tech companies are using open government data to develop apps and services that address real-world problems, such as traffic congestion, disaster response, and public health monitoring. These initiatives are contributing to Thailand's broader goal of becoming a regional digital innovation hub.

Thailand's commitment to digital transformation is also evident in its efforts to streamline internal government processes. The Digital Service Framework, introduced as part of the broader DX strategy,

promotes the use of cloud-based services, AI, and automation in government operations. These technologies are improving the efficiency of government workflows, reducing bureaucratic delays, and enabling more data-driven decision-making. By embracing digital transformation, the Thai government is enhancing the quality of public services, fostering innovation, and building a more resilient digital economy.

4.9. Cyber Security [CYB]

As Thailand's reliance on digital technologies grows, so does the need for robust cybersecurity measures. In 2024, the Thai government is prioritizing cybersecurity through its National Cybersecurity Strategy, which seeks to protect critical infrastructure, government systems, and citizens' data from cyber threats. The government has established the Thai Cybersecurity Agency (TCSA) to coordinate national efforts to safeguard Thailand's digital infrastructure. The agency is responsible for monitoring cyber threats, responding to incidents, and enforcing cybersecurity regulations across both the public and private sectors.

One of the key focuses in 2024 is enhancing Thailand's capacity to prevent and respond to cyberattacks. The government is investing in cybersecurity training programs for public officials and launching public awareness campaigns to promote safe online practices among citizens. Thailand has also forged partnerships with international cybersecurity organizations to share knowledge, intelligence, and best practices for dealing with emerging cyber threats.

To bolster the country's cybersecurity infrastructure, the government is implementing advanced technologies such as AI and blockchain to enhance security protocols. AI-powered systems are being used to detect and mitigate cyber threats in real time, while blockchain is being explored for securing government records and transactions. In 2024, these efforts are helping to create a more secure digital environment, ensuring that Thailand can continue to expand its digital economy and public services without compromising on security.

4.10. The use of Emerging ICT [EMG]

Thailand is becoming a leader in the development and deployment of new ICT technologies in 2024. Thailand's economy is being transformed and the country is being established as a digital innovation center in the ASEAN region as a result of its investments in 5G, artificial intelligence (AI), blockchain, and the Internet of Things (IoT). The government's Thailand 4.0 initiative is continuing to promote

the incorporation of emergent technologies in a variety of sectors, such as healthcare, manufacturing, and agriculture. This has resulted in increased productivity and new opportunities for growth.

Thailand is also making substantial progress in the field of artificial intelligence. The AI Development Plan of the government is promoting AI research and innovation by fostering collaboration among academia, industry, and government. In sectors including finance, education, and public services, artificial intelligence (AI) applications are being implemented to enhance efficiency and generate novel economic prospects. In 2024, AI is also playing a critical role in Thailand's endeavors to resolve social challenges, including environmental sustainability and healthcare access in rural areas.

In Thailand, blockchain technology is experiencing significant growth, particularly in the finance and supply chain sectors. The government is investigating the potential of blockchain technology to enhance the security and transparency of public procurement, while private sector companies are incorporating it to improve the efficiency and traceability of logistics. Thailand is fostering a more competitive and resilient digital future by embracing emergent ICT in 2024, which is propelling digital transformation throughout the economy.

19. Switzerland

1. General Information

Area: **41,284 km2**

Population: **8,935,858**

Government Type: Federal Republic

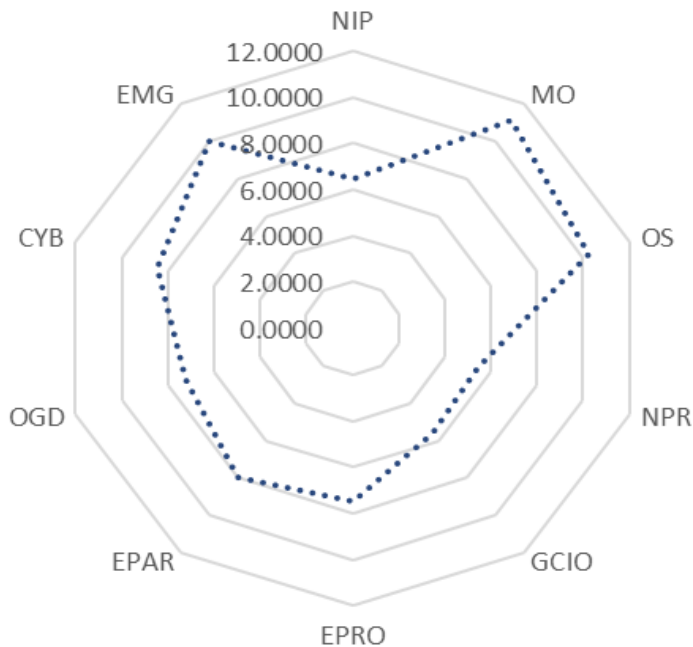2024 Growth Rate: **1.3%**

GDP (IMF '24): **$938.46 Bn**

GDP Per Capita: **$105,185**

Internet User: **95.6%**

Wired (Fixed Broadband User) per 100 people: **48.8**

Wireless Broadband User per 100 people: **106**

2. Digital Government Overview in Country

3. Digital Government Development and new trends

3.1. The development:

Switzerland's government digitalization efforts in 2024 have been characterized by a robust commitment to modernizing public administration through digital tools and enhancing accessibility for citizens and businesses. The Digital Switzerland Strategy 2024 has placed a significant emphasis on fostering a resilient, inclusive digital society while maintaining the country's leadership in innovation and technology.

One of the key highlights of Switzerland's digital journey has been the implementation of secure and efficient e-government services across various sectors. The country continues to focus on simplifying administrative processes, reducing bureaucratic hurdles, and providing user-friendly digital platforms for citizens. For example, the introduction of the SwissID platform has been a major milestone, enabling secure online identification for access to public services, further streamlining interactions between citizens and government agencies.

In 2024, Switzerland has also enhanced its commitment to sustainability through digitalization. The country has integrated digital technologies to promote smart infrastructure, green energy management, and sustainable urban development. These efforts underscore Switzerland's dual focus on both technological advancement and environmental responsibility. Additionally, Switzerland's digital progress is reflected in its international recognition, with the country being ranked 19th in the Waseda rankings in 2024, highlighting its continued leadership in digital governance.

3.2.New Trends

The Digital Switzerland Strategy 2024 outlines Switzerland's comprehensive approach to fostering digital transformation in government. This strategy is anchored in four main pillars: connectivity, innovation, trust, and international collaboration. It focuses on ensuring high-quality digital infrastructure, supporting innovation ecosystems, and building a secure and trustworthy digital environment for citizens and businesses.

Key goals of the strategy include enhancing broadband access across the country to bridge the digital divide between urban and rural areas and providing incentives for the adoption of emerging technologies such as artificial intelligence (AI) and blockchain. For instance, the government has invested heavily in AI applications for public services, such as predictive analytics in healthcare and automated administrative processes, which has led to improved service delivery and cost reductions.

Additionally, Switzerland continues to strengthen its global digital standing through partnerships with international organizations and participation in global digital governance forums. These collaborations are designed to position Switzerland as a leader in developing ethical guidelines for emerging technologies, such as AI and digital privacy standards.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Switzerland has made significant strides in ensuring robust network infrastructure to support its digitalization goals. The rollout of 5G technology is one of the major steps taken to enhance connectivity, enabling faster data transmission and supporting emerging applications such as the Internet of Things (IoT), autonomous systems, and smart city initiatives.

By 2024, the Swiss government aims to ensure that 98% of the population has access to high-speed broadband, including those in remote and mountainous regions. This nationwide broadband strategy is supported by both public and private sector investments, with a focus on fiber-optic networks. For example, Swisscom, the leading telecommunications provider in Switzerland, has accelerated its fiber-optic expansion plans, aiming to cover 60% of Swiss households with fiber connectivity by 2025. Switzerland is also investing in enhancing cybersecurity measures for its digital infrastructure. The Swiss National Cyber Security Centre (NCSC) plays a pivotal role in securing critical infrastructure, monitoring cyber threats, and supporting the government's preparedness against potential cyberattacks, which is crucial as the country expands its digital services.

4.2. Management Optimization [MO]

One of Switzerland's key approaches to digital transformation in government is through the optimization of public sector management. This involves reengineering administrative processes and integrating digital tools to increase efficiency, reduce redundancy, and provide better services to citizens. The Swiss government has been deploying Enterprise Resource Planning (ERP) systems across multiple federal agencies to streamline operations and improve data management. The ERP systems facilitate the coordination of various functions such as finance, human resources, procurement, and logistics, ensuring that these services are more integrated and effective.

In 2024, the Swiss government also continues to push for the digitalization of public procurement through the SIMAP platform, which allows for more transparent and efficient tendering processes.

This system enables federal and cantonal authorities to manage public tenders digitally, improving the speed and transparency of procurement processes.

4.3. Online Service [OS]

Switzerland has made considerable progress in providing digital public services that are easily accessible to citizens and businesses. The eGovernment Switzerland program has been a cornerstone of this effort, offering a wide range of online services, from tax filing to business registration.

One notable service is the Online Tax Filing System, which allows citizens to file taxes digitally, reducing the paperwork burden and enhancing efficiency. In 2024, this system has seen further integration with other government services, such as income verification and social security, enabling seamless data sharing and reducing errors. Switzerland also offers e-health services, allowing patients to access their medical records, schedule appointments, and communicate with healthcare providers online. This has proven particularly valuable in rural areas, where access to healthcare services is more limited.

4.4. National Portal [NPR]

Switzerland's national portal has seen significant upgrades in 2024 to ensure a more unified and streamlined digital experience for its citizens. The ch.ch portal serves as a one-stop-shop for accessing all federal, cantonal, and municipal services, providing a comprehensive range of online services. The portal has been designed to improve accessibility, offering multilingual support, and ensuring that citizens can navigate the site easily across devices. This user-friendly design prioritizes inclusivity, enabling access for people with disabilities through compliance with Web Content Accessibility Guidelines (WCAG).

The 2024 upgrade of the portal has also incorporated artificial intelligence-powered chatbots that assist users in finding relevant information and completing administrative tasks. These chatbots are designed to provide 24/7 support, helping users navigate government processes, such as applying for permits, registering businesses, and accessing health services. In addition, the portal integrates with the SwissID platform, allowing citizens to securely log in to various services with a single identity verification, making the entire digital experience more seamless and secure.

Beyond functionality, the Swiss government has prioritized the protection of user data on the national portal. Through encryption protocols and privacy-by-design frameworks, citizens can trust that their personal information is secure. This trust has been critical in increasing citizen participation in e-government services, contributing to the success of Switzerland's digital transformation.

4.5. Government CIO [GCIO]

In Switzerland, the Government CIO (Chief Information Officer) role has grown increasingly vital as digitalization becomes more central to public sector operations. The Federal CIO, part of the Federal Department of Finance, oversees the implementation of IT and digital strategies across all federal agencies. This includes ensuring the alignment of IT services with the broader goals of the Digital Switzerland Strategy 2024, which focuses on enhancing the digital infrastructure, cyber resilience, and public service delivery.

One of the key initiatives led by the Government CIO in 2024 is the consolidation of the government's IT infrastructure to promote cost-efficiency and security. By transitioning to cloud-based solutions, the government has improved data management, disaster recovery, and scalability of digital services. Additionally, the Government CIO has championed the use of open-source software across public institutions, reducing dependency on proprietary systems and fostering a more transparent and collaborative environment for digital development.

The Government CIO also plays a critical role in fostering public-private partnerships, particularly in areas of emerging technologies like AI and blockchain. In 2024, the Government CIO has been instrumental in launching innovation labs that bring together government, academia, and industry to experiment with and develop new solutions aimed at improving public service delivery.

4.6. E-Government Promotion [EPRO]

Switzerland has consistently promoted e-government initiatives as a means to enhance public sector efficiency and citizen engagement. In 2024, the Swiss E-Government Action Plan is expanded to include new digital services aimed at reducing administrative burdens for both individuals and businesses. These efforts are part of a broader government push to make Switzerland one of the top countries in digital public administration.

One standout initiative in 2024 has been the digitization of Switzerland's tax system. Through online portals and apps, citizens can now file their taxes, receive updates, and track refunds in real-time. This system, integrated with the SwissID platform, has made tax filing simpler and faster, significantly reducing the paperwork required from both individuals and tax authorities. Additionally, the digitization of business registration processes has cut down the time it takes to start a new business, supporting the growth of Switzerland's entrepreneurial ecosystem.

Furthermore, Switzerland has actively promoted cross-border e-government cooperation in the European region. Collaborations with neighboring countries in the EU have led to the adoption of interoperable systems, making it easier for businesses operating across borders to navigate regulatory and administrative requirements. These initiatives have reinforced Switzerland's role as a digital pioneer in Europe, ensuring that its public services are both innovative and competitive on the global stage.

4.7. E-Participation [EPAR]

E-participation has become a cornerstone of Switzerland's digital democracy in 2024. Switzerland, Denmark, and the UK all scored highest in E-Government Participation, highlighting their outstanding achievements in fostering digital citizen engagement. The Swiss government has developed numerous digital platforms to enhance citizen engagement and ensure that the public has a direct line to decision-making processes. These platforms include online consultation portals, where citizens can submit feedback on proposed legislation and public policies. This participatory approach fosters a more inclusive and transparent governance model.

A key development in 2024 is the expansion of e-voting. Several Swiss cantons now offer e-voting as a secure and convenient option for Swiss citizens, particularly those living abroad. In recent trials, e-voting systems have been refined to meet stringent security requirements, with blockchain technology playing a critical role in ensuring the integrity and transparency of the voting process. This technology has bolstered trust in e-voting systems and increased voter turnout, particularly among younger citizens.

Moreover, Switzerland has taken steps to actively involve its citizens in digital policymaking through crowdsourcing initiatives. For instance, the government has launched online platforms where citizens can propose ideas for improving public services or developing new digital projects. These ideas are

then evaluated by experts and may be implemented by relevant government agencies. This approach has empowered citizens to have a say in the future direction of Switzerland's digital landscape and fostered a more engaged and active society.

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." In an effort 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.

Many 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 particular 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

Switzerland's commitment to digital transformation (DX) in 2024 is reflected in its efforts to integrate cutting-edge technologies across government operations. DX initiatives focus on improving service delivery, increasing efficiency, and fostering a data-driven culture within public administration. The Swiss government has placed significant emphasis on automation, artificial intelligence, and big data analytics to optimize decision-making processes and deliver more personalized services to its citizens.

4.9 Cybersecurity

A cornerstone of this progress is the National Cybersecurity Strategy (NCS), which outlines objectives and measures to protect the nation's digital infrastructure and emphasizes the importance of international cooperation in addressing cyber threats. The Federal Council adopted the updated Digital Switzerland Strategy for 2024 on December 8, 2023. This strategy serves as a framework for government action on digitalization, focusing on areas such as cybersecurity, the regulation of artificial intelligence systems, and the development of electronic interfaces (APIs). It aims to ensure that Switzerland fully leverages the potential of digitalization while maintaining robust security measures.

In response to the evolving cyber threat landscape, the Swiss Federal Council decided on November 8, 2023, that the new Information Security Act (ISA) and its four implementing ordinances would enter into force on January 1, 2024. The ISA consolidates the legal foundations for protecting federal information and IT resources, establishing uniform minimum information security requirements for all federal authorities and associated organizations, in line with international standards. These initiatives reflect Switzerland's proactive approach to integrating cybersecurity into its digitalization agenda, ensuring that technological advancements are accompanied by robust security frameworks to protect national interests and public trust.

Additionally, the government has made strides in ensuring that data is made available in machine-readable formats, facilitating its use by developers and analysts. This focus on cyber security aligns with Switzerland's broader strategy of combating cyberattack through collaboration between the public sector, private companies, and academia, solidifying its position as a leader in digital government transformation.

4.10   The use of Emerging ICT [EMG]

Switzerland has embraced emerging ICT (Information and Communication Technologies) as a core part of its digital transformation in 2024. The Swiss government has been a proponent of leveraging technologies such as artificial intelligence (AI), blockchain, and quantum computing to enhance public services and drive economic growth. The Swiss Federal Innovation Agency (Innosuisse) has been at the forefront of funding and supporting projects that explore the potential of these technologies in sectors ranging from finance to healthcare.

One area where Switzerland has been particularly active is the application of blockchain technology in public services. In 2024, several cantons have piloted blockchain-based platforms for land registry, allowing for secure, transparent, and immutable property transactions. Additionally, AI-driven solutions have been implemented in public health and transportation, providing more efficient service delivery and real-time data analysis that informs government decisions.

Switzerland's focus on fostering innovation in emerging ICT is also evident in its approach to supporting tech startups. The country has established multiple innovation hubs and accelerators that bring together entrepreneurs, researchers, and government officials to collaborate on cutting-edge projects. These hubs are not only advancing technological innovation but also ensuring that Switzerland remains a global leader in the development and application of next-generation digital technologies.

20. Taiwan

1. General Information

Area: **36,193 km²**

Population: **23,184,788**

Government Type: Semi-Presidential Republic

2024 Growth Rate: **3.7%**

GDP (IMF '24): **$802.96 Bn**

GDP Per Capita: **$34,589**

Internet User: **86.3%**

Wired (Fixed Broadband User) per 100 people: **29.3**

Wireless Broadband User per 100 people: **122**

2. Digital Government Overview in Country
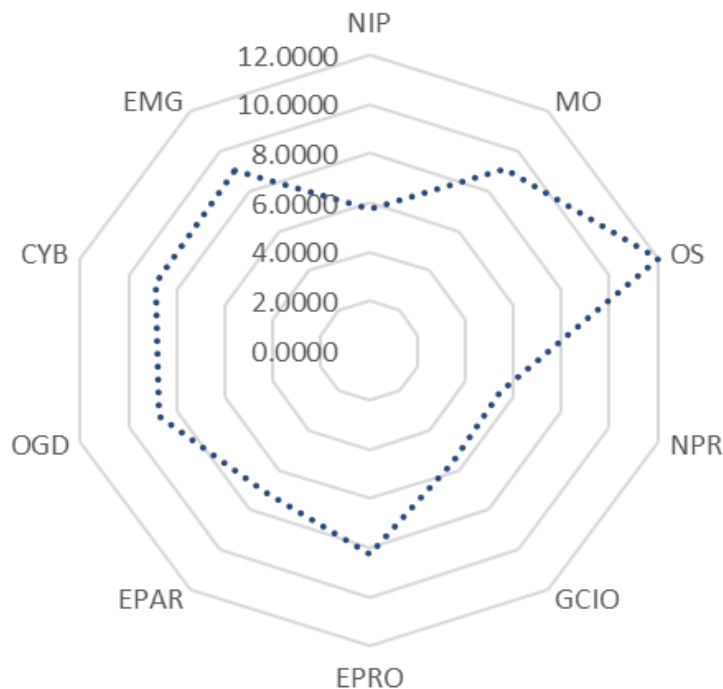
3. Digital Government Development and new trends

3.1. The development

In 2024, Taiwan made substantial progress in the digitalization of its government, thereby establishing itself as a leader in digital governance in the Asia-Pacific region. The Digital Nation and Innovative

Economic Development Program (DIGI+) is a central component of the Taiwanese government's strategy to transition to a fully digital society, and its ongoing dedication to digital innovation is evidenced in its continuous implementation. This initiative emphasizes the modernization of public administration by incorporating state-of-the-art technologies, including blockchain, artificial intelligence (AI), and big data.

The emphasis on the enhancement of public service delivery through digital means is a noteworthy aspect of Taiwan's digitalization endeavors in 2024. The government of Taiwan has effectively increased the accessibility of online public services, allowing citizens to access government services more efficiently and conveniently from their residences or mobile devices. For instance, the incorporation of digital platforms for healthcare, education, and taxation has simplified these services, thereby reducing the necessity for in-person interactions and mitigating bureaucratic delays. By centralizing access to a variety of e-government applications, the Taiwan Cloud Marketplace, a one-stop portal for public services, has improved the user experience.

Furthermore, Taiwan has implemented proactive measures to integrate environmental sustainability into its digital transformation initiatives. The utilization of smart technologies in urban management, particularly in the areas of energy conservation and waste management, has facilitated Taiwan's overarching objective of mitigating carbon emissions and addressing climate change. Taiwan has achieved international recognition for its environmental leadership as a result of these digital initiatives, which are consistent with the country's dedication to the United Nations' Sustainable Development Goals (SDGs"). This year, the nation was ranked in the 20th place in the Waseda rankings, which further solidified its status as a global authority in digital governance.

3.2. New trends

Taiwan's digital transformation strategy in 2024 is driven by the DIGI+ 2024 Plan, a comprehensive framework designed to enhance the country's digital infrastructure, foster innovation, and bolster cyber resilience. The DIGI+ plan focuses on transforming Taiwan into a "smart nation" by leveraging digital technologies to improve public services, drive economic growth, and ensure social equity. Central to this strategy is the Smart Government initiative, which promotes the use of AI, the Internet of Things (IoT), and big data analytics to streamline government operations and make them more efficient and responsive to the needs of citizens.

One of the key pillars of Taiwan's digital strategy is the expansion of its 5G network, which plays a crucial role in facilitating the development of smart cities across the island. The government has prioritized the extension of 5G coverage to ensure that all citizens, including those in rural and underserved areas, have access to high-speed internet. This expanded connectivity is essential for enabling digital inclusion and supporting innovations in various sectors such as healthcare, education, transportation, and public safety. For example, the Taoyuan Aerotropolis, Taiwan's flagship smart city project, leverages 5G technology to enhance urban planning, optimize traffic flow, and improve emergency response systems, making it a model for future smart city development in Taiwan.

In addition to its domestic initiatives, Taiwan has actively pursued international cooperation to enhance its digital capabilities. As part of the Asia Silicon Valley Development Plan, the government has promoted collaboration between Taiwanese tech companies, research institutions, and international partners to drive innovation in emerging technologies such as AI, robotics, and cloud computing. This plan not only strengthens Taiwan's position as a hub for technological innovation but also helps the country stay competitive in the global digital economy.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Taiwan has made remarkable progress in strengthening its digital infrastructure, positioning itself as one of the most connected nations in the world. In 2024, the country continues to invest heavily in its telecommunications infrastructure, with a particular focus on the expansion of 5G networks. Taiwan's 5G rollout, which began in 2020, has now reached over 90% of the population, providing citizens with access to ultra-fast internet speeds and enabling the development of smart city technologies. This expansion is part of the government's broader strategy to create a more digitally connected society and foster the growth of Taiwan's high-tech industries.

In addition to 5G, Taiwan has made significant advancements in its fiber-optic broadband network, ensuring that even rural areas have access to high-speed internet. The National Broadband Plan aims to provide universal access to broadband services by the end of 2024, with minimum download speeds of 100 Mbps across the island. This level of connectivity is crucial for supporting the digital economy and enabling remote work, online education, telemedicine, and other digital services that have become increasingly important in the post-pandemic world.

Taiwan's preparedness for the future also includes its commitment to developing smart infrastructure. The government has invested in upgrading its power grids, transportation networks, and public utilities to support the integration of IoT devices and smart sensors. These upgrades are key to improving energy efficiency, reducing maintenance costs, and enhancing the overall quality of life for Taiwanese citizens. As part of this effort, the government has partnered with private companies to pilot smart transportation systems, such as autonomous buses and AI-powered traffic management systems, in major cities like Taipei and Kaohsiung.

4.2. Management Optimization [MO]

In 2024, Taiwan's government has placed a strong emphasis on optimizing management processes within public administration, with the goal of enhancing operational efficiency and reducing redundancies. This has been achieved through the implementation of digital tools and the re-engineering of traditional workflows to align with modern digital practices. A key component of this initiative is the Government Service Transformation Program, which seeks to digitize core government services and promote the use of e-signatures, cloud-based document management, and automation in routine administrative tasks.

By embracing digital technologies, Taiwan has been able to reduce processing times for various government services, such as permit applications, business registrations, and social welfare claims. For example, the Smart Permit System, which automates the process of issuing permits and licenses, has reduced approval times from weeks to just a few days, benefiting both businesses and individual citizens. This system also integrates with the Taiwan Cloud Marketplace, allowing government agencies to share data securely and collaborate more effectively.

Moreover, the Taiwanese government has introduced performance management systems that utilize big data and AI to monitor the effectiveness of public programs and initiatives in real-time. This data-driven approach allows for more informed decision-making and ensures that government resources are allocated efficiently. For instance, the Taiwan Performance Dashboard tracks key performance indicators (KPIs) across various government departments, providing insights that help improve service delivery and identify areas for further optimization. This focus on management optimization has been instrumental in making Taiwan's government more agile and responsive to the changing needs of its citizens.

4.3. Online Service [OS]

Taiwan has made significant progress in expanding its online services in 2024, offering a wide range of digital platforms that make it easier for citizens to access government services from the comfort of their homes. The Taiwan Cloud Marketplace is the centerpiece of the government's digital service strategy, serving as a comprehensive platform that integrates services from various government agencies. Through this platform, citizens can apply for permits, pay taxes, access healthcare records, and even participate in online consultations with government officials.

One of the most notable developments in 2024 has been the digitalization of Taiwan's healthcare system. The National Health Insurance (NHI) Administration has introduced a fully digital healthcare platform that allows citizens to access their medical records, schedule appointments, and receive telemedicine consultations. This platform is integrated with the NHI Card, which serves as a digital health ID that can be used for seamless access to healthcare services across the country. The government's efforts to enhance online healthcare services have not only improved the efficiency of the healthcare system but also made it more accessible to people living in remote areas.

In addition to healthcare, Taiwan has also expanded its digital education services in 2024. The government has launched a national e-learning platform that provides students with access to a wide range of educational resources, including online courses, digital textbooks, and interactive learning tools. This platform has been especially valuable during the COVID-19 pandemic, allowing students to continue their education remotely. The government's focus on digital education is part of its broader strategy to prepare the next generation for the demands of the digital economy.

4.4. National Portal [NPR]

Taiwan's national government portal, Taiwan.gov.tw, continues to evolve as a central hub for e-government services and information in 2024. The portal has been designed to be user-friendly, integrating a range of online services from various government departments and providing a single point of access for citizens, businesses, and even foreign residents. This centralized platform reflects Taiwan's commitment to making government services more accessible and transparent, allowing users to complete tasks such as renewing their passports, accessing social security benefits, and paying taxes online, all within a few clicks.

In 2024, Taiwan has placed a strong emphasis on enhancing the accessibility and inclusiveness of the portal, ensuring that it caters to all citizens, regardless of their location, age, or level of digital literacy. The portal is available in multiple languages, including English, Mandarin, and Taiwanese, and has been optimized for mobile devices, ensuring seamless access across different platforms. To address the needs of Taiwan's aging population, the government has introduced features such as larger text options, voice navigation, and simplified processes tailored specifically for senior users.

The Taiwan's national portal in 2024 is its focus on transparency and open government data. The portal provides citizens with access to a wide range of public data, including government budgets, procurement contracts, and environmental data. This commitment to transparency not only fosters trust between the government and its citizens but also promotes civic engagement by allowing citizens to participate in decision-making processes and hold government officials accountable.

4.5. Government CIO [GCIO]

Taiwan's government continues to recognize the critical role of the Government Chief Information Officer (CIO) in driving its digital transformation agenda. In 2024, the Executive Yuan's Office of Information and Communication Security serves as the central authority for coordinating digital initiatives across all government agencies. The Government CIO plays a pivotal role in formulating policies related to digital transformation, overseeing the implementation of e-government services, and ensuring that Taiwan's digital infrastructure is resilient and secure.

One of the key responsibilities of the Government CIO in 2024 is fostering collaboration across different government departments to ensure the seamless integration of digital technologies into public services. The CIO's office has been instrumental in promoting the adoption of cloud computing and big data analytics to enhance decision-making processes within the government. For instance, the Public Service Data Integration Program, led by the CIO, enables the collection and analysis of data from various government departments, helping policymakers develop more targeted and effective public policies.

Cybersecurity is another critical area where the Government CIO has made significant contributions in 2024. With the increasing digitization of public services and the growing threat of cyberattacks, the CIO's office has implemented comprehensive security measures to protect government systems and citizen data. This includes the development of Taiwan's National Cyber Security Program, which

focuses on strengthening Taiwan's defenses against cyber threats by enhancing the capabilities of government agencies and raising awareness among the public.

4.6. E-Government Promotion [EPRO]

In 2024, Taiwan continues to actively promote e-government as a way to enhance public administration and improve service delivery to its citizens. The government's efforts have been focused on expanding the reach of digital services across all sectors and ensuring that these services are accessible to everyone, including the elderly, people with disabilities, and those living in rural areas. Taiwan's e-government initiatives are part of its broader DIGI+ 2024 Plan, which aims to make Taiwan a fully digital society by 2025.

Taiwan's e-government promotion efforts have been particularly successful in the realm of digital identity. The government's National Identification System, which integrates a digital ID card with various e-government services, has made it easier for citizens to access government services online. This system allows users to authenticate their identity, sign documents electronically, and perform a wide range of tasks such as filing taxes, applying for social benefits, and renewing licenses, all through a secure digital platform. The digital ID system has significantly reduced the need for in-person visits to government offices, saving time and resources for both citizens and the government.

Additionally, Taiwan has been actively promoting its e-government services to businesses, with a particular focus on supporting small and medium-sized enterprises (SMEs). The government has launched several initiatives to encourage SMEs to embrace digital tools for their interactions with government agencies, such as the E-Tax Filing System and the Online Business Registration Portal. These platforms have simplified administrative processes for businesses, allowing them to register, file taxes, and access government support programs more efficiently. The government's efforts to promote e-government among businesses have contributed to the growth of Taiwan's digital economy and strengthened the country's position as a regional leader in e-governance.

4.7. E-Participation [EPAR]

Taiwan has made significant advancements in promoting e-participation, allowing citizens to engage more actively in government decision-making processes through digital platforms. In 2024, Taiwan's vTaiwan platform remains a flagship example of how the government fosters civic participation in policymaking. This platform allows citizens to engage in open discussions, provide feedback, and

collaborate with government officials on a wide range of policy issues, from social reforms to economic development strategies. The vTaiwan initiative is based on the principles of open government and transparency, ensuring that citizens have a direct voice in the decisions that affect their lives.

The success of vTaiwan has encouraged the government to further expand its e-participation initiatives in 2024. In addition to vTaiwan, the government has developed the **Join Platform**, which serves as a centralized hub for citizen engagement. Through this platform, citizens can participate in online consultations, submit petitions, and propose new policies. The platform also features live streaming of government meetings and public consultations, allowing citizens to stay informed and involved in the political process. These initiatives have helped Taiwan build a more inclusive and participatory democracy, where citizens can engage with the government more easily and hold officials accountable.

Moreover, Taiwan's commitment to e-participation extends to local governance as well. In 2024, several municipalities across Taiwan have adopted digital tools to facilitate citizen engagement at the local level. For instance, the city of Taipei has launched the Smart Taipei Citizen Participation Platform, which allows residents to submit proposals for local development projects, participate in budget allocation processes, and report issues in their communities. These local e-participation initiatives complement national efforts and contribute to a more connected and engaged society.

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

Taiwan's digital transformation in 2024 is characterized by a strong focus on harnessing data to drive innovation, enhance public services, and improve governance. The government's Open Data Platform continues to play a central role in Taiwan's DX efforts, providing access to a wide range of datasets across various sectors, including healthcare, transportation, education, and the environment. By making this data available to the public, Taiwan encourages innovation and the development of new services and applications that benefit both the government and citizens. For example, developers have used open government data to create apps that provide real-time information on public transportation, air quality, and healthcare services.

Taiwan's approach to digital transformation goes beyond just making data available; it actively encourages collaboration between the public and private sectors. The government has fostered

partnerships with tech companies, universities, and startups to develop solutions that leverage open data for public benefit. For instance, the government has partnered with AI startups to develop predictive models for disaster management, using open data on weather patterns, population density, and infrastructure vulnerabilities. This collaborative approach ensures that Taiwan remains at the forefront of digital innovation while addressing societal challenges through data-driven solutions.

Moreover, Taiwan's commitment to open government data is reflected in its Smart City Development Program, which integrates data from various sources to create more efficient and sustainable urban environments. By combining data from IoT devices, sensors, and government systems, Taiwan's cities are becoming smarter and more responsive to the needs of their residents. For instance, smart traffic management systems in Taipei use real-time data to optimize traffic flow, reduce congestion, and lower emissions, contributing to Taiwan's broader goals of sustainability and environmental protection.

4.9. Cyber Security [CYB]

In 2024, cybersecurity remains a top priority for the Taiwanese government, given the increasing frequency of cyber threats and Taiwan's position as a regional leader in digital governance. The National Cybersecurity Strategy for 2024 outlines a comprehensive approach to protecting the country's digital infrastructure and safeguarding citizen data. Taiwan has invested heavily in strengthening its cyber defenses, with the government working closely with private sector partners and international allies to share threat intelligence and develop more robust cybersecurity measures.

One of the key elements of Taiwan's cybersecurity strategy is the establishment of the Taiwan Cyber Security Management Act, which requires all government agencies and critical infrastructure operators to implement strict cybersecurity measures, including regular risk assessments, incident response plans, and employee training programs. The government has also established the National Cyber Security Center, which coordinates the country's response to cyber incidents and works to enhance the cybersecurity capabilities of both public and private sector organizations.

In addition to bolstering its domestic cyber defenses, Taiwan has made efforts to enhance international cooperation on cybersecurity in 2024. Taiwan's government has participated in cybersecurity forums and signed agreements with other countries to share best practices and collaborate on joint cybersecurity initiatives. These international partnerships are crucial for addressing the global nature

of cyber threats and ensuring that Taiwan remains resilient in the face of increasingly sophisticated attacks. Furthermore, Taiwan's leadership in cybersecurity has helped to build trust with its citizens, who are assured that their data and digital identities are being protected by some of the most advanced security measures in the region.

4.10. The use of Emerging ICT [EMG]

Taiwan's 2024 digitalization efforts place a strong emphasis on emerging information and communication technologies (ICT) such as AI, blockchain, and 5G, which are critical to the country's ongoing innovation and economic growth. The Asia Silicon Valley Development Plan, launched by Taiwan in previous years, has evolved into a cornerstone of the country's strategy to become a global leader in emerging ICT. In 2024, this initiative continues to drive advancements in artificial intelligence (AI), the Internet of Things (IoT), and 5G technologies. These efforts are transforming Taiwan's economic landscape by fostering innovation across industries, improving efficiency, and creating new business opportunities.

One of the key areas of focus in 2024 is the integration of 5G technology into Taiwan's infrastructure and services. Taiwan has been a pioneer in the deployment of 5G networks, and by 2024, 5G coverage is nearly universal across the country. This extensive network has enabled the development of smart cities, autonomous vehicles, and advanced healthcare applications. For example, the Smart Healthcare Project, backed by the government, leverages 5G and IoT to provide remote medical consultations, real-time health monitoring, and AI-driven diagnostics in rural and underserved areas. The high-speed, low-latency connectivity provided by 5G has also opened doors for the development of new services in entertainment, manufacturing, and logistics.

Artificial intelligence continues to be another crucial pillar of Taiwan's ICT strategy. The government has invested in AI research and development, aiming to position Taiwan as a regional AI hub. Taiwan's AI Talent Program is an initiative designed to train the next generation of AI experts and to promote collaboration between academia, government, and industry. This program supports AI startups and encourages the application of AI in solving real-world problems, such as traffic management, energy conservation, and healthcare optimization. Moreover, AI is being integrated into public administration, enhancing efficiency in government services such as data processing, public safety, and citizen engagement.

21. United Arab Emirates

1. General Information

Area: **83,600 km2**

Population: **11,136,218**

Government Type: Federal Absolute Monarchy

2024 Growth Rate: **4%**

GDP (IMF '24): **$527.80 Bn**

GDP Per Capita: **$47,864**

Internet User: **100%**

Wired (Fixed Broadband User) per 100 people: **37.1**

Wireless Broadband User per 100 people: **199**

2. Digital Government Overview in Country
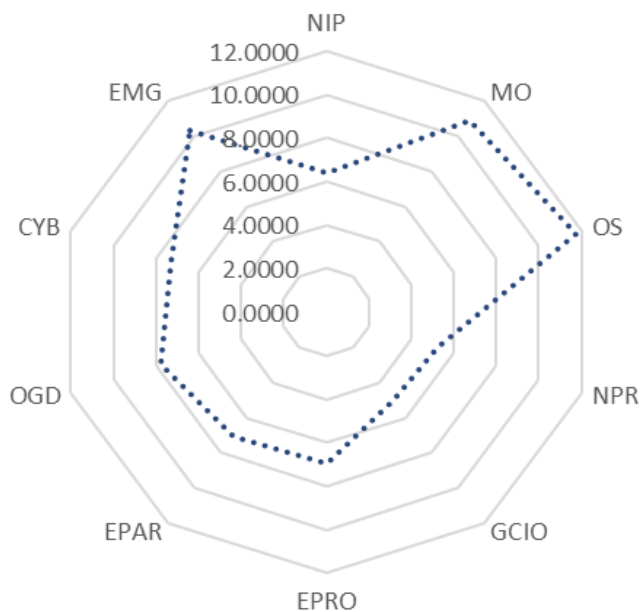
3. Digital Government Development and new trends

3.1. The development

The United Arab Emirates (UAE) continues to lead the region in digital transformation, with its government focusing on cutting-edge technologies and smart governance in 2024. Underscoring its

global standing, the UAE is ranked 21st in the Waseda rankings for 2024. With a vision to become one of the world's most advanced digital governments. The UAE's commitment to digitalization has positioned it as a global leader in e-government, marked by its high-ranking status in the United Nations E-Government Development Index (EGDI) and E-Participation Index (EPI). the UAE is leveraging emerging technologies such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT) to deliver seamless, efficient, and secure public services.

The UAE's National Digital Strategy 2025, launched in 2022, continues to guide its ambitious digital transformation efforts. This strategy emphasizes innovation, collaboration, and sustainability, aiming to foster a smart and inclusive society. In 2024, the UAE remains committed to improving digital literacy among its citizens, enhancing the use of AI in government services, and promoting open data initiatives that empower individuals and businesses to innovate and create value from publicly available information. The UAE is also investing heavily in its network infrastructure, ensuring that high-speed connectivity reaches every corner of the country to support the growing demand for digital services.

The government's focus on digital transformation extends beyond just technology. In 2024, the UAE prioritizes user experience, ensuring that citizens, residents, and businesses can access services conveniently through various digital platforms. The UAE Pass, a unified digital identity solution, continues to expand its functionality, enabling secure, one-stop access to over 5,000 government and private sector services. This focus on seamless service delivery is a testament to the UAE's vision of becoming a world leader in digital governance.

3.2. New Trends

The UAE's digital transformation strategy is aligned with the UAE Centennial 2071 vision, which aims to prepare the country for a post-oil economy by fostering innovation, sustainability, and digital governance. In 2024, the UAE is focusing on advancing its Smart Government initiatives, which aim to digitize public services across all federal and local government entities. The Smart Dubai program, for instance, has become a global model for smart city initiatives, leveraging AI, blockchain, and IoT to enhance urban living and provide efficient public services.

In line with the Fourth Industrial Revolution Strategy, the UAE is integrating advanced technologies into various sectors, including education, healthcare, finance, and transportation. The National AI

Strategy 2031, which seeks to position the UAE as a global leader in AI, remains central to the country's digital vision. In 2024, this strategy continues to drive investments in AI research and development, as well as AI-based applications across government services, including smart policing, AI-powered chatbots for public inquiries, and predictive analytics for healthcare management.

Additionally, the UAE's commitment to sustainability is reflected in its Green Economy for Sustainable Development strategy, which promotes the use of digital technologies to drive green initiatives. In 2024, the government is further exploring the potential of digital solutions to reduce the carbon footprint of its operations. Smart meters, digital water management systems, and AI-driven waste management solutions are just a few examples of how the UAE is blending digital transformation with its sustainability goals.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

In 2024, the UAE continues to boast one of the most advanced telecommunications infrastructures in the world, making it a leader in network readiness and digital preparedness. The UAE's 5G network rollout, which began in 2019, has reached full nationwide coverage, providing the backbone for its digital services and smart city projects. This high-speed connectivity supports advanced applications such as autonomous vehicles, remote healthcare services, and real-time smart city management, ensuring that the UAE can meet the growing demand for data-driven services.

The Telecommunications and Digital Government Regulatory Authority (TDRA) is responsible for overseeing the development of the UAE's network infrastructure. In 2024, the TDRA continues to push for further improvements in network quality, with a focus on expanding fiber-optic networks to enhance broadband speed and reliability. The UAE's National Broadband Plan also aims to ensure that all households and businesses have access to gigabit-speed internet by 2025, reflecting the country's commitment to providing cutting-edge connectivity.

Furthermore, the UAE is investing in next-generation network technologies, such as 6G research and development. As part of its future-oriented strategy, the UAE is positioning itself to be one of the first countries to adopt 6G technology, which is expected to revolutionize industries like healthcare, manufacturing, and entertainment. By continually enhancing its network infrastructure, the UAE is ensuring that its digital economy remains competitive on the global stage.

4.2. Management Optimization [MO]

The UAE government is heavily invested in optimizing its management practices through the use of digital tools and data-driven decision-making. In 2024, the government continues to promote a Digital-First approach, where digital services are prioritized and streamlined to ensure maximum efficiency. Government entities are encouraged to adopt cloud computing, AI, and big data analytics to enhance service delivery, reduce administrative burdens, and optimize resource allocation.

One of the key initiatives for management optimization is the use of government dashboards, which provide real-time data on service performance, citizen engagement, and resource utilization. These dashboards enable government leaders to make informed decisions quickly and effectively, enhancing the agility and responsiveness of public administration. Additionally, predictive analytics is being utilized to forecast demand for services and allocate resources accordingly, minimizing waste and ensuring that services are delivered in a timely manner.

In 2024, the UAE continues to implement its Digital Government Excellence Program, which aims to build a culture of continuous improvement and innovation within government institutions. This program includes training and upskilling government employees in the latest digital tools and practices, ensuring that public servants are equipped to manage the digital transformation effectively. By fostering a data-driven and innovation-oriented culture, the UAE government is optimizing its management processes to better serve the needs of its citizens and businesses.

4.3. Online Service [OS]

The UAE is recognized globally for its comprehensive and user-friendly online services. By 2024, the UAE government has expanded its digital service offerings, ensuring that citizens and businesses can complete a wide range of transactions online. Services such as applying for visas, renewing licenses, paying utility bills, and accessing healthcare information are all available through digital platforms, reducing the need for in-person visits and making government interactions more convenient.

The UAE Government Portal (u.ae) serves as the central hub for all government services, providing users with easy access to information and e-services across federal and local government agencies. In 2024, the portal continues to enhance its functionality by integrating more AI-powered features, such as chatbots that can assist users in navigating services and answering questions in real time. These

improvements are part of the government's commitment to providing a seamless digital experience for all users.

Moreover, the UAE is expanding the scope of its Smart Services, which are designed to anticipate user needs and provide proactive solutions. For example, the Smart Police Station initiative allows residents to report crimes, file complaints, and receive police services without ever interacting with an officer in person. These smart services, combined with the UAE's investment in automation and AI, are making government services faster, more efficient, and more accessible to the general public.

4.4. National Portal [NPR]

The UAE's national government portal, u.ae, is the centerpiece of the country's e-government strategy, providing a unified platform for accessing public services. In 2024, u.ae continues to be a model of digital service delivery, offering a wide range of services to citizens, residents, and businesses. The portal is designed with user experience in mind, featuring an intuitive interface that makes it easy to navigate and find relevant information and services.

In addition to providing access to over 5,000 government services, u.ae also serves as a gateway for e-participation, enabling citizens to provide feedback on government policies and initiatives through surveys, consultations, and online forums. This integration of services and e-participation mechanisms helps to enhance the transparency and accountability of the government. In 2024, the portal is further enhanced with AI-powered features that provide personalized recommendations based on user behavior and preferences. These enhancements make u.ae more than just a service portal—it is a central hub for digital engagement, where users can interact with the government, access services, and contribute to policy discussions in a seamless and integrated manner.

4.5. Government CIO [GCIO]

The role of the Government Chief Information Officer (GCIO) in the UAE has evolved significantly in recent years, playing a critical role in driving the country's digital transformation. In 2024, the GCIO continues to spearhead efforts to modernize government operations by promoting digital-first policies, integrating emerging technologies, and enhancing cybersecurity across all public sector agencies. The GCIO is tasked with ensuring that all government entities are aligned with the UAE's national digital strategy and that they adopt best practices for digital governance.

The UAE's GCIO is also responsible for fostering inter-agency collaboration, ensuring that different government departments work together seamlessly to deliver unified and coherent digital services. Under the leadership of the GCIO, the UAE government is focusing on breaking down silos and encouraging data sharing between agencies to improve service delivery and enhance decision-making. This approach has been instrumental in enabling the rapid deployment of innovative solutions, such as AI-driven government services and the integration of blockchain technology into administrative processes.

In 2024, the GCIO continues to focus on upskilling the government workforce, ensuring that public sector employees are well-equipped to manage and implement digital initiatives. The UAE government has invested in a range of training programs and certifications aimed at enhancing the digital competencies of its employees, helping them to adopt new technologies and improve service delivery. The GCIO's office also collaborates with private sector tech companies and academic institutions to foster innovation and develop new digital solutions tailored to the unique needs of the UAE government.

4.6. E-Government Promotion [EPRO]

The UAE's commitment to promoting e-government is evident through its comprehensive and well-coordinated efforts across various levels of government. In 2024, the UAE continues to lead the region in e-government promotion, with a strong focus on making digital services accessible to all citizens and residents. Through initiatives such as the Smart Government Program, the UAE has successfully transitioned a significant portion of its public services to online platforms, reducing bureaucracy and improving convenience for users.

One of the key pillars of the UAE's e-government promotion efforts is the use of emerging technologies, such as artificial intelligence (AI) and blockchain, to improve service delivery. For example, the UAE has integrated blockchain into its real estate and judicial services, allowing for faster and more secure transactions. In addition, AI-powered chatbots and virtual assistants are being deployed across multiple government platforms to provide instant support and assistance to users, streamlining the process of accessing government services.

The government also places a strong emphasis on user-centric design in its e-government initiatives. In 2024, the UAE continues to refine its digital services by actively seeking feedback from citizens

and residents, ensuring that services are intuitive, efficient, and easy to use. This focus on user experience, combined with the government's efforts to raise awareness about the availability and benefits of e-services, has contributed to a significant increase in the adoption of digital government services across the UAE.

4.7. E-Participation [EPAR]

E-participation plays a critical role in the UAE's broader digital governance strategy, enabling citizens to engage with government decision-making processes through digital platforms. In 2024, the UAE continues to enhance its e-participation efforts by providing more opportunities for citizens and residents to contribute their opinions and feedback on various policies and initiatives. This is facilitated through the UAE Government Portal (u.ae), which includes dedicated sections for surveys, public consultations, and interactive forums.

The UAE's focus on e-participation is not only about enhancing transparency but also about fostering a more inclusive and participatory form of governance. By utilizing digital platforms, the government can reach a wider audience, including those in remote areas, and encourage greater public involvement in policy development. In 2024, the UAE continues to expand its e-participation tools, integrating features such as real-time polls and feedback mechanisms that allow citizens to have a direct impact on policy decisions.

The government also promotes digital literacy and civic engagement through various educational initiatives and outreach programs. These programs aim to empower citizens with the knowledge and skills needed to participate effectively in the digital governance process. In 2024, the UAE continues to prioritize e-participation as a key component of its digital strategy, recognizing that active citizen engagement is essential for building trust and accountability in government.

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

In 2024, the UAE continues to lead the way in digital transformation, with a strong focus on leveraging data to drive innovation and improve public services. The government's Digital Transformation Strategy emphasizes the importance of data as a strategic asset, and efforts are underway to expand the availability and accessibility of open government data. Through the Open Data Portal, the UAE provides a wide range of datasets covering areas such as healthcare, education, transportation, and the

environment, allowing individuals and businesses to innovate and create value from publicly available information.

The UAE's digital transformation efforts are closely aligned with its Fourth Industrial Revolution Strategy, which seeks to integrate advanced technologies such as AI, IoT, and blockchain across all sectors of the economy. In 2024, the government continues to invest in these technologies to streamline public services, enhance operational efficiency, and foster innovation. For instance, AI-driven predictive analytics is being used in healthcare to anticipate patient needs and optimize resource allocation, while blockchain is being deployed in real estate and legal services to enhance transparency and security.

The UAE is also a leader in promoting the use of data-driven decision-making within the public sector. Government agencies are encouraged to adopt data analytics tools to improve service delivery and policy development. In 2024, the UAE is further expanding its open data initiatives by making more datasets available to the public and encouraging collaboration between the government, private sector, and academia to harness the potential of data for innovation and economic growth.

4.9. Cyber Security [CYB]

Cybersecurity remains a top priority for the UAE government as it continues to expand its digital infrastructure and services. In 2024, the UAE continues to strengthen its cybersecurity framework through initiatives such as the UAE National Cybersecurity Strategy, which was launched to protect critical national infrastructure and safeguard government data from cyber threats. The strategy emphasizes the importance of collaboration between government entities, private sector organizations, and international partners to enhance the country's overall cybersecurity posture.

In 2024, the UAE Cybersecurity Council continues to lead efforts to implement the strategy, focusing on enhancing the country's ability to detect, prevent, and respond to cyberattacks. The council works closely with government agencies and businesses to promote best practices in cybersecurity and ensure that all entities are equipped to protect their digital assets. The UAE is also investing in cybersecurity training and education programs to develop a skilled workforce capable of addressing the growing threat landscape.

The UAE's commitment to cybersecurity extends beyond its borders. As part of its international cooperation efforts, the UAE actively participates in global cybersecurity initiatives and collaborates

with other countries to share information and best practices. In 2024, the UAE continues to be a regional leader in cybersecurity, hosting conferences and forums that bring together experts from around the world to discuss the latest trends and challenges in the field.

4.10. The use of Emerging ICT [EMG]

The UAE is at the forefront of adopting and promoting emerging information and communication technologies (ICT), positioning itself as a regional hub for innovation in 2024. The government's Fourth Industrial Revolution Strategy emphasizes adopting AI, blockchain, IoT, and 5G technologies to drive economic growth and enhance public services. In 2024, the UAE will continue investing heavily in these technologies, focusing on AI, which is integrated across various sectors, including healthcare, education, and transportation.

The UAE's commitment to emerging ICT is also reflected in its support for innovation hubs and technology parks, such as Dubai Silicon Oasis and Abu Dhabi's Hub71, which serve as incubators for startups and tech companies. These hubs provide a conducive environment for developing and commercializing new technologies, attracting talent and investment from around the world. In 2024, the UAE is further expanding its support for innovation by offering incentives for tech startups and promoting partnerships between the public and private sectors to accelerate the adoption of emerging technologies.

In addition to AI, the UAE is exploring the potential of quantum computing and 6G networks, positioning itself to be at the cutting edge of technological advancements. The government's forward-thinking approach to ICT is helping to build a resilient and future-proof digital economy, ensuring that the UAE remains competitive in the global digital landscape. By fostering a culture of innovation and embracing emerging technologies, the UAE is well-positioned to lead the region in the digital age.

22. Australia

1. General Information

Area: **7,692,024 km2**

Population: **26,789,675**

Government Type: Constitutional Monarchy

2024 Growth Rate: **1.2%**

GDP (IMF '24): **$1.79 Tn**

GDP Per Capita: **$67,021**

Internet User: **96.24%**

Wired (Fixed Broadband User) per 100 people: **36.4**

Wireless Broadband User per 100 people: **126**

2. Digital Government Overview in Country
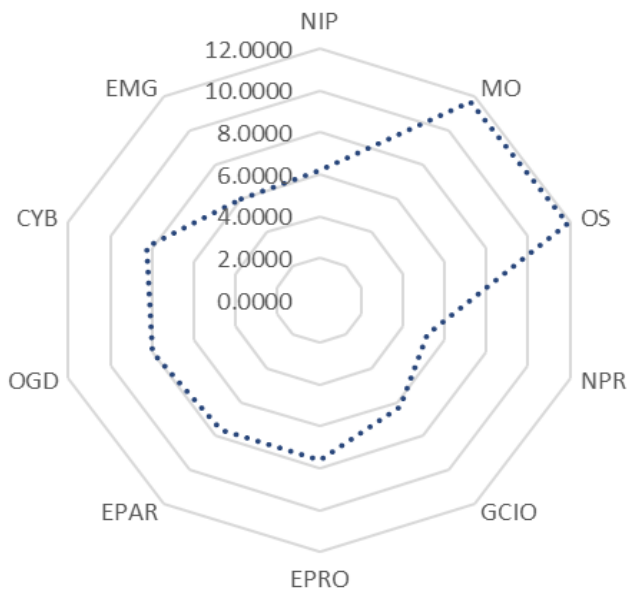
3. Digital Government Development and new trends

3.1. The development

In 2024, Australia has established itself as one of global leader in digital governance by consistently advancing its digital transformation agenda. The nation's dedication to the continuous modernization

of its digital services has resulted in a 22nd-place ranking in the Waseda rankings, which underscores its dedication to the development of a more responsive, efficient, and connected public sector. The significance of incorporating technology across public administration, fostering innovation, and increasing citizen engagement is underscored by initiatives such as Australia's Digital Economy Strategy 2030.

The expansion of digital identity systems, the improvement of cloud-based infrastructure, and the ongoing investment in cybersecurity resilience are among the key initiatives of Australia's digital government in 2024. The government's objective is to enhance the efficacy and cost savings of citizens and enterprises by facilitating seamless and user-friendly interactions with government services. Australia's dedication to transparency and accountability is also evident in its initiatives to increase the accessibility of government data to the public through the data.gov.au portal.

Australia's collaborative approach to digital transformation, which involves partnerships between the government, private sector, and academia, further bolsters its global reputation in digital governance. This multi-stakeholder approach guarantees that Australia's digital infrastructure is resilient, secure, and able to meet the needs of its swiftly changing digital economy.

3.2. New trends

Australia's digital transformation strategy in 2024 is underpinned by the Digital Transformation Strategy 2018–2025, which focuses on delivering world-class digital services by 2025. The strategy outlines key priorities, including enhancing digital platforms, improving the user experience for citizens and businesses, and promoting digital inclusion across the country. These efforts align with broader national goals, such as the Digital Economy Strategy 2030, which aims to make Australia a top 10 digital economy by the end of the decade.

In 2024, Australia's government continues to prioritize the rollout of digital identity verification through the myGovID platform. This initiative allows citizens to securely access government services online and is a cornerstone of the government's push towards a more digital and secure service delivery ecosystem. Additionally, the Service Australia initiative focuses on streamlining access to social services, ensuring that citizens receive prompt and effective support through digital channels.

Another key aspect of Australia's digital strategy is its focus on sustainability and environmental considerations. The government continues to invest in green technology and digital solutions that

reduce carbon emissions, such as smart grids and energy-efficient data centers. By integrating sustainability into its digital transformation strategy, Australia is ensuring that its technological advancements contribute to both economic growth and environmental stewardship.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

In 2024, Australia's digital transformation endeavors have been significantly influenced by its investment in network infrastructure. The National Broadband Network (NBN) project, a multi-billion-dollar initiative, has enabled millions of Australians, including those residing in remote and rural regions, to access high-speed internet. This was crucial in establishing equitable access to digital services throughout the nation and bridging the digital divide. The NBN is being further developed by the government in 2024, with an emphasis on enhancing its speed, reliability, and coverage.

Another critical infrastructure priority in Australia is the deployment of 5G networks in key cities and regions. Australia has made substantial strides in the expansion of 5G coverage by 2024, with a particular focus on the facilitation of next-generation technologies, including the Internet of Things (IoT), autonomous vehicles, and smart cities. This infrastructure is indispensable for accommodating the expanding demand for real-time data processing and high-bandwidth applications in a variety of industries, such as healthcare, transportation, and manufacturing.

Additionally, Australia is making progress in the development of its cloud infrastructure. The Secure Cloud Strategy is intended to facilitate the secure and efficient migration of government agencies to cloud platforms, thereby guaranteeing scalability and resilience. This cloud-first approach guarantees the protection of sensitive data through robust cybersecurity measures, while also enabling more agile service delivery. Australia's digital capabilities are anticipated to be further enhanced by the migration of additional government services to the cloud in 2024.

4.2. Management Optimization [MO]

In 2024, Australia continues to optimize the management of its public sector through the use of digital tools and automation. The Digital Transformation Agency (DTA) plays a central role in driving these efforts, focusing on improving the efficiency of government operations and service delivery. By embracing digital technologies such as artificial intelligence (AI), machine learning, and robotic

process automation (RPA), the Australian government is streamlining administrative processes, reducing manual work, and enhancing decision-making.

A key area of focus for management optimization in 2024 is data-driven governance. The Australian government continues to harness data analytics to optimize policy development, resource allocation, and service delivery. Data integration across agencies is enabling more coordinated and informed decision-making, allowing for better responses to societal needs. For example, the use of predictive analytics in healthcare is helping to allocate resources more effectively, leading to improved outcomes for patients.

Australia also prioritizes the continuous upskilling of its public sector workforce to support the effective use of digital tools. Through initiatives such as the Public Sector Digital Capability Framework, government employees are trained in digital literacy, cybersecurity, and data management. This ensures that the public sector workforce is equipped to manage and implement digital projects efficiently, contributing to the overall optimization of government operations.

4.3. Online Service [OS]

Australia's commitment to providing high-quality online services remains strong in 2024. The government has significantly expanded the range of digital services available to citizens through platforms such as myGov, which offers a centralized access point to various government services, including tax, healthcare, and social security. The expansion of online services aims to make interactions with the government more convenient, efficient, and user-friendly, reducing the need for in-person visits.

In 2024, Australia's focus on enhancing the user experience for online services is evident in its efforts to simplify service delivery and improve accessibility. The government is adopting a mobile-first approach, ensuring that digital services are optimized for smartphones and tablets, which are increasingly the preferred means of accessing services. Additionally, efforts are being made to ensure that online services are accessible to all Australians, including those with disabilities, by adhering to global standards for web accessibility.

The Australian government is also exploring the use of emerging technologies to further enhance its online service offerings. For instance, AI-powered chatbots and virtual assistants are being integrated into government websites to provide instant support and guidance to users. These innovations help to

reduce wait times and improve the overall efficiency of service delivery, while also ensuring that citizens can easily navigate government services online.

4.4.National Portal [NPR]

Australia's myGov platform serves as the national digital portal, providing citizens with a unified interface for accessing government services. As of 2024, myGov continues to be enhanced with new features, offering a streamlined experience that consolidates services from various government agencies into a single, easy-to-use portal. The platform plays a critical role in the country's broader digital government strategy by making services more accessible and reducing administrative burdens for citizens.

The government has prioritized making the myGov portal more intuitive and responsive to user needs in 2024. Enhancements include personalized dashboards that allow users to manage their interactions with the government, track the status of applications, and receive notifications about important deadlines. These improvements are part of Australia's broader effort to create a more citizen-centric government that prioritizes ease of use and convenience.

Security is also a top priority for the national portal. In 2024, myGov continues to benefit from the integration of advanced security features, such as multi-factor authentication and secure cloud storage for sensitive information. These measures ensure that citizens can safely access and manage their personal information online, while also protecting against potential cyber threats. The success of myGov has made it a cornerstone of Australia's digital government efforts, with ongoing plans to further expand its capabilities.

4.5.Government CIO [GCIO]

The role of the Government Chief Information Officer (GCIO) in Australia is pivotal to driving digital transformation across the public sector. In 2024, the GCIO continues to lead efforts to modernize government operations, improve service delivery, and enhance cybersecurity. The GCIO works closely with the Digital Transformation Agency (DTA) to ensure that all government entities are aligned with Australia's digital strategy and that they adopt best practices for digital governance.

One of the key responsibilities of the GCIO is to oversee the implementation of emerging technologies within the public sector. In 2024, the GCIO is focused on integrating AI, cloud computing, and data

analytics into government services to improve efficiency and effectiveness. For example, the GCIO is leading initiatives to leverage AI for predictive analytics in areas such as healthcare and social services, enabling the government to proactively address issues and allocate resources more effectively.

The GCIO also plays a crucial role in building digital capabilities within the government workforce. In 2024, efforts are underway to upskill public sector employees in areas such as digital literacy, cybersecurity, and data management. These initiatives ensure that government employees are well-equipped to manage and implement digital projects, contributing to the overall success of Australia's digital transformation agenda.

4.6.E-Government Promotion [EPRO]

Australia continues to be a leader in e-government promotion, with a strong focus on making digital services accessible to all citizens. In 2024, the government is advancing its efforts to promote e-government through initiatives such as the Service Australia program, which aims to streamline access to social services through digital channels. The program's success in delivering faster and more efficient services has made it a model for e-government promotion in the region.

The Australian government also emphasizes the importance of digital inclusion in its e-government promotion efforts. In 2024, there is a strong focus on ensuring that vulnerable populations, such as those in remote areas and the elderly, have access to digital services. Programs that provide digital literacy training and affordable internet access are key components of this strategy, helping to bridge the digital divide and ensure that all Australians can benefit from e-government services.

Australia's e-government promotion efforts are further supported by its collaboration with the private sector and academia. Partnerships with technology companies and research institutions help to drive innovation and ensure that the government remains at the forefront of digital transformation. In 2024, Australia is expanding these partnerships, working closely with leading tech firms to integrate emerging technologies such as artificial intelligence (AI) and blockchain into public services. These collaborations not only enhance the efficiency of e-government services but also contribute to Australia's global standing as a digital governance innovator. Additionally, Australia's participation in international forums and digital governance initiatives ensures that the country continues to exchange best practices and remain aligned with global digital transformation trends.

4.7.E-Participation [EPAR]

Australia's commitment to fostering citizen engagement through digital platforms has resulted in robust e-participation initiatives in 2024. The government recognizes the importance of involving citizens in decision-making processes and has expanded the range of digital tools available for public participation. The AUSGov Engage platform, for instance, provides a centralized location for consultations, surveys, and petitions, allowing citizens to contribute their views on policies and legislative proposals. This platform has become a key component of Australia's digital democracy, ensuring that citizens have a direct voice in governance.

In 2024, the government is focused on enhancing the accessibility of e-participation tools to ensure that all Australians, regardless of their geographic location or socio-economic background, can contribute to public discourse. Digital literacy programs and campaigns aimed at promoting civic engagement are being implemented to encourage more citizens to participate in government consultations online. Furthermore, Australia's commitment to transparency is evident through the publication of consultation outcomes and the government's response to citizen feedback, ensuring that the public is informed about how their input is used in decision-making.

Australia's e-participation efforts also extend to the use of social media and other digital platforms to engage with citizens in real-time. Government agencies actively use social media to gather feedback, share updates, and respond to citizens' concerns. In 2024, this approach is being refined to ensure that government communications are more interactive and responsive, allowing for a more dynamic and inclusive form of citizen participation.

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

Australia's approach to digital transformation in 2024 is centered on creating a more open, innovative, and data-driven public sector. The Digital Transformation Strategy outlines the government's commitment to harnessing technology to improve service delivery, boost productivity, and create new opportunities for economic growth. Central to this transformation is the emphasis on open government data, with the data.gov.au portal continuing to serve as a key resource for public access to government datasets. By making a wide range of data available, the government encourages transparency, accountability, and innovation across sectors.

In 2024, Australia continues to expand the scope and quality of the data made available through open government data initiatives. The government prioritizes high-value datasets in areas such as healthcare, environmental management, and transportation, which can be used by businesses, researchers, and developers to create innovative solutions and drive economic growth. This open data approach is also fostering collaboration between the public and private sectors, as well as supporting the development of new technologies such as AI and machine learning, which rely heavily on large datasets.

Additionally, the government's focus on interoperability and standardization ensures that data from different agencies can be easily shared and integrated. This enhances cross-agency collaboration and leads to more coordinated responses to complex challenges, such as disaster management and public health emergencies. In 2024, Australia's open data and digital transformation efforts are helping to create a more agile, responsive, and accountable government, while also providing valuable resources for innovation and economic development.

4.9. Cyber Security [CYB]

As digitalization continues to advance in Australia, cybersecurity remains a top priority for the government in 2024. Recognizing the increasing risks posed by cyber threats, Australia has strengthened its Cyber Security Strategy 2020–2030, focusing on enhancing the resilience of critical infrastructure, government systems, and the private sector. The strategy emphasizes a proactive approach to cybersecurity, incorporating advanced threat detection and response systems to mitigate risks before they materialize.

In 2024, Australia continues to invest in cybersecurity education and training to ensure that both public and private sector employees are equipped with the necessary skills to protect sensitive data and infrastructure. The government also works closely with industry leaders and international partners to share intelligence on emerging cyber threats and develop coordinated responses. Initiatives such as the Australian Cyber Security Centre (ACSC) play a crucial role in monitoring and addressing cyber incidents, ensuring that Australia remains well-prepared to defend against both domestic and international cyber threats.

Australia's cybersecurity efforts are further supported by legislative measures that mandate strict security protocols for businesses and government agencies. In 2024, these regulations are continuously updated to address the evolving cyber threat landscape, ensuring that Australia's digital

infrastructure remains secure. Additionally, public awareness campaigns aimed at educating citizens about online safety and best practices for data protection are part of the government's broader strategy to create a cyber-resilient nation.

4.10. The use of Emerging ICT [EMG]

Australia's focus on emerging ICT (Information and Communication Technology) in 2024 reflects its commitment to staying at the forefront of technological innovation. The government recognizes the potential of emerging technologies such as artificial intelligence (AI), quantum computing, blockchain, and 5G to drive economic growth and improve public services. As part of the Digital Economy Strategy 2030, Australia is investing in these technologies to create new opportunities for innovation and ensure the country remains competitive in the global digital landscape.

In 2024, AI continues to be a key area of focus for the Australian government, with significant investments being made in AI research and development. The government is working with industry and academia to develop AI-driven solutions for various sectors, including healthcare, agriculture, and manufacturing. These efforts aim to enhance productivity, improve decision-making, and create new opportunities for economic growth. Australia's AI Ethics Framework, established in previous years, also continues to guide the responsible development and deployment of AI technologies in the country.

Australia is also making strides in the deployment of 5G networks, which are critical for supporting the next generation of digital services and applications. In 2024, the rollout of 5G has enabled the development of smart cities, autonomous vehicles, and IoT (Internet of Things) technologies, contributing to the country's digital transformation. Additionally, blockchain technology is being explored for applications in secure data sharing, supply chain management, and digital identity verification. These advancements in emerging ICT are positioning Australia as a leader in technological innovation, driving economic growth and improving the quality of life for its citizens.

23. France

1. General Information

Area: **551,695 km2**

Population: **66,578,901**

Government Type: Semi-Presidential Republic

2024 Growth Rate: **1.1%**

GDP (IMF '24): **$3.13 Tn**

GDP Per Capita: **$47,034**

Internet User: **85.3%**

Wired (Fixed Broadband User) per 100 people: **48.6**

Wireless Broadband User per 100 people: **109**

2. Digital Government Overview in Country
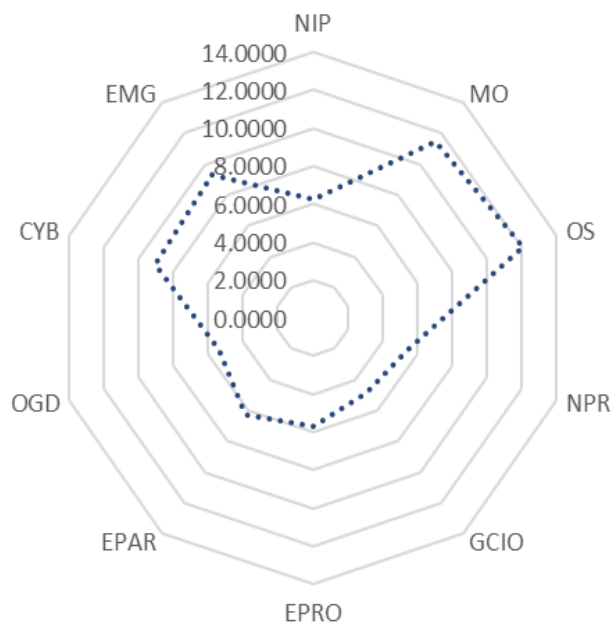
3. Digital Government Development and new trends

3.1. The development

France is continuing to establish itself as a frontrunner in the digitization of the government in the year 2024 via the implementation of programs that place an emphasis on digital sovereignty,

innovation, and citizen-centric services. Waseda's rankings placed the nation in 23rd place, which is a reflection of the country's continued dedication to achieving these objectives. France, which is one of the primary actors in the digital transformation agenda of the European Union, has been concentrating on strengthening its digital infrastructure, fostering digital inclusion, and improving e-governance. The desire of the French government to improve the country's global competitiveness, lessen the costs of administrative work, and empower individuals by simplifying their access to public services is the impetus behind these initiatives.

There is a strong alignment between the ideals of openness, security, and innovation and the digitalization activities that France is participating in. Plan France Numérique is a comprehensive national digital strategy that aims to stimulate digital adoption across both the public and commercial sectors. The government has been aggressive in introducing a number of measures to modernize public services, such as the continuous growth of the Plan France Numérique. In addition, France's forward-thinking approach to handling the problems of the digital era is highlighted by the country's leadership in fostering ethical artificial intelligence, cybersecurity frameworks, and data sovereignty.

3.2. New Trends

France's national strategy for digital transformation is anchored in the Plan France Numérique 2024, which outlines clear objectives to ensure digital inclusion, enhance the competitiveness of French businesses, and transition to a data-driven economy. One of the central goals of this strategy is to bridge the digital divide by extending high-speed internet access to all regions, particularly rural and underserved areas, by 2024. This initiative supports the country's broader goal of achieving digital equity and ensuring that all citizens benefit from digital advancements.

The strategy also includes the advancement of public sector digital services, with a strong focus on e-government services that are both efficient and secure. France has made significant investments in developing digital platforms that allow for seamless interaction between citizens and the government, with services available for tax filing, social benefits, healthcare, and more. Furthermore, the government is placing significant emphasis on data sovereignty, promoting the use of French and European cloud services to ensure the security and control of data generated within its borders.

To achieve its goals, France has also launched targeted programs focused on digital literacy, aiming to equip citizens with the skills necessary to navigate the digital landscape. These efforts include

collaborations with educational institutions to integrate digital skills into curricula and specialized training for underserved communities. By fostering a digitally literate society, France ensures that its digital transformation benefits all citizens, regardless of socio-economic status, and prepares the workforce for the future.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

France has invested heavily in its digital infrastructure, with the Plan France Très Haut Débit (THD) being one of its flagship programs. This initiative aims to provide high-speed broadband coverage to 100% of the French population by the end of 2024, emphasizing fiber-optic deployment and 5G expansion across the country. The plan has already made significant strides, with millions of households now connected to ultra-fast broadband, ensuring that both urban and rural areas have access to reliable digital services.

The French government's commitment to the rollout of 5G technology is another key aspect of its network infrastructure strategy. France is one of the leading European nations in 5G adoption, with telecom operators actively expanding coverage across major cities and industries. By 2024, 5G networks are expected to play a crucial role in enabling smart cities, autonomous vehicles, and the Internet of Things (IoT), supporting France's ambition to become a global hub for innovation in emerging technologies.

The emphasis on cybersecurity within France's network infrastructure strategy is equally notable. As the country expands its digital capabilities, it is concurrently fortifying the security of these networks to prevent vulnerabilities. This includes working closely with ANSSI to secure critical digital infrastructure and ensuring the robustness of the nation's telecom systems. Investments in encryption and threat-detection mechanisms are paramount to protecting national interests while fostering technological growth.

4.2. Management Optimization [MO]

France has undertaken significant efforts to optimize public sector management through the implementation of digital tools and processes. The State Modernization Program (SME), which aims to simplify administrative procedures, has been instrumental in driving efficiency across various

levels of government. This program leverages digital solutions to reduce bureaucracy, streamline public services, and enhance collaboration between different government agencies.

In 2024, France's public administration continues to embrace artificial intelligence and automation to optimize decision-making processes and resource allocation. AI is being utilized to improve case management in areas such as social services, tax administration, and law enforcement, reducing processing times and improving accuracy. Additionally, France's commitment to open data and transparency is reflected in its efforts to make government data more accessible to the public, empowering citizens and businesses to make informed decisions.

France's digital management initiatives also focus on empowering government employees with new skills through continuous digital education. Training programs are being rolled out to ensure that public servants are proficient in using the latest digital tools and systems. These efforts are key to ensuring that government operations remain agile, resilient, and capable of meeting the ever-evolving demands of a digital-first society.

4.3. Online Service [OS]

France has made significant strides in expanding its range of online services, making it easier for citizens and businesses to interact with the government digitally. The Service Public.fr portal serves as the central hub for accessing a wide array of e-government services, ranging from tax filing and social security applications to healthcare services and business registration. This portal is designed to be user-friendly and accessible, ensuring that all citizens, regardless of their digital literacy, can benefit from online services.

In 2024, the government continues to enhance the functionality of its online platforms by integrating new services and improving user experience. For example, the digital health platform Mon Espace Santé now allows citizens to access their medical records, schedule appointments, and communicate with healthcare providers seamlessly. This focus on expanding and improving online services reflects France's broader commitment to building a more connected and efficient digital government.

In parallel, the government has been pushing forward initiatives aimed at simplifying access to essential services for the elderly and disabled populations. France's investment in accessible technology for these groups has led to the creation of adaptive interfaces, providing a more inclusive

experience for all citizens. Ensuring that no one is left behind, regardless of their technical abilities, is a core component of France's online services strategy.

4.4. National Portal [NPR]

The Service Public.fr portal remains the cornerstone of France's digital government services in 2024. It consolidates a wide range of public services under one digital roof, ensuring that citizens and businesses can access essential information and services without having to navigate multiple websites. The portal is continuously updated to ensure it remains relevant and responsive to the needs of users, with new features and services being added regularly.

One of the key goals of the portal is to reduce the administrative burden on citizens by allowing them to complete various bureaucratic processes online. This includes services such as tax declarations, applying for social benefits, and even registering a business. The French government has also prioritized enhancing the security of the portal, ensuring that personal data and transactions conducted through the platform are protected by state-of-the-art cybersecurity measures.

The portal has also become a model for efficiency and user engagement, featuring a streamlined design that facilitates easy access to complex services. In 2024, the integration of AI chatbots and virtual assistants has made navigating the portal even simpler, allowing users to resolve queries and complete tasks without needing to engage with human agents. The adoption of AI and machine learning technologies reflects France's commitment to making public services more responsive and accessible to its citizens

4.5. Government CIO [GCIO]

France's government CIO plays a pivotal role in overseeing the country's digital transformation agenda. The Directorate of Digital and Information Systems (DINUM) is responsible for coordinating the implementation of digital policies across all government agencies, ensuring that digital initiatives are aligned with national strategies and are executed efficiently. In 2024, the role of the CIO has expanded to include greater oversight of digital innovation, with a focus on promoting interoperability, open data, and the ethical use of AI within government services.

Under the leadership of the government CIO, France has made significant progress in modernizing its IT infrastructure and integrating new technologies into public administration. The government CIO

also collaborates with various stakeholders, including private sector partners and EU agencies, to ensure that France remains at the forefront of digital innovation and public sector efficiency.

Moreover, the French government CIO has actively promoted an open-data culture across public administrations, leading efforts to enhance transparency and accountability. In 2024, data sharing between various government departments has improved significantly, facilitating better decision-making processes. The CIO's office also continues to spearhead research and development projects in emerging fields, such as AI ethics and digital identity systems, ensuring that France remains a leader in government technology.

4.6. E-Government Promotion [EPRO]

France's efforts to promote e-government have been widely successful, ranking high in international e-government indices. In 2024, the French government continues to prioritize digital adoption across all sectors of society, focusing on ensuring that public services are accessible to everyone. Through targeted campaigns, the government has encouraged citizens to utilize online platforms to interact with the public administration, reducing the reliance on in-person services.

Moreover, the government's collaboration with the private sector and civil society organizations has bolstered the promotion of e-government. In 2024, France continues to leverage partnerships to raise awareness about the benefits of digital services, particularly among older populations and rural communities. These efforts are part of a broader strategy to ensure that France's digital transformation is inclusive and reaches all segments of society.

4.7. E-Participation [EPAR]

France has made substantial progress in fostering e-participation, enabling citizens to engage with the government through digital platforms. In 2024, the government continues to invest in initiatives that promote transparency and facilitate public engagement in policy-making processes. The Plateforme de Consultation Citoyenne allows citizens to participate in consultations, express their views on proposed laws, and contribute to shaping public policy. This platform has played a pivotal role in enhancing democratic engagement and ensuring that the voices of French citizens are heard.

Additionally, France's adoption of participatory budgeting at the local level has empowered citizens to have a say in how public funds are allocated. This initiative has been particularly successful in

encouraging engagement among younger populations and marginalized communities, giving them a direct role in decision-making processes. By expanding the scope of e-participation initiatives, France ensures that its digital transformation strengthens democratic governance and fosters greater civic involvement.

France is also exploring the use of AI and data analytics to analyze citizen feedback and improve decision-making. In 2024, the government has launched pilot programs that use these technologies to gather insights from public consultations and refine policies based on data-driven assessments. These innovations reflect France's commitment to not only enabling citizen participation but also ensuring that the feedback provided is effectively utilized to enhance governance.

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

France's digital transformation is underpinned by a strong commitment to open government data. In 2024, the French government continues to expand its open data initiatives, making more datasets available to the public through platforms such as data.gouv.fr. These datasets cover a wide range of areas, including healthcare, education, transportation, and the environment, empowering citizens, researchers, and businesses to use government data to drive innovation, enhance services, and promote transparency.

The government has also been proactive in encouraging the use of open data to address societal challenges. In 2024, several hackathons and innovation contests were organized to engage the tech community in developing solutions that leverage open government data. These events have led to the creation of new applications and tools that improve public services, such as traffic management systems and healthcare monitoring tools, which contribute to the overall digital transformation of the public sector.

Moreover, France's open data strategy includes robust privacy and security safeguards to ensure that the release of data complies with EU regulations, such as the General Data Protection Regulation (GDPR). The balance between openness and data protection is a central feature of France's digital transformation efforts, demonstrating the government's commitment to both transparency and the protection of citizens' rights in the digital era.

4.9. Cyber Security [CYB]

Cybersecurity remains a top priority for France in 2024, with the government ramping up efforts to protect its digital infrastructure and safeguard the personal data of its citizens. The Agence Nationale de la Sécurité des Systèmes d'Information (ANSSI) continues to play a central role in implementing France's cybersecurity policies, which focus on strengthening the resilience of critical infrastructure, enhancing threat detection capabilities, and fostering international collaboration on cybersecurity matters.

In 2024, France launched new initiatives aimed at securing the digital ecosystem in both the public and private sectors. The Cybersecurity Strategy for France 2024 outlines measures to protect against cyber threats, such as ransomware attacks and data breaches, which have become increasingly prevalent. This includes mandatory cybersecurity assessments for public institutions and increased funding for cybersecurity research and innovation.

Additionally, France is actively involved in the development of European cybersecurity standards, contributing to the EU Cybersecurity Act and working closely with other EU member states to create a more secure digital single market. By fostering a strong cybersecurity framework at both the national and international levels, France ensures that its digital transformation is underpinned by robust security measures that protect both public and private sector digital assets.

4.10. The use of Emerging ICT [EMG]

With a special emphasis on artificial intelligence (AI), quantum computing, and 5G technologies, France is set to be at the forefront of investigating and implementing future trends in information and communications technology in the year 2024. There have been major investments made by the French government in artificial intelligence (AI), and the AI for Humanity plan is still being implemented. The objective of this policy is to establish France as a worldwide leader in the development of ethical AI. Promoting research, providing assistance to artificial intelligence companies, and ensuring that implementations of AI follow to ethical principles that safeguard individual rights and eliminate prejudice are the primary priorities of this approach respectively.

One such area of concentration for France is quantum computing, and the country's government is making investments in quantum research via a program called the Quantum Plan. In the year 2024, the quantum research institutes of France are making great gains, with the objective of establishing themselves as the leaders in Europe in the competition to create practical applications of quantum

computing. The implementation of these investments is anticipated to bring about revolutionary changes in domains such as cybersecurity, healthcare, and environmental research, therefore providing France with a competitive advantage in the wider technological landscape.

24. Indonesia

1. General Information

Area: **1,904,569 km2**

Population: **284,146,367**

Government Type: Presidential Republic

2024 Growth Rate: **5%**

GDP (IMF '24): **$1.48 Tn**

GDP Per Capita: **$5,205**

Internet User: **66.5%**

Wired (Fixed Broadband User) per 100 people: **4.82**

Wireless Broadband User per 100 people: **118**

2. Digital Government Overview in Country
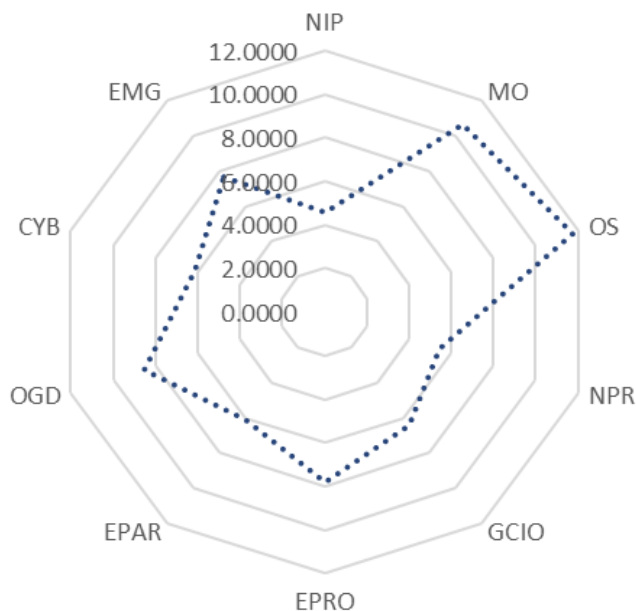
3. Digital Government Development and new trends

3.1. The development

In 2024, Indonesia continues its ambitious journey towards digital transformation, marked by significant advancements in e-government services, infrastructure development, and digital inclusion. The Indonesian government has prioritized digitalization as a key driver for economic growth and

public service improvement, aligning its efforts with the 2024 National Digital Transformation Roadmap. This roadmap emphasizes the importance of digital technology in enhancing government efficiency, reducing bureaucratic hurdles, and fostering a more inclusive digital economy.

One of the critical highlights of Indonesia's digital transformation is the expansion of its smart city initiatives. Cities like Jakarta, Surabaya, and Bandung are increasingly adopting smart technologies to improve urban management and enhance the quality of life for residents. These initiatives include deploying sensors for traffic management, public safety systems, and smart infrastructure projects. The focus on smart cities reflects Indonesia's commitment to leveraging digital solutions to address urban challenges and create more sustainable and livable environments.

Indonesia's digital transformation is further validated by ranking 24th in the Waseda rankings. Additionally, the country's commitment to public-private partnerships is evident as the government actively collaborates with technology companies and startups to drive innovation and enhance the delivery of public services. This collaborative approach accelerates the implementation of digital solutions and fosters a vibrant tech ecosystem that contributes to the country's economic growth and technological advancement.

3.2. New Trends

Indonesia's national strategy for digital transformation is guided by the 2024 National Digital Economy Framework, which outlines key objectives and initiatives aimed at enhancing the country's digital capabilities. This framework focuses on several strategic pillars, including infrastructure development, digital skills enhancement, and the promotion of digital innovation. A central component of the strategy is the 100 Smart Cities Movement, which aims to deploy smart technologies across various urban centers to improve public services and urban management.

The strategy also emphasizes the importance of digital inclusivity. Indonesia is working to ensure that digital technologies are accessible to all citizens, including those in remote and underserved areas. This includes expanding internet connectivity through the Palapa Ring Project, which aims to provide high-speed broadband access to all provinces, and promoting digital literacy programs to equip citizens with the skills needed to participate in the digital economy.

In addition, the Indonesian government is focused on fostering a conducive environment for digital innovation and entrepreneurship. The Digital Startup Ecosystem Initiative supports startups through

funding, mentorship, and regulatory support, aiming to create a robust ecosystem that drives technological advancements and economic growth. By addressing key areas such as infrastructure, skills, and innovation, Indonesia's digital strategy positions the country to capitalize on the opportunities presented by the digital age. New president moved to new capital Nusantara for administration.

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Indonesia's network infrastructure preparedness has seen significant progress with the ongoing expansion of high-speed broadband networks and the development of 5G technology. The government's focus on improving connectivity is evident through initiatives like the Palapa Ring Project, which aims to create a nationwide fiber-optic network. This project is crucial for bridging the digital divide between urban and rural areas, providing high-speed internet access to remote regions, and supporting the growth of the digital economy.

In 2024, Indonesia is also making strides in the deployment of 5G networks, with major cities and industrial zones already experiencing the benefits of high-speed, low-latency connectivity. The government's strategic investment in 5G technology is aimed at enhancing digital services, supporting smart city initiatives, and enabling advanced applications such as IoT, autonomous vehicles, and telemedicine. The rollout of 5G is expected to drive innovation and improve the quality of digital services across the country.

Furthermore, the Indonesian government is investing in cybersecurity infrastructure to protect its digital assets and ensure the security of online transactions and communications. The establishment of the National Cyber and Crypto Agency (BSSN) reflects the government's commitment to addressing cybersecurity threats and safeguarding critical infrastructure. By enhancing network infrastructure and focusing on security, Indonesia is laying the groundwork for a resilient and secure digital ecosystem.

4.2. Management Optimization [MO]

In 2024, Indonesia's efforts to optimize public sector management through digital tools are gaining momentum. The government is implementing the e-Government Master Plan, which aims to streamline administrative processes, reduce bureaucracy, and improve the efficiency of public

services. This master plan includes the development of integrated digital platforms that enable seamless interactions between government agencies and citizens, facilitating faster and more transparent service delivery.

The adoption of automation and data analytics is another key aspect of Indonesia's management optimization strategy. The government is leveraging these technologies to enhance decision-making processes, optimize resource allocation, and improve public service delivery. For example, automated systems are being used for tax administration and social welfare programs, reducing processing times and increasing accuracy.

Additionally, Indonesia is focusing on building digital competencies within the public sector. Training programs and capacity-building initiatives are being rolled out to ensure that government employees are proficient in using digital tools and systems. These efforts are essential for achieving the goals of the e-Government Master Plan and ensuring that public sector operations are efficient and responsive to the needs of citizens.

4.3. Online Service [OS]

Indonesia has made significant progress in expanding its online services, with a focus on improving accessibility and efficiency. The Laporta platform serves as a central hub for accessing a wide range of government services, including tax filings, business registrations, and social security applications. This platform is designed to simplify interactions between citizens and the government, reducing the need for in-person visits and streamlining administrative processes.

In 2024, the government continues to enhance its online services by integrating new features and improving user experience. For instance, the JKN (Jaminan Kesehatan Nasional) online platform has been upgraded to facilitate easier access to healthcare services, allowing citizens to check their health insurance status, book appointments, and access medical records online. These improvements are part of a broader strategy to make public services more accessible and efficient through digital means.

Additionally, Indonesia is focusing on expanding digital services for businesses, with initiatives such as the Online Single Submission (OSS) system, which simplifies the process of business licensing and permits. This system aims to reduce bureaucratic barriers and support the growth of the entrepreneurial ecosystem by providing a streamlined and user-friendly platform for business-related services

4.4. National Portal [NPR]

The Laporta portal is a central element of Indonesia's digital government strategy, providing a unified access point for various online services and information. Launched as part of the government's digital transformation efforts, the portal consolidates a wide range of services, including tax administration, social benefits, and business registration. This integration is designed to make it easier for citizens and businesses to interact with government agencies, reducing administrative burdens and improving service delivery.

In 2024, the Laporta portal continues to evolve, incorporating new features and technologies to enhance user experience. The addition of AI-powered chatbots and virtual assistants has made it easier for users to navigate the portal and access information. These technologies help address common queries, provide guidance on using the platform, and streamline interactions with government services.

The portal also emphasizes data security and privacy, with robust measures in place to protect user information. The government's commitment to secure online interactions is reflected in the implementation of advanced encryption and authentication technologies. By ensuring that the portal is both user-friendly and secure, Indonesia is enhancing its digital infrastructure and supporting the broader digital transformation goals.

4.5. Government CIO [GCIO]

The role of the government CIO in Indonesia is crucial for driving the country's digital transformation agenda. The Ministry of Communication and Information Technology (Kominfo) oversees the implementation of digital policies and strategies, ensuring that government initiatives are aligned with national goals and effectively executed. In 2024, the government CIO is focused on advancing the digital infrastructure, enhancing public sector efficiency, and fostering innovation through strategic digital initiatives.

The government CIO plays a key role in coordinating digital projects across various government agencies, ensuring that digital tools and systems are integrated and interoperable. This coordination is essential for achieving the goals of the e-Government Master Plan and enhancing the delivery of public services. The CIO's office also engages with stakeholders, including private sector partners and technology providers, to drive innovation and support the development of new digital solutions.

In addition to overseeing digital projects, the government CIO is involved in policy development and regulatory oversight. The CIO's office works to ensure that digital policies are aligned with international standards and best practices, addressing issues such as data privacy, cybersecurity, and digital inclusion. By leading these efforts, the government CIO is instrumental in shaping Indonesia's digital landscape and driving the country's digital transformation forward

4.6. E-Government Promotion [EPRO]

Indonesia's promotion of e-government is characterized by a focus on increasing digital adoption and enhancing public engagement with digital services. In 2024, the government continues to prioritize initiatives that raise awareness about the benefits of e-government and encourage citizens to utilize online services. This includes public awareness campaigns, digital literacy programs, and community outreach efforts aimed at promoting the use of digital platforms.

The government is also working to enhance public trust in digital services by emphasizing transparency and accountability. Efforts include the development of open data initiatives, which provide citizens with access to government data and promote greater transparency in public administration. By making data available and encouraging public participation, Indonesia is working to build trust in digital services and ensure that they are used effectively to meet the needs of citizens.

Additionally, Indonesia's promotion of e-government includes fostering collaborations with the private sector to drive innovation and improve service delivery. The government supports partnerships with technology companies and startups to develop new digital solutions and enhance existing services. These collaborations contribute to the growth of the digital economy and help ensure that e-government initiatives are aligned with the needs of citizens and businesses

4.7. E-Participation [EPAR]

Indonesia has made significant strides in promoting e-participation, enabling citizens to engage with the government through digital channels. The Sistem Pemerintahan Berbasis Elektronik (SPBE) is a key initiative in this area, providing a comprehensive platform for citizen engagement and feedback. Launched as part of Indonesia's broader digital transformation efforts, SPBE allows citizens to participate in public consultations, submit grievances, and provide feedback on government policies and services. This platform enhances transparency and ensures that citizens have a voice in the decision-making process, fostering a more inclusive and responsive government.

In 2024, Indonesia is also expanding its use of digital tools for public engagement, such as online surveys, forums, and social media platforms. These tools facilitate real-time interactions between citizens and government officials, allowing for quicker responses to public concerns and suggestions. The government's commitment to e-participation is reflected in its efforts to improve digital literacy among citizens, ensuring that everyone has the skills needed to engage with online platforms effectively.

Additionally, the government is exploring AI and data analytics to analyze citizen feedback and improve policy-making. By leveraging advanced technologies to process and interpret large volumes of feedback, Indonesia aims to gain deeper insights into public sentiment and preferences. This approach helps in refining policies and services to better align with the needs and expectations of the population, contributing to more effective governance.

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

Indonesia's digital transformation strategy strongly emphasizes the use of open government data to drive innovation and improve transparency. The Open Data Portal, which provides access to a wide range of government datasets, is central to this effort. By making data available to the public, the government aims to promote transparency, support research and innovation, and enable citizens to make informed decisions.

In 2024, the government continues to expand its open data initiatives, adding new datasets and improving the quality and usability of existing data. The portal includes data on various topics, such as healthcare, education, transportation, and environmental issues. This data is used by researchers, businesses, and civil society organizations to develop new applications, conduct analyses, and advocate for policy changes.

Moreover, the Indonesian government is implementing data privacy and security measures to protect sensitive information while promoting openness. This includes compliance with national data protection laws and international standards, ensuring that the release of data does not compromise individual privacy or security. The balance between openness and data protection is a key component of Indonesia's digital transformation strategy, reflecting the government's commitment to both transparency and security

4.9. Cyber Security [CYB]

Cybersecurity is a critical focus area for Indonesia as it continues to enhance its digital infrastructure. The government has implemented the National Cyber Security Strategy (NCSS), which aims to protect critical infrastructure, safeguard personal data, and enhance the resilience of digital systems. The strategy includes measures for threat detection, incident response, and public-private collaboration to address cybersecurity challenges.

In 2024, Indonesia has increased its investment in cybersecurity infrastructure, including the establishment of the National Cyber and Crypto Agency (BSSN). This agency plays a key role in coordinating national cybersecurity efforts, supporting government agencies and private sector organizations, and developing cybersecurity policies and regulations. The BSSN also focuses on increasing public awareness of cybersecurity issues and promoting best practices for protecting digital assets.

Additionally, Indonesia is enhancing its cybersecurity training and capacity-building programs. These programs aim to equip government employees, businesses, and individuals with the skills to effectively address cyber threats. By investing in education and training, Indonesia is strengthening its overall cybersecurity posture and ensuring that robust security measures support its digital transformation

4.10. The use of Emerging ICT [EMG]

Indonesia actively explores and adopts emerging ICT trends to drive its digital transformation and economic growth. In 2024, the government is focused on several key areas, including artificial intelligence (AI), blockchain technology, and Internet of Things (IoT). These technologies are seen as critical enablers of innovation and efficiency across various sectors. The government's AI strategy includes initiatives to promote AI research and development, support AI startups, and integrate AI into public services. Projects such as AI for Healthcare and AI for Agriculture are examples of how AI is being used to address specific challenges and improve service delivery. The government is also working on creating an ethical framework for AI to ensure that its use aligns with societal values and regulations.

Blockchain technology is being explored for its potential to enhance transparency and efficiency in areas such as supply chain management, public records, and financial transactions. The government is supporting pilot projects and research to evaluate the benefits and challenges of blockchain

applications in the public sector. The adoption of IoT is driving the development of smart cities and digital infrastructure projects. By deploying IoT sensors and devices, Indonesia aims to improve urban management, enhance public services, and support innovation in areas such as transportation and environmental monitoring. The government's commitment to emerging ICT reflects its goal of leveraging new technologies to drive progress and improve the quality of life for its citizens.

25. Italy

1. General Information

Area: **301,336 km2**

Population: **59,289,343**

Government Type: Parliamentary Republic

2024 Growth Rate: **0.7%**

GDP (IMF '24): **$2.33 Tn**

GDP Per Capita: **$39,230**

Internet User: **85.1%**

Wired (Fixed Broadband User) per 100 people: **33.8**

Wireless Broadband User per 100 people: **98.4**

2. Digital Government Overview in Country
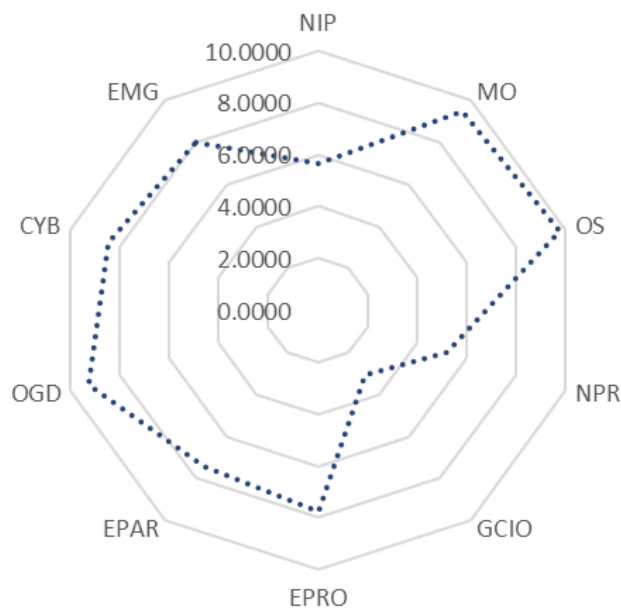
3. Digital Government Development and new trends

3.1. The development

Continuing to achieve substantial progress in digital transformation in 2024, Italy demonstrates its dedication to boosting public services, advancing infrastructure, and promoting innovation. Italy's

advancement, as shown by its 25th position in the Waseda rankings, highlights its increasing impact in global digital governance. The Digital Italy 2024 Plan delineates the strategic vision of the nation for using technology to update government processes, enhance efficiency, and stimulate economic development. This strategy underscores Italy's commitment to using digital technology in areas such as healthcare, education, and public administration.

An outstanding achievement in Italy's digital transformation endeavors is the execution of the "Italia Digitale" project, which seeks to provide a cohesive digital environment for governmental services. The primary objective of this effort is to optimize administrative procedures, increase public participation, and enhance the availability of government services via digital platforms. This programme has played a crucial role in promoting the use of digital tools and technology across Italy's governmental sector.

In addition, Italy is investing substantial investments in digital infrastructure to facilitate its ambitious transformation objectives. The augmentation of high-speed broadband networks and the implementation of 5G technology are fundamental elements of Italy's approach to improve connectivity and facilitate digital innovation. The anticipated outcomes of these expenditures include stimulating economic expansion, enhancing the standard of living, and facilitating the advancement of smart cities and sophisticated digital services.

3.2. New Trends

Italy's digital transformation strategy is guided by the National Strategy for Digitalization, which outlines key objectives and initiatives for advancing digital capabilities across the country. The strategy focuses on several core areas, including e-government development, digital inclusion, and innovation promotion. A central component of the strategy is the Digital Agenda for Italy, which aims to enhance the efficiency of public services, reduce bureaucratic hurdles, and promote the use of digital technologies in various sectors.

The Italian government is also committed to digital inclusion as a key priority. This involves efforts to ensure that all citizens have access to digital tools and services, particularly those in underserved or remote areas. The National Broadband Plan aims to expand high-speed internet access across the country, addressing the digital divide and supporting the growth of the digital economy.

Additionally, Italy's strategy emphasizes the importance of fostering innovation and entrepreneurship in the tech sector. The government supports startups and technology companies through various initiatives, including funding programs, incubators, and accelerators. By creating a supportive environment for innovation, Italy aims to drive technological advancements and enhance its global competitiveness in the digital economy

4. Digital Government by Indicators

4.1. Network Infrastructure Preparedness [NIP]

Italy's network infrastructure preparedness is a crucial component of its digital transformation strategy. The country has made significant investments in broadband expansion and 5G deployment to improve connectivity and support digital services. The National Broadband Plan aims to provide high-speed internet access to all regions, including rural and underserved areas, ensuring that citizens and businesses can benefit from reliable and fast connectivity.

In 2024, Italy is focusing on the rollout of 5G technology, which is expected to enhance digital services and support advanced applications such as smart cities, autonomous vehicles, and IoT. Major cities like Rome, Milan, and Turin are already experiencing the benefits of 5G, with improved network speeds and lower latency. The government's investment in 5G infrastructure is a key driver of digital innovation and economic growth.

Furthermore, Italy is investing in cybersecurity measures to protect its digital infrastructure and ensure the security of online transactions. The establishment of the National Cybersecurity Agency (ACN) reflects the government's commitment to addressing cyber threats and safeguarding critical infrastructure. The ACN focuses on enhancing the country's cybersecurity posture, providing support to organizations, and developing policies to mitigate cyber risks

4.2. Management Optimization [MO]

Italy's efforts to optimize public sector management through digital tools are central to its digital transformation strategy. The government has implemented the Digital Administration Code, which aims to streamline administrative processes, reduce bureaucracy, and improve the efficiency of public services. This code sets out guidelines for the digitalization of government operations, including the adoption of electronic signatures, digital documentation, and online service delivery.

The use of automation and data analytics is another key aspect of Italy's management optimization efforts. By leveraging these technologies, the government aims to improve decision-making, optimize resource allocation, and enhance service delivery. For example, automated systems are being used for tax administration and social services, reducing processing times and increasing accuracy.

Additionally, Italy is focusing on digital skills development within the public sector. Training programs and capacity-building initiatives are being rolled out to ensure that government employees are proficient in using digital tools and systems. These efforts are essential for achieving the goals of the Digital Administration Code and ensuring that public sector operations are efficient and responsive to citizen needs.

4.3. Online Service [OS]

Italy has made significant progress in expanding its online services, with a focus on improving accessibility and user experience. The "SPID" (Sistema Pubblico di Identità Digitale) system is a central component of Italy's digital service strategy, providing a unified digital identity for accessing government services. SPID allows citizens to access a wide range of public services online, including tax filings, social security, and healthcare, using a single digital identity.

In 2024, the Italian government continues to enhance its online services by integrating new features and improving usability. For example, the "FatturaPA" platform, which facilitates electronic invoicing for public sector transactions, has been upgraded to streamline invoicing processes and improve efficiency. The platform supports compliance with digital invoicing requirements and reduces administrative burdens for businesses.

Additionally, Italy is expanding its e-government services through the development of new digital platforms and applications. The "MyCicero" app, which provides access to various public services such as transportation, parking, and public health, is an example of how digital tools are being used to enhance service delivery and convenience for citizens.

4.4. National Portal [NPR]

The "Piattaforma Digitale Nazionale" is Italy's national portal for accessing government services and information. Launched as part of the Digital Italy 2024 Plan, the portal serves as a central access point for a wide range of online services, including administrative procedures, public records, and

government updates. The platform is designed to improve the efficiency of interactions between citizens and government agencies, providing a user-friendly interface for accessing services and information.

In 2024, the national portal continues to evolve with the integration of advanced technologies such as AI and machine learning. These technologies enhance the portal's functionality by providing personalized recommendations, improving search capabilities, and automating routine tasks. For example, AI-powered chatbots are available on the portal to assist users with common inquiries and guide them through service processes.

The portal also emphasizes data security and privacy, with robust measures in place to protect user information and ensure compliance with data protection regulations. The government has implemented advanced encryption technologies and secure authentication methods to safeguard sensitive data and maintain user trust.

4.5. Government CIO [GCIO]

The role of the government CIO in Italy is crucial for driving the country's digital transformation agenda. The Department for Digital Transformation (DTT) oversees the implementation of digital policies and strategies, ensuring that government initiatives align with national goals and are effectively executed. The government CIO is responsible for coordinating digital projects, managing IT infrastructure, and fostering innovation within the public sector.

In 2024, the government CIO is focused on advancing Italy's digital infrastructure and supporting the implementation of the Digital Administration Code. This involves overseeing the development and integration of digital tools and systems across government agencies, ensuring that they are interoperable and aligned with the country's digital strategy.

The government CIO also plays a key role in policy development and regulatory oversight, working to ensure that digital policies address emerging challenges and align with international best practices. This includes developing policies on data protection, cybersecurity, and digital inclusion, as well as engaging with stakeholders to promote collaboration and innovation in the tech sector.

4.6. E-Government Promotion [EPRO]

Italy's promotion of e-government is characterized by efforts to increase digital adoption and enhance public engagement with online services. The government has launched various initiatives to raise awareness about the benefits of e-government and encourage citizens to use digital platforms for accessing public services. This includes public awareness campaigns, digital literacy programs, and community outreach efforts.

In 2024, the government continues to focus on public trust and transparency in digital services. Initiatives such as the "Open Government Data" program provide citizens with access to government data, promoting transparency and enabling informed decision-making. By making data available and engaging with the public, Italy aims to build trust in digital services and ensure that they meet the needs of its citizens.

Additionally, Italy's e-government promotion includes fostering partnerships with the private sector to drive innovation and improve service delivery. The government collaborates with technology companies and startups to develop new digital solutions and enhance existing services. These collaborations contribute to the growth of the digital economy and support Italy's broader goals of digital transformation.

4.7. E-Government Participation [EPAR]

Italy is making significant efforts to enhance e-participation by providing citizens with opportunities to engage with the government through digital channels. The "Partecipa" platform is a key initiative in this area, offering a space for public consultations, feedback submissions, and citizen engagement in decision-making processes. This platform enables citizens to participate in discussions about policy proposals, provide input on government projects, and stay informed about ongoing initiatives.

In 2024, Italy is expanding its use of digital tools for public engagement, including online forums, surveys, and social media platforms. These tools facilitate real-time interactions between citizens and government officials, allowing for quicker responses to public concerns and suggestions. The government is also working to improve digital literacy to ensure that all citizens can effectively participate in e-engagement activities.

The focus on AI and data analytics is enhancing Italy's approach to e-participation by enabling more effective analysis of citizen feedback. By using these technologies to process and interpret feedback, the government can gain deeper insights into public sentiment and preferences. This data-driven

approach helps refine policies and improve service delivery by aligning government actions with the needs and expectations of the population. Italy's investment in AI and data analytics for e-participation reflects a commitment to creating a more responsive and transparent government.

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

Italy's digital transformation is closely linked to the use of open government data, which is pivotal for fostering innovation and enhancing transparency. The Open Data Portal is a central element of Italy's digital strategy, providing public access to a wide range of government datasets. This initiative aims to make data available to researchers, businesses, and the public to drive innovation and support evidence-based decision-making.

In 2024, the government is expanding its open data efforts by increasing the volume and variety of datasets available on the portal. This includes data on various sectors such as healthcare, transportation, and environmental monitoring. The government's commitment to open data is evident in its support for data-driven research and innovation initiatives, which leverage open datasets to develop new applications and solutions.

Additionally, Italy is focusing on data privacy and security as it promotes open government data. The government has implemented policies and technologies to protect sensitive information while ensuring that the release of data does not compromise individual privacy. This balance between openness and security is crucial for maintaining public trust and ensuring that digital transformation efforts are aligned with ethical standards and regulatory requirements.

4.9. Cyber Security [CYB]

Italy places a strong emphasis on cybersecurity as part of its digital transformation efforts, recognizing the importance of protecting digital assets and infrastructure. The National Cybersecurity Strategy outlines key objectives for safeguarding critical infrastructure, securing personal data, and enhancing the country's overall cybersecurity posture. This strategy includes measures for threat detection, incident response, and public-private collaboration.

In 2024, Italy has reinforced its cybersecurity infrastructure through the establishment of the National Cybersecurity Agency (ACN). The ACN is responsible for coordinating national cybersecurity efforts, providing support to organizations, and developing policies to address emerging cyber threats. The

agency's role includes monitoring cyber incidents, providing guidance on best practices, and facilitating information sharing between public and private sectors.

Italy is also investing in cybersecurity education and awareness programs to build capacity and promote a culture of security. These initiatives aim to educate government employees, businesses, and the general public about cybersecurity risks and best practices. By enhancing awareness and preparedness, Italy is working to strengthen its cybersecurity resilience and protect against evolving threats.

4.10.   The use of Emerging ICT [EMG]

Italy is actively exploring and adopting emerging ICT trends to drive innovation and support its digital transformation goals. In 2024, the government is focusing on several key areas, including artificial intelligence (AI), blockchain technology, and Internet of Things (IoT). These technologies are seen as essential for enhancing public services, fostering economic growth, and addressing societal challenges.

The government's AI strategy includes initiatives to support AI research and development, promote the adoption of AI technologies in various sectors, and ensure ethical use of AI. Projects such as AI for Healthcare and AI in Public Administration are examples of how AI is being used to improve service delivery and decision-making processes. The government is also working on developing an AI regulatory framework to address ethical and privacy concerns.

Blockchain technology is being explored for its potential to enhance transparency and efficiency in areas such as public records management and supply chain tracking. Italy is supporting pilot projects and research to evaluate the benefits and challenges of blockchain applications in the public sector.

The adoption of IoT is driving the development of smart city projects and digital infrastructure initiatives. By deploying IoT sensors and devices, Italy aims to improve urban management, enhance public services, and support innovation in areas such as transportation and environmental monitoring. The government's focus on emerging ICT reflects its commitment to leveraging new technologies to drive progress and improve the quality of life for its citizens.

8. 3 Research Papers on Digital Government Related Trends

A. Progress of AI in both Government and Private Sectors

B. 5G Applications to Health, Mobility, and Local Economic Development as DX Promoter

C. Progress of Smart Cities in ASEAN 6 (Indonesia, Thailand, Vietnam, Singapore, Malaysia, and the Philippines)

A. Progress of AI in both Government and Private Sectors

I. Introduction

Artificial Intelligence (AI) continues to reshape the landscape of virtual and e-government operations globally. In 2024, countries with high development rankings have integrated AI into their governmental frameworks to streamline public services, enhance citizen engagement, and increase operational efficiency. AI, defined as machine-based systems capable of performing tasks such as predicting, making decisions, and providing recommendations, plays a transformative role in modernizing government functions. A notable trend is the focus on AI-driven public health systems, where AI tools are used for diagnostics, predictive healthcare, and managing health resources efficiently, especially in nations prioritizing public health as a key component of digitalization efforts (Hess et al., 2024). Additionally, AI is crucial in cybersecurity and data protection, with governments investing heavily in AI solutions to secure sensitive information and protect citizens' privacy. Similarly, in the private sector, AI drives innovation across various industries. Retail and e-commerce businesses utilize AI for personalized recommendations and optimized inventory management, while financial services use it for fraud detection and personalized advice. The manufacturing sector benefits from AI through predictive maintenance and process optimization, enhancing production efficiency. This widespread adoption of AI highlights its pivotal role in both public and private sectors, driving comprehensive digital transformation and improving overall efficiency and service delivery.

II. Discussion and Findings:

1. Artificial Intelligence Implementations in Government Operations

AI has been widely adopted across various sectors, with governments increasingly recognizing its potential to drive efficiency, transparency, and citizen satisfaction. Countries like Singapore, Estonia, and South Korea have led the charge, integrating AI technologies into their virtual government systems to automate administrative processes, streamline public service delivery, and enhance decision-making (World Bank, 2024). These efforts have resulted in faster response times, improved data management, and more personalized citizen interactions. Concurrently, the private sector has also embraced AI, leveraging its capabilities to transform business operations. In retail, AI-powered algorithms enable personalized shopping experiences and efficient inventory management, while financial institutions use AI for predictive analytics and fraud detection. The manufacturing industry benefits from AI through predictive maintenance and automated production lines, enhancing operational efficiency. Countries in the Waseda rankings have increased their AI-related budgets,

prioritizing public safety, infrastructure management, and smart cities. However, each country's approach to AI remains unique, tailored to their specific needs, political environments, and digital readiness. Overall, the collective efforts of these top-ranked countries and private enterprises showcase AI's potential to transform governance and business while emphasizing the need for ongoing innovation, regulation, and ethical considerations in its implementation. This research examines AI implementations in several top-performing countries, as ranked by the Waseda e-Government Rankings 2024, to understand how AI influences policymaking, service delivery, public administration, and private sector advancements.

2. Countries analysis

2.1. Singapore

In 2024, Singapore's public sector continues to drive AI adoption through strategic initiatives like the Smart Nation Initiative, which integrates AI into public services such as traffic management and healthcare. AI-powered predictive analytics streamline traffic flow, while advanced surveillance systems enhance public safety. The government's Model AI Governance Framework promotes responsible AI use by focusing on transparency and fairness, and the AI Verify program, launched in 2022, helps organizations assess the trustworthiness of their AI systems (Lee Kuan Yew School of Public Policy, 2023). Ongoing investments in AI research and infrastructure aim to cement Singapore's leadership in AI-driven public services.

In the private sector, AI adoption is thriving across finance, healthcare, manufacturing, and retail. Financial institutions like DBS and OCBC employ AI for fraud detection and customer service, while healthcare startups such as Kronikare and Biofourmis lead in AI-powered wound care and remote patient monitoring. Manufacturing companies, including Rolls-Royce and ST Engineering, are adopting AI to optimize operations and automate processes. In retail, AI enhances personalized marketing and logistics, improving efficiency and customer experiences. These advancements highlight the private sector's essential role in Singapore's AI progress.

2.2. The United Kingdom (UK)

In 2024, the United Kingdom has made significant strides in AI within the government sector, particularly in healthcare through the National AI Strategy. AI initiatives in the National Health Service (NHS) are set to enhance early disease detection and diagnostic accuracy, potentially reducing healthcare costs by millions and improving patient outcomes (UK Government, 2021). The

government aims to address issues such as poor data quality and outdated IT infrastructure, though many departments still struggle with fragmented AI strategies and complex legacy systems.

In contrast, the private sector in the UK has shown greater agility in AI adoption, largely due to economic incentives and substantial investments. AI could add £550 billion to the UK economy by 2035 if businesses overcome current barriers like digital infrastructure and skills shortages. Since 2016, the sector has attracted over £20 billion in AI investment, positioning the UK as a leading player in Europe's tech ecosystem (Microsoft, 2023). Despite this, challenges persist, including gaps in digital infrastructure and a need for a more skilled workforce, which could affect the sector's ability to sustain its growth and competitive edge.

2.3. Denmark

Denmark, the top-ranked country in the Waseda e-Government Rankings for 2024, is making significant strides in AI adoption across both government and private sectors. The Danish government's National Strategy for Artificial Intelligence emphasizes responsible, human-centered AI development, targeting key areas such as health, energy, agriculture, and transportation. A standout feature of Denmark's approach is its commitment to ethical AI. The strategy incorporates an ethical framework grounded in six principles, emphasizing human dignity, equality, and transparency (Mohan, 2020).

In the private sector, Denmark has seen rapid adoption of AI, particularly among large corporations. The private sector's success is supported by Denmark's advanced digital infrastructure and access to high-quality public data, which are crucial for AI development. The collaboration between 25 private and public organizations, including IBM Denmark, is an example of how the private sector is deeply integrated into Denmark's AI ecosystem (Invest In Denmark, 2024). The private sector's innovation is also evident in AI applications across various industries, such as healthcare, where AI aids in diagnostics, and energy, where it supports Denmark's renewable energy ambitions.

Denmark's leadership in AI, backed by ethical oversight and strong public-private collaboration, reinforces its position at the top of global e-government rankings. The integration of AI into both public services and private industry highlights Denmark's comprehensive approach to digital transformation, combining advanced technology with a commitment to ethical standards and collaborative innovation. This holistic strategy not only enhances public services but also drives economic growth and fosters a robust AI ecosystem, solidifying Denmark's role as a leader in AI adoption and implementation.

2.4.   The United States of America (USA)

In 2024, the United States continues to make substantial progress in AI adoption across public sectors, driven by strategic initiatives from government agencies. The National Science Foundation (NSF) and other agencies have funded AI research institutes focusing on sectors like agriculture, healthcare, and security, ensuring the U.S. remains a leader in AI innovation. In defense, the Department of Defense (DoD) utilizes AI through programs such as Project Maven, which enhances drone surveillance and military operations. The Centers for Disease Control and Prevention (CDC) use AI for predictive analytics in managing public health crises, while the Federal Emergency Management Agency (FEMA) leverages AI to optimize disaster response. These advancements highlight AI's critical role in improving public services and national security (Centers for Disease Control and Prevention, 2024).

In the private sector, U.S. tech giants such as Google, Microsoft, and Amazon lead AI research and development, with applications spanning natural language processing, autonomous systems, and AI-driven cloud services. The finance sector has widely adopted AI for algorithmic trading and fraud detection, while retail giants like Amazon utilize AI to enhance personalization and supply chain optimization. Companies like Tesla and Waymo continue pushing the boundaries of autonomous vehicle technology, aiming to develop safer self-driving cars. Despite this rapid progress, ethical and regulatory challenges such as AI bias and data privacy remain, prompting both public and private sectors to focus on AI governance and workforce development.

2.5.   South Korea

In 2024, South Korea continues to advance in AI adoption across public services, particularly in healthcare, education, and governance. AI-driven diagnostic tools and telemedicine services have significantly improved patient care, a trend accelerated by the COVID-19 pandemic. To foster AI education, the government has introduced specialized programs at universities and retraining opportunities for professionals, ensuring the workforce is equipped for the evolving job market (Park & Cho, 2023). In terms of regulation, South Korea is working on establishing ethical frameworks that promote transparency, accountability, and fairness in AI applications, addressing growing concerns around data privacy and ethical use.

The private sector in South Korea is also making notable contributions to AI development. Tech giants such as Samsung and Naver lead AI innovation, with Samsung integrating AI into products ranging from smartphones to home appliances and establishing global AI research centers. Startups like Vuno and Lunit are pioneering AI applications in healthcare diagnostics, while Hyundai Robotics is

advancing AI-powered robotics for manufacturing. The entertainment industry, with companies like Kakao and CJ ENM, leverages AI for personalized content recommendations and virtual influencers. These developments, supported by international partnerships with the US and EU, position South Korea as a strong contender in the global AI race.

2.6. Netherlands

In 2024, the Netherlands has made remarkable progress in integrating AI into public services, backed by a comprehensive national AI strategy. The government emphasizes ethical AI use, focusing on transparency, accountability, and minimizing biases in AI systems. The National AI Coalition plays a central role in guiding AI development while ensuring that it aligns with Dutch societal values. AI has been integrated into key sectors such as healthcare, where predictive analytics improve patient care, and transportation, where AI optimizes traffic management and public transport systems. Additionally, AI enhances administrative functions like fraud detection, tax collection, and cybersecurity (Di Iorio et al., 2022). Collaboration with the EU ensures that the Netherlands remains at the forefront of responsible AI regulation.

The Netherlands boasts a thriving AI startup ecosystem, with innovation hubs in cities like Amsterdam and Eindhoven. Dutch industries, including agriculture, finance, and logistics, are leveraging AI to drive efficiency and innovation. For instance, the agricultural sector uses AI for precision farming, optimizing crop yields while minimizing resource usage. The financial sector adopts AI for risk management, fraud detection, and personalized financial services. Collaborative efforts between the private sector, academia, and government fuel AI research and development, supported by significant venture capital investments. AI's impact on healthcare is also substantial, with private providers using AI-driven diagnostic tools and predictive models to enhance patient outcomes. Overall, the Netherlands' focus on ethical AI development positions the country as a leader in AI innovation.

2.7. Estonia

In 2024, Estonia e-governance system, supported by the X-Road platform, enables secure data exchange between government and private databases, forming the backbone for AI-driven services. Notable AI applications include Kratt, an AI chatbot that assists citizens with inquiries about government services, and Hugo, an AI legal assistant that democratizes access to legal resources. AI is also being integrated into law enforcement for predictive policing, optimizing resource allocation by analyzing crime data. In the judicial system, AI tools assist in case processing and decision-making, streamlining workflows and enhancing efficiency. Estonia's commitment to fostering public-private

partnerships and collaborating with the EU on AI frameworks demonstrates its role as a leader in AI innovation and ethical governance (Lodato & Messa, 2022).

In the private sector, Estonia's vibrant AI startup ecosystem continues to thrive. Companies like Veriff are pioneering digital identity verification solutions, while Starship Technologies is leading the way in autonomous delivery robots. These innovations highlight Estonia's growing influence in AI technology. In healthcare, AI is employed in platforms such as Cognuse, which offers personalized cognitive training and rehabilitation programs. In education, AI-driven platforms are helping tailor learning experiences to individual needs, supporting both students and educators. Estonia's active engagement in public-private partnerships and EU-wide AI projects underscores its strategic approach to fostering AI advancements and maintaining its competitive edge in the global market.

2.8.   Saudi Arabia

Saudi Arabia's National Strategy for Data & AI (NSDAI), with the ambition of becoming a global leader in AI by 2030, is pivotal to Saudi Arabia's Vision 2030. A notable example of this ambition is the $500 billion Neom project, which integrates AI across various domains including urban planning, autonomous transportation, renewable energy, and healthcare (Al Arabiya, 2023). The NSDAI also focuses on enhancing healthcare through AI-driven diagnostics and predictive analytics, as well as improving education with AI tools designed to personalize learning and boost administrative efficiency.

In the private sector, Saudi Arabia's adoption of AI is transforming several key industries. The financial sector is increasingly utilizing AI for fraud detection, customer service automation, and risk management, with AI-powered chatbots becoming a standard feature in banking services. The oil and gas industry, led by companies like Saudi Aramco, is leveraging AI for predictive maintenance, exploration, and optimization of production processes. Similarly, the retail and e-commerce sectors are using AI for personalized marketing, inventory management, and enhancing customer experience through recommendation systems. Telecommunications companies are applying AI to optimize network management and service delivery, particularly with the rollout of 5G networks. Additionally, a burgeoning startup ecosystem is emerging, supported by initiatives such as the Saudi AI & Robotics Accelerator program, which fosters innovation across various sectors.

2.9.   Germany

Germany is also a leader in AI research and development, with hubs like Cyber Valley in Tübingen contributing to European AI innovation. The government has made substantial progress in both the public and private sectors since launching its National AI Strategy in 2018, with a €3 billion investment aimed at fostering AI research, ethical practices, and societal contributions (Deutsche Welle, 2018). The country actively participates in EU-wide research projects, striving for AI standardization across the bloc. However, ensuring a skilled AI workforce presents challenges, which Germany addresses through significant investment in education and training programs for reskilling and upskilling. Data privacy and security, especially under GDPR, remain top concerns as AI integration deepens. Balancing these ethical and legal considerations with technological advancement is a key focus of Germany's AI agenda, ensuring that innovation serves the public good responsibly and securely.

In the private sector, Germany's industrial and manufacturing capabilities are bolstered by AI-driven Industry 4.0 technologies. AI is widely used for predictive maintenance, supply chain optimization, and smart manufacturing processes. Automotive giants such as Volkswagen, BMW, and Daimler are at the forefront of integrating AI into autonomous driving, intelligent logistics, and production automation. The AI startup ecosystem is thriving in cities like Berlin and Munich, supported by government funding and venture capital, fostering innovation in sectors ranging from financial services to healthcare. However, challenges remain in upskilling the workforce and addressing data privacy concerns, particularly given the EU's stringent GDPR governing AI use.

2.10. New Zealand

In 2024, New Zealand has made significant strides in AI integration across various sectors, with strategic support from the Ministry of Business, Innovation, and Employment (MBIE). The public sector leverages AI for enhanced healthcare through predictive analytics, which improves patient care and resource allocation, and supports mental health initiatives with AI-driven platforms. In agriculture, AI aids in crop management, pest control, and resource optimization, crucial for New Zealand's agriculture-driven economy (New Zealand Department of the Prime Minister and Cabinet, 2024). AI also automates social services and improves resource allocation efficiency.

The private sector in New Zealand has witnessed a surge in AI startups focused on machine learning, natural language processing, and computer vision. These startups are innovating in areas like healthcare, financial services, and retail. Investment in AI has increased significantly, with venture capital flowing into AI-driven enterprises, reflecting strong confidence in the technology's future. For

instance, AI-driven solutions in agriculture include precision farming tools that use drones and IoT devices to enhance productivity. Financial services benefit from AI through advanced fraud detection and personalized financial advice platforms (VentureBeat, 2024). Despite progress, challenges such as a shortage of skilled AI professionals and ethical issues related to data privacy persist. Ongoing collaboration between government, industry, and academia is crucial for addressing these challenges and fully harnessing AI's potential.

2.11. Japan

Japan has proactively integrated AI into its societal framework, which highlights Japan's commitment to embedding AI across diverse sectors such as healthcare, transportation, and public administration. The country's recent "AI Social Principles" underscore a focus on safety, security, and fairness in AI applications, promoting responsible use of technology (Humane AI, 2024). In public administration, AI-driven chatbots streamline municipal services, enhancing interaction efficiency and administrative processes. Additionally, predictive analytics powered by AI play a crucial role in disaster management, helping Japan better prepare for and respond to natural disasters like earthquakes and typhoons.

In the healthcare sector, Japan's AI advancements extend beyond pandemic response to include disease prediction, patient management, and resource optimization. Institutions such as the National Institute of Advanced Industrial Science and Technology (AIST) are pivotal in driving AI research and its application across various fields. This research is complemented by public-private collaborations focused on developing smart cities, where AI enhances energy management, transportation efficiency, and public services. The synergy between government initiatives and private industry is also evident in AI's role in manufacturing and industry, where companies like Toyota and Mitsubishi employ AI for predictive maintenance and quality control, driving smart factory innovations.

Japan's private sector is equally dynamic, with AI transforming industries such as finance, retail, and entertainment. Financial institutions utilize AI for risk management and fraud detection, while e-commerce giants like Rakuten leverage AI for personalized marketing and inventory management. The country's automotive industry leads in developing autonomous vehicles, with Honda and Nissan investing significantly in self-driving technology. Additionally, Japan's entertainment sector benefits from AI in gaming, anime production, and content creation, reflecting the broad and impactful application of AI across various domains.

2.12. Canada

Canada's progress in AI within government sectors is marked by substantial investments and strategic initiatives. In 2024, the Canadian government allocated $2.4 billion to enhance AI capabilities, including $2 billion for the AI Compute Access Fund and the Canadian AI Sovereign Compute Strategy (Prime Minister of Canada, 2024). This funding supports essential research and protects Canadian data and intellectual property. The government is also advancing the Artificial Intelligence and Data Act (AIDA), part of Bill C-27, which aims to regulate AI technologies responsibly. Public sector AI applications include fraud detection by the Canada Revenue Agency (CRA), personalized job-matching by Employment and Social Development Canada (ESDC), and improved military training by the Department of National Defence (DND).

In the private sector, Canada's AI industry has grown significantly, with both domestic firms and global tech giants investing heavily in AI R&D. The Pan-Canadian Artificial Intelligence Strategy, receiving over $443 million in its second phase, bridges AI research with commercial applications and supports Canadian businesses (Canada, 2024). Collaborations with global tech companies further bolster Canada's AI infrastructure and talent. This alignment between public policy and private investment positions Canada as a global leader in AI innovation.

2.13. Ireland

The Irish government's AI strategy, aligned with EU regulations like the AI Act, supports innovations in public services such as energy management and environmental monitoring to aid Ireland's climate goals. By adhering to these stringent frameworks, Ireland ensures responsible AI deployment that respects privacy and ethical considerations (European Commission, 2024). To address the obstacles such as a growing skills gap in AI expertise, Ireland is investing in educational programs to upskill the workforce and ensure that ethical guidelines keep up with AI advancements.

In the private sector, Ireland's technology, finance, and pharmaceutical industries are leveraging AI for applications like data analytics, customer service, and process automation. The nation benefits from a vibrant AI startup ecosystem, supported by research centers such as the ADAPT Centre and the Insight Centre for Data Analytics, which drive innovation through collaboration between academia and industry (Insight Centre, 2024). However, obstacles such as a skills gap and the need for robust ethical frameworks remain. Addressing these challenges is crucial as Ireland seeks to enhance its position as a tech hub, attract further foreign investment, and ensure that AI development remains sustainable and ethical.

2.14. Sweden

The Swedish government has implemented AI-driven automation for routine administrative tasks such as processing applications and managing records, which helps streamline operations and enhance customer service through chatbots. In healthcare, AI is making significant strides, particularly in diagnostics and personalized medicine, where AI systems analyze medical data and radiology images to improve healthcare delivery and patient outcomes. Furthermore, Sweden's social services leverage predictive analytics to anticipate and address societal issues like unemployment, enabling better resource allocation and planning for preventive interventions. In transportation, the Swedish Transport Administration is using AI to develop autonomous vehicles and improve traffic management in smart cities, contributing to the reduction of accidents and improving traffic flow.

Sweden also plays a leading role in shaping the ethical and regulatory framework for AI within the European Union (EU), emphasizing responsible and transparent AI use. The government is active in creating guidelines to ensure fairness and non-discrimination, particularly in sectors like healthcare, where the ethical use of AI is critical (Flanders Investment & Trade, 2020). Despite these advancements, Sweden faces a shortage of AI professionals, which is seen as a challenge to continued growth in the field. To combat this, the government and private sector are investing in educational and training initiatives to close this talent gap. On the industry side, sectors such as manufacturing, retail, and financial services are rapidly adopting AI, with companies like Volvo and Scania utilizing AI for predictive maintenance and supply chain optimization, while major banks use AI for fraud detection and risk management. AI Sweden, the national center for AI innovation, serves as a hub for accelerating AI adoption through research, knowledge sharing, and pilot projects.

2.15. Iceland

In the public sector, AI is playing a key role in advancing Iceland's digital government strategies. A notable development in 2024 is the use of AI in public health and environmental monitoring. AI-driven systems have been deployed to enhance medical diagnostics, allowing healthcare professionals to detect early signs of diseases, particularly in rural areas with limited access to specialized medical facilities. For instance, Iceland's national health system has integrated AI-powered diagnostic tools to detect cardiovascular diseases and certain types of cancers, improving patient outcomes by offering early treatment options (Ministry of Health, Iceland, 2019).

In the private sector, AI is transforming tourism with personalized travel recommendations and language translation tools to cater to international visitors. The fisheries industry is utilizing AI for

predictive analytics, ensuring sustainable fishing practices by tracking fish populations and optimizing routes. AI also enhances customer service and fraud detection in the financial sector, with banks adopting AI-powered chatbots and advanced fraud detection systems. Iceland's growing AI startup ecosystem, supported by initiatives like the Icelandic Innovation Fund, is fostering innovation across sectors such as healthcare, finance, and green tech, driving the country's AI advancement forward.

2.16. Norway

Norway has established itself as a frontrunner in digital transformation, integrating AI to enhance public services across key sectors. In healthcare, AI is driving predictive analytics, improving patient care, and optimizing the management of medical resources. Initiatives like "Helseplattformen" are designed to streamline healthcare services through AI further, ensuring better patient outcomes and more efficient resource distribution. Similarly, AI has transformed public administration, with the Norwegian Tax Administration utilizing AI to streamline tax processing, improve fraud detection, and enhance overall service delivery. Norway significantly emphasizes ethical AI deployment, with robust collaboration between government, academia, and the private sector (Computer Weekly, 2024). Universities are central to AI research, while the country also participates in international initiatives to align its policies with global standards.

In the private sector, AI is critical to Norway's energy and sustainability initiatives. Major companies like Equinor leverage AI to optimize oil and gas exploration and production while also using it to reduce carbon emissions (Equinor, 2024). Additionally, AI plays a significant role in Norway's renewable energy sector, particularly in wind and hydropower management. The financial sector has also embraced AI, with Norwegian banks and fintech startups deploying AI for customer service, risk management, fraud detection, and personalized financial advice. AI is revolutionizing operations in logistics and transportation through improved supply chain optimization and autonomous maritime solutions led by companies like Kongsberg. Norway's startup ecosystem is vibrant, with government support for AI innovation through funding, incubation programs, and research collaboration.

2.17. Finland

In 2024, Finland is advancing significantly in the realm of artificial intelligence (AI), building upon its foundational National AI Strategy, "Finland's Age of Artificial Intelligence," which aims to establish the country as a global AI leader by 2025 (UNCTAD, 2019)). Ethical AI remains central to Finland's AI strategy, with the country strengthening its ethical guidelines to ensure AI respects privacy, human rights, and operates transparently and without bias. Finland's "Elements of AI" course,

developed by the University of Helsinki, has gained international acclaim, educating millions globally. The Finnish government continues to expand AI literacy programs, aiming to educate 1% of the global population about AI and extending these initiatives to more schools and businesses.

In the private sector, major players such as Nokia, Supercell, and HUS Helsinki University Hospital are leveraging AI for predictive analytics, customer service automation, and personalized healthcare. The Finnish startup ecosystem is thriving, with Helsinki emerging as a hub for AI-driven startups supported by incubators and government funding. Companies like Konecranes and Valmet are integrating AI into manufacturing processes to enhance production efficiency and reduce costs. Additionally, collaborations between Finnish universities and industry, such as those facilitated by the Finnish Center for Artificial Intelligence (FCAI), are advancing practical AI applications across various sectors

Despite these advancements, Finland faces challenges, including a notable talent and skills gap. While the general population is becoming more AI literate, the demand for highly specialized AI professionals continues to exceed the available supply. In response, the government is increasing investments in AI training programs and fostering international collaborations to attract skilled talent. Additionally, many AI innovations are still in the pilot phase, and scaling these solutions across various sectors remains a critical challenge for the future.

2.18. Switzerland

Switzerland continues solidifying its position as a global leader in responsible AI development with its updated National AI Strategy unveiled in 2023. This strategy emphasizes ethical AI, focusing on transparency, public trust, and the alignment of AI systems with human rights and global ethical standards (World Economic Forum, 2024). In public safety, the use of AI-driven predictive policing and surveillance systems has enhanced security measures while maintaining a strong commitment to privacy. Additionally, advancements in the transport sector include new AI-powered traffic management systems designed to reduce congestion and support autonomous public transport projects.

The Swiss government continues to bolster AI research and innovation through increased funding from the Swiss National Science Foundation, supporting public-private partnerships that drive developments in finance, robotics, and sustainability. Key industry players, including financial institutions like UBS and Credit Suisse, are leveraging AI for risk management, fraud detection, and customer service enhancements. In manufacturing, Swiss companies are integrating AI to optimize

production processes and develop advanced robotics, while pharmaceutical giants like Novartis and Roche are employing AI for drug discovery and personalized medicine.

Switzerland faces ongoing challenges in balancing innovation with regulation, particularly concerning data privacy and the potential for bias in AI systems. The country is actively working to create a flexible regulatory framework that supports innovation while safeguarding citizens' rights. Ethical considerations remain a priority, with ongoing discussions aimed at addressing issues of data privacy and bias in AI technologies. Switzerland's commitment to global collaboration further strengthens its role in shaping responsible AI standards and sharing best practices internationally.

2.19.   Taiwan

Taiwan has established itself as a key player in the global AI landscape, thanks to both government-led initiatives and private sector innovations. Notably, the 2023 launch of a Taiwan-specific generative AI system, designed to meet local needs in finance and government data processing, highlights Taiwan's focus on creating tailored AI solutions (Chambers, 2024). In 2024, Taiwan further expanded AI integration into key sectors like healthcare and education. AI-powered diagnostics and predictive analytics are improving patient outcomes in hospitals, optimizing resource use, and enhancing the healthcare system's efficiency. In education, AI-driven personalized learning tools are being deployed, significantly improving student engagement and learning outcomes. Furthermore, Taiwan is proactive in addressing ethical concerns surrounding AI. In 2023, the government introduced updated guidelines emphasizing data privacy, fairness, and transparency in AI deployment. Collaboration between the government, academia, and private sector ensures that AI developments align with societal values while adhering to global governance standards.

The private sector in Taiwan has also significantly contributed to AI progress, particularly in hardware innovation. Taiwan's dominance in the AI chip market is widely recognized, with TSMC supplying over 90% of the world's advanced semiconductors for AI applications (CNN, 2024). Moreover, international companies like Google have expanded their AI operations in Taiwan, launching initiatives such as the Gemini Academy, which focuses on enhancing AI literacy among local developers and promoting AI-driven innovations across industries. Taiwan's leadership in AI hardware and software development ensures the country remains at the forefront of global AI advancements.

2.20.   Thailand

In 2024, Thailand continues to advance its AI capabilities as part of its broader Thailand 4.0 initiative, which aims to drive economic growth and innovation through technology. The Thai government has been actively advancing its AI agenda through the "Thailand 4.0" initiative, which focuses on leveraging AI to enhance public services and boost economic growth. AI applications in the public sector have become increasingly prevalent, particularly in areas such as healthcare, where AI-driven diagnostics and patient management systems are improving service delivery and patient outcomes. The government is also utilizing AI for smart city projects, which include AI-powered traffic management systems designed to reduce congestion and enhance urban planning (Thailand Ministry of Digital Economy and Society, 2024).

In the private sector, Thailand is witnessing a surge in AI-driven innovation, particularly within the technology and finance industries. Thai tech companies are leading the way in developing AI solutions for fintech, including advanced algorithms for fraud detection, risk management, and customer personalization. Additionally, the manufacturing sector is embracing AI to optimize production processes, enhance supply chain management, and implement predictive maintenance strategies. The startup ecosystem in Thailand is vibrant, with numerous AI startups emerging in Bangkok and other major cities, supported by local incubators and venture capital. These startups are working on cutting-edge applications in sectors such as e-commerce, health tech, and logistics (Thailand Board of Investment, 2024).

2.21. UAE

In 2024, the United Arab Emirates (UAE) continues to lead in artificial intelligence (AI) innovation, driven by its ambitious National AI Strategy 2031. This strategy aims to position the UAE as a global AI leader by 2031, with significant advancements across various sectors including transportation, healthcare, education, and energy (UAE Artificial Intelligence Office, 2021). The UAE's healthcare sector has seen transformative changes through AI integration, particularly in early disease detection, telemedicine, and personalized treatment. The Ministry of Health and Prevention (MOHAP) has implemented advanced AI systems to improve diagnostic accuracy and optimize patient care, including predictive models for managing health crises. In law enforcement, Dubai Police have advanced their use of AI with predictive policing technologies designed to forecast and prevent criminal activities.

In the private sector, AI substantially impacts finance, retail, real estate, and energy. UAE banks, such as Emirates NBD, are utilizing AI for customer service enhancements, fraud detection, and risk

management, with AI-powered virtual assistants and chatbots becoming commonplace. The retail industry leverages AI for personalized shopping experiences, inventory management, and predictive analytics to better understand consumer behavior. In real estate, AI supports property management, predictive maintenance, and virtual tours, aiding investors in making informed decisions. The energy sector is also incorporating AI to optimize renewable energy production, manage smart grids, and predict equipment maintenance needs. Additionally, the UAE's burgeoning AI startup ecosystem is bolstered by government support, incubators, and collaborations with global tech giants like IBM, Microsoft, and Google, driving further innovation across the region (UAE Artificial Intelligence Office, 2021).

2.22. Australia

Australia has made big steps forward in artificial intelligence (AI) thanks to new versions of its National AI Roadmap and AI Action Plan. The new AI Ethics Framework, which stresses fairness, openness, and responsibility in AI applications (Australian Government Business, 2024), shows that the government is serious about making AI ethical. With the opening of new AI and Digital Capability Centers in 2024, the government built on the $124 million investment the year before. Australia needs to stay ahead of the world's competition, especially regarding AI-driven climate protection and digital healthcare systems (Australian Government Business, n.d.). These centers focus on new ideas and large-scale AI solutions.

Australia's business industry is working hard to use AI in a wide range of fields. Leaders in the mining and resources sector, such as Rio Tinto and BHP, are using AI to automate tasks, plan maintenance, and handle resources in order to run their businesses more efficiently and have less of an effect on the environment. AI is improving customer service, risk management, and scam spotting in finance. More and more, robots and personalized financial advice are being used. AI also helps the retail industry by analyzing customers, streamlining the supply chain, and displaying more relevant ads. This makes the shopping experience better for customers and better manages stock. Even with these improvements, Australia still has trouble making sure AI is used in a decent way and building a skilled workforce. The main topics of ongoing talks are data protection and making good legal systems to help people use AI responsibly.

2.23. France

The French government has reinforced its commitment to AI development with an updated National AI Strategy, which focuses on fostering innovation, ethical standards, and sector-specific applications.

AI technologies are now extensively integrated into French public services, including healthcare and transportation. For instance, French hospitals are using AI for predictive diagnostics and personalized medicine, which aims to improve patient outcomes and streamline healthcare services (European Commission, 2023). Additionally, AI is enhancing public transportation systems through smart traffic management and real-time scheduling, contributing to more efficient and sustainable urban mobility.

On the private sector front, France boasts a thriving AI ecosystem characterized by robust corporate investments and a dynamic startup landscape. Major French companies, such as Airbus and Renault, are integrating AI to optimize various aspects of their operations. Airbus utilizes AI to advance manufacturing processes and enhance product design through predictive analytics and automation (Airbus, 2024). The financial sector also benefits from AI, with institutions like BNP Paribas leveraging AI for fraud detection, risk management, and customer service enhancements.

Despite these advancements, France faces challenges such as ensuring data privacy and addressing the skills gap in AI expertise. The government is addressing these issues through regulatory frameworks that balance innovation with privacy protections and by investing in education and training programs to build a skilled AI workforce. Overall, France's strategic approach and ongoing investments in AI are positioning it as a significant player in the global AI landscape, driving progress across both public services and private industry (French Government, 2024).

2.24. Indonesia

Indonesia's National AI Strategy 2020-2045 emphasizes leveraging AI to foster economic growth, enhance public services, and bolster national security. Key areas of focus include healthcare, bureaucratic efficiency, education, food security, and the development of smart cities. The integration of AI into smart city initiatives in Jakarta, Bandung, and Surabaya exemplifies this commitment, with AI technologies being used to manage traffic, ensure public safety, optimize waste management, and improve disaster response efforts. Additionally, AI is enhancing healthcare services through predictive analytics and disease detection, significantly improving access and efficiency, especially in remote areas.

The rise of AI startups, such as Kata.ai, Nodeflux, and Hara, underscores the dynamic growth in sectors like fintech, e-commerce, and healthcare (Tracxn, 2024). The financial industry has particularly embraced AI, employing it for fraud detection, credit scoring, and personalized services, thereby enhancing operational efficiency and customer experience. Retail and e-commerce platforms

like Tokopedia and Bukalapak are utilizing AI for personalized recommendations, inventory management, and demand forecasting, transforming the shopping experience and optimizing their operations. Moreover, telecom giant Telkomsel and other companies are leveraging AI for network management and customer service improvements. Despite these advancements, Indonesia faces challenges such as a shortage of skilled talent, data privacy concerns, and the digital divide between urban and rural areas. Moving forward, the government's focus on innovation, digital infrastructure, and supportive regulation is expected to further propel Indonesia's position in the Southeast Asian AI landscape.

2.25. Italy

In public administration, Italy is leveraging AI to streamline operations, enhance efficiency, and reduce bureaucracy. AI-driven platforms are being introduced for automating document processing and customer service, aiming to improve public service delivery (Joinup, 2024). In healthcare, the focus is on optimizing diagnostics and patient care through AI, supported by government initiatives in medical imaging and personalized medicine. Additionally, smart city projects in cities like Milan and Turin use AI for real-time data analysis in urban mobility, energy management, and waste reduction, contributing to more efficient and sustainable urban environments.

Italy is incorporating AI into manufacturing processes, predictive maintenance, and supply chain management to enhance productivity and competitiveness as a cornerstone of its Industry 4.0 initiative in the private sector (Grimaldi & Galli, 2020). AI is also being implemented in the financial sector for the purposes of fraud detection, risk assessment, and customer service automation. In order to facilitate their digital transformation, major institutions are investing significantly in AI. AI is revolutionizing personalized marketing, inventory management, and customer experience in retail and e-commerce. Platforms are utilizing AI for dynamic pricing and recommendation systems. Innovations in software development, robotics, and data analytics are being facilitated by the burgeoning AI startup ecosystem in Italy, particularly in Milan and Rome, which is bolstered by robust partnerships between universities and research institutions. Italy is confronted with obstacles, including the complexity of complying with EU AI regulations and a skills deficit, despite these advancements.

III. Conclusion:

The analysis across 25 countries reveals that AI is transforming public and private sectors by enhancing efficiency, personalizing experiences, and optimizing resource management. Nations are

increasingly leveraging AI to streamline operations in healthcare, improve urban infrastructure, and bolster public safety. The majority of countries are investing in AI research, fostering public-private partnerships, and developing frameworks to ensure ethical and effective AI use. However, common obstacles persist, including challenges in data privacy, a shortage of skilled professionals, and navigating complex regulatory landscapes. Despite these hurdles, the trend towards integrating AI into public services is unmistakable, with governments recognizing its potential to drive innovation and improve quality of life. As AI continues to evolve, addressing these challenges will be crucial to maximizing its benefits and ensuring equitable and responsible deployment.

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B. 5G Applications to Health, Mobility, and Local Economic Development as DX Promoter.

I. Introduction

The implementation of 5G technology is revolutionizing public services and governance, becoming a key driver of government digital transformation, especially in the healthcare sector, mobility, and local economic development. In the healthcare sector, 5G facilitates the expansion of telemedicine, enabling remote diagnostics, virtual consultations, and real-time monitoring of patients, which is essential for improving access to healthcare services, especially in rural and underserved areas. 5G underpins the development of smart transportation systems, enabling smoother public transit operations, real-time traffic management, and the potential for safer, more efficient autonomous vehicles, enhancing urban mobility and public safety. Moreover, 5G plays a pivotal role in local economic development by enabling smart city initiatives. This includes better management of public infrastructure such as water, energy, and waste services, as well as enhancing government services through data-driven decision-making. The high-speed, low-latency capabilities of 5G allow for real-time data collection and analysis, enabling governments to optimize resource allocation, streamline public services, and enhance the overall quality of life for citizens. Governments are leading this transformation by investing in 5G infrastructure and crafting regulatory policies that facilitate its deployment in public sectors, ensuring that health, mobility, and local governance systems become more efficient, accessible, and future-ready.

II. Discussion and Findings:

1. 5G Applications in Government Operations

The Waseda rankings highlight significant advancements across 66 countries in implementing 5G applications to drive digital transformation (DX) in critical areas such as health, mobility, and local economic development. The rankings demonstrate that 5G is revolutionizing public services by enabling more efficient healthcare delivery, transforming mobility systems, and fostering smarter, data-driven local economies. The rankings also reveal that countries with early investments in 5G are reaping the benefits of enhanced public service delivery and governance. The following analysis of top 25 countries in the rankings will provide an in-depth look at how individual countries have implemented 5G across these sectors. Each country's unique strategies, challenges, and successes in using 5G as a tool for digital transformation will demonstrate how this technology is shaping the future

of health, mobility, and local economic growth. The examples will prove the role of 5G in driving public sector innovation and improving governance outcomes worldwide.

2.   Countries analysis:

2.1. Singapore

In Singapore, real-time healthcare and online patient tracking are made possible by 5G. This is especially helpful for the country's older population and people with long-term illnesses. High-speed, low-latency lines make it possible to have treatments and evaluations from afar, so people don't have to go to the hospital as often. Wearable gadgets that are linked via 5G send patient data to healthcare workers all the time. This lets them help patients sooner and improves their results. Smart hospitals in Singapore are also using 5G-powered autonomous robots to help with cleaning, delivering medicine, and moving patients. This makes the jobs of healthcare workers easier and increases the speed of the hospitals' operations.

5G's ultra-reliable, low-latency connection is helping Singapore move forward with its driverless vehicle (AV) projects. Buses and vans that don't need drivers are being tested. They're supposed to make public transportation work better and ease traffic. 5G also supports vehicle-to-everything (V2X) connection, which lets self-driving cars work with traffic infrastructure without any problems (Ng, 2024). This makes the roads safer and improves traffic flow. 5G-enabled smart traffic control systems use real-time data from sensors and cameras to cut down on traffic and make the roads safer. Smart parking solutions help drivers find open spots faster and with less pollution.

Additionally, the government is putting in place 5G so that public services like smart grids and energy-efficient systems can be managed and watched in real time. This helps cities grow in a way that doesn't harm the environment. 5G supports the growth of smart infrastructure and public services by making it easier to connect people in both cities and rural areas. This improves the quality of life and promotes economic growth that benefits everyone in the country.

2.2. The United Kingdom (UK)

The healthcare industry has changed in the UK since 5G technology was introduced. This is because it provides fast and low-latency connections, making real-time medical services possible. In turn, this makes it easier for doctors to do online visits and tests more quickly. This improves access to healthcare services, especially in areas that are hard to reach or don't have enough of them. In addition, 5G technology makes it easier to connect medical gadgets and smart tech, which lets doctors check

on patients' health in real time. This new technology not only improves the health of patients but also makes things easier for healthcare centers.

In mobility, 5G is making a big difference in the progress of intelligent transportation systems. When 5G technology and the Internet of Things (IoT) come together, it is easier to set up more innovative traffic control systems, reducing traffic jams and making public transportation networks run more smoothly. Additionally, the progress of 5G technology is significantly aiding the development of self-driving cars by making it easier for cars to talk to traffic infrastructure, which leads to better and more efficient travel. Improving communication helps keep traffic moving smoothly and reduces the chance of crashes, creating a more connected and long-lasting system for moving around cities.

With its £40 million fund, the UK government is supporting the creation of 5G Innovation Regions, which is a big step toward economic growth. In these areas, the focus is on using 5G technology to encourage new ideas in many areas, such as industry, agriculture, and public services (Government of the United Kingdom, 2024). The goal of this project is to boost output and help small and medium-sized businesses (SMEs). This should lead to economic growth in both cities and rural areas. The amazing things that 5G could do in these areas are in line with the UK's larger goals of improving public services and growing the economy.

2.3. Denmark

Denmark, which was in top three in the Waseda rankings 2024, is using 5G technology to accelerate digital transformation (DX) in healthcare, transportation, and local economic growth. Due to its high-speed and low-latency, 5G technology has greatly enhanced telemedicine and remote treatment. AR and VR technology allow doctors to deliver real-time consultations and surgical aid, especially in remote areas where access to specialist healthcare is limited (European Commission, 2023). IoT devices and 5G technologies provide continual patient monitoring, improving chronic disease management and emergency response. Denmark's healthcare providers are using 5G to handle large data volumes and use AI-driven solutions for predictive analytics and individualized therapies to improve efficiency and quality.

Denmark is using 5G to improve traffic management, congestion, and public transit efficiency via intelligent transportation systems (ITS). Real-time data from sensors and linked cars enables adaptive traffic signals, dynamic routing, and autonomous vehicles. Urban transportation frameworks become safer, more efficient, and more sustainable with this progress. Autonomous cars and drones can

265

communicate with their surroundings thanks to 5G technology. Autonomous buses and delivery drones are essential to Denmark's sustainable transportation goals.

Danish economic growth is benefiting from 5G technology, notably smart city efforts. The technology enables smart grids, energy management, and IoT-driven public services, boosting economic growth and urban sustainability. Expanding 5G networks boosts Denmark's digital economy by encouraging innovation and technology entrepreneurs, laying the groundwork for new business models. Denmark's dedication to high-speed internet helps digital services grow, which are vital to local companies and the economy. These projects make Denmark a worldwide leader in using 5G technology to change numerous industries.

2.4. The United States of America (USA)

In the United States, 5G technology transforms healthcare by improving remote consultations and patient monitoring. The high-speed, low-latency capabilities of 5G enable real-time video consultations, enhancing telemedicine services. This advancement is particularly beneficial for rural areas with limited healthcare access. For example, institutions like the Mayo Clinic use 5G to support telehealth, enabling seamless remote diagnostics and consultations. These developments contribute to more efficient and timely healthcare delivery, ultimately improving patient outcomes.

5G improves mobility by supporting smart transportation systems and autonomous vehicles. Major U.S. cities like San Francisco and Los Angeles leverage 5G networks to implement intelligent traffic systems and vehicle-to-infrastructure communication. This integration helps reduce congestion and enhances road safety by allowing vehicles to share real-time data. Using 5G in transportation is expected to optimize traffic flow and reduce accidents, improving the overall efficiency of urban mobility (U.S. Department of Transportation, 2024).

The deployment of 5G networks in cities such as Austin and Seattle is driving local economic development by fostering innovation in the tech sector. 5G enables businesses to enhance their digital capabilities, boosting local entrepreneurship and job creation. In Austin, for example, 5G is supporting the growth of tech startups and attracting investments in digital infrastructure, positioning the city as a leader in smart city solutions and technology-driven economic development.

2.5. South Korea

South Korea is harnessing 5G technology to advance healthcare through enhanced remote medical services and real-time monitoring. 5G's high-speed and low-latency features enable remote

consultations and surgeries, improving access to care nationwide. Wearable health devices also benefit from 5G, transmitting patient data instantly to healthcare providers, leading to quicker diagnoses and personalized treatments. This application highlights South Korea's commitment to leveraging digital tools to elevate medical services and patient outcomes.

In South Korea, 5G is revolutionizing urban mobility by enabling smart transportation systems and improved traffic management. Vehicle-to-Everything (V2X) technology, supported by 5G, allows real-time communication between vehicles and infrastructure, reducing congestion and enhancing safety (Liu & Zhang, 2023). Seoul's 5G-enabled traffic systems adjust signal timings based on real-time data, optimizing traffic flow. The technology also supports autonomous vehicles, paving the way for more efficient and safer urban transportation.

The expansion of 5G in South Korea is driving local economic development by creating new business opportunities and enhancing digital infrastructure. 5G supports industries such as entertainment and manufacturing, fostering innovations like augmented and virtual reality. The technology also facilitates the growth of smart factories, boosting efficiency through automation. These advancements demonstrate how 5G is stimulating economic growth and enhancing the competitiveness of South Korean businesses.

2.6. Netherlands

In the Netherlands, 5G technology enhances healthcare by enabling advanced telemedicine and remote patient monitoring. The rapid data transmission capabilities of 5G facilitate high-quality video consultations and real-time health data sharing (Dutch Ministry of Economic Affairs and Climate Policy, 2024). For instance, the Erasmus Medical Center in Rotterdam utilizes 5G to support remote surgeries and diagnostics, improving access to specialized care for patients in remote areas. This advancement in telehealth is crucial for providing timely and efficient medical services, thus improving overall patient outcomes.

The Netherlands is at the forefront of integrating 5G into smart mobility solutions. Cities like Amsterdam and Eindhoven are deploying 5G to support intelligent transportation systems and autonomous vehicles (Dutch Ministry of Economic Affairs and Climate Policy, 2024). For example, Amsterdam's 5G network is being used to enhance vehicle-to-everything (V2X) communication, which helps optimize traffic management and reduce congestion. This integration of 5G technology

contributes to safer and more efficient urban transportation, aligning with the country's goals for smart city development.

5G is driving local economic growth in the Netherlands by fostering innovation and digital transformation. The Dutch government supports various initiatives to leverage 5G for boosting local industries and startups. In cities such as Utrecht, the deployment of 5G infrastructure is promoting technological advancements and attracting investment in tech-driven businesses. This focus on 5G is positioning the Netherlands as a leader in digital economy growth, enhancing its competitive edge in the global market.

2.7. Estonia

In Estonia, 5G technology is revolutionizing healthcare by enabling remote diagnostics and telemedicine with high precision and low latency. The Tartu University Hospital has integrated 5G to facilitate remote surgeries and teleconsultations, allowing specialists to assist in complex procedures from different locations. This advancement ensures that patients in rural areas receive timely medical care, significantly improving healthcare accessibility and efficiency across the country.

Estonia is leveraging 5G to enhance its smart transportation infrastructure, particularly in Tallinn. The city is deploying 5G networks to support connected and autonomous vehicles, improving traffic management and reducing congestion. For instance, Tallinn's smart traffic lights and vehicle-to-infrastructure (V2I) communication systems use 5G to optimize traffic flow and enhance safety, reflecting Estonia's commitment to cutting-edge urban mobility solutions.

5G is also fueling local economic development in Estonia by driving innovation and attracting tech startups. The government's support for 5G infrastructure aims to create a robust digital ecosystem conducive to business growth (Estonian Ministry of Economic Affairs and Communications, 2024). In cities like Tallinn and Tartu, the rollout of 5G networks is encouraging investments in tech-driven sectors, promoting the growth of smart industries, and bolstering Estonia's position as a digital leader in Europe.

2.8. Saudi Arabia

Saudi Arabia is harnessing 5G technology to revolutionize its healthcare sector by enabling real-time telemedicine and remote surgeries. Hospitals in Riyadh and Jeddah have started implementing 5G networks to conduct virtual consultations and remote monitoring of patients, improving healthcare

accessibility, especially in remote areas (Arab News, 2024). This technology also supports the development of advanced healthcare solutions, including AI-driven diagnostics.

Saudi Arabia is using 5G to support its ambitious smart mobility projects. The kingdom's Vision 2030 includes deploying 5G-enabled autonomous vehicles and smart traffic systems to reduce congestion and enhance road safety, particularly in major cities like Riyadh and Jeddah. These initiatives aim to modernize the transportation system, making it more efficient and eco-friendly, in line with the country's sustainability goals.

5G is a cornerstone of Saudi Arabia's digital economy transformation, driving growth across various sectors. The implementation of 5G infrastructure is boosting industries such as entertainment, logistics, and manufacturing. Moreover, Saudi Arabia's investments in 5G attract foreign investments, furthering the kingdom's aim to diversify its economy beyond oil. This development is expected to enhance the country's economic competitiveness in the region significantly.

2.9. Germany

The advancement of 5G technology facilitates significant progress in areas such as telemedicine and remote treatments, thereby greatly improving the healthcare system in Germany. The implementation of 5G technology facilitates immediate data transfer and high-resolution video streaming, which are essential for intricate surgical procedures and remote healthcare consultations. The integration of 5G technology with wearable health devices enhances the overall delivery of healthcare services. This enhances the precision of diagnostics and enables continuous monitoring of patients.

Germany is establishing a benchmark for others to follow in the realm of 5G-enabled smart mobility solutions, particularly concerning autonomous vehicles and intelligent transportation networks. Implementing linked automobile technology alongside advanced traffic management systems aims to enhance traffic safety and alleviate congestion in urban areas such as Berlin. The implementation enhances urban mobility and aligns with national objectives aimed at reducing emissions and fostering sustainable transportation alternatives.

The implementation of 5G technology is yielding positive outcomes for Germany's economy, a development that can be linked to increased investment and enhanced innovation. The digitization plan of the German government encompasses significant investments in 5G infrastructure. This development is projected to foster growth across various sectors, such as digital services, manufacturing, and logistics (European Commission, 2024). The implementation of 5G technology

enhances Germany's position as a frontrunner in the digital economy, presenting opportunities for innovative economic development. Cities such as Frankfurt and Munich are increasingly recognized as significant centers for technology development.

2.10. New Zealand

When 5G technology is used in New Zealand, it makes it easier to create advanced apps like augmented reality (AR) and virtual reality (VR). These apps are used in medical training, remote surgeries, and therapy care (Spark New Zealand, n.d.). 5G's high speed and low delay make it possible for surgeons to work together in real time, which is especially helpful in rural areas that don't have a lot of skilled medical experts. Using 5G technology also makes online patient tracking and telemedicine easier, which makes healthcare more accessible and efficient across the country. Using technology makes patient care much better and relieves stress on healthcare systems. This successfully fixes differences in how people in New Zealand can get medical services.

Connecting 5G to smart systems is changing the transit industry and the way people move around. 5G technology makes it easier to use real-time data processing, which makes traffic control tools much better. Vehicle-to-everything (V2X) contact is also very important for making roads safer and directing traffic more efficiently. 5G is also very important for developing self-driving cars and connected transport options because it provides the necessary framework for these new ideas to grow. 5G is helping to build a sustainable and connected mobility framework in New Zealand by making it easier for smarter, safer, and more efficient transportation systems to work together.

The spread of 5G technology is making a big difference in local economic growth, especially in rural and regional areas, which is speeding up growth in these areas. By making these areas more connected, New Zealand can boost local economies, bring in businesses, and make it easier for people to work from home. The rise of 5G coverage makes the digital economy more open to everyone, letting small towns in rural areas join in and helping the economy grow across the country. New Zealand's efforts to improve connections are a key part of making society more open and digitally savvy, which in turn supports long-term economic growth.

2.11. Japan

In Japan, the implementation of 5G technology is significantly altering the landscape of healthcare through the facilitation of advanced telemedicine and the execution of remote surgeries. For example, 5G networks serve to enable high-definition video consultations and real-time remote diagnostics,

especially in rural and underserved regions. Furthermore, the amalgamation of 5G technology with Internet of Things (IoT) devices facilitates ongoing health surveillance and prompt intervention, thereby improving patient outcomes and optimizing the efficiency of medical services.

Japan is utilizing 5G technology to enhance its smart mobility initiatives, marked by notable progress in autonomous vehicles and intelligent transportation systems. Tokyo is currently implementing smart traffic management systems that are enabled by 5G technology. These systems aim to optimize traffic flow and mitigate congestion through the analysis of real-time data (Japan Times, 2024). Furthermore, the implementation of 5G technology facilitates the advancement of connected vehicle systems, which are essential for the nation's objective of establishing a cohesive and effective transportation infrastructure.

The implementation of 5G technology in Japan is contributing to local economic development through the promotion of innovation and the attraction of international investments. The prioritization of 5G infrastructure by the government serves as a catalyst for digital transformation, thereby supporting various industries including robotics, artificial intelligence, and fintech. Cities such as Osaka and Fukuoka are increasingly recognized as technology hubs, with the implementation of 5G facilitating the development of new business models and improving their competitiveness in the global market.

2.12. Canada

Canada is using 5G to change healthcare, transportation, and local economic growth. In healthcare, 5G technology is revolutionizing telehealth services, improving remote diagnostics, and enabling real-time data exchange, boosting accessibility and efficiency. The ultra-low latency and excellent dependability of 5G networks enable continuous health monitoring via wearable devices that may provide real-time warnings and enable prompt actions. Chronic disease management benefits from this. Big data, artificial intelligence, and machine learning may be integrated into healthcare systems via 5G, improving treatment customization and patient outcomes. Despite these advances, Canada faces regulatory and procurement barriers when adopting health technology.

Smart transportation systems in Canadian cities are improving with 5G technology. The technology enables autonomous cars and intelligent traffic systems, improving traffic flow, congestion, and public transit. Vehicle-to-everything (V2X) connection provided by 5G improves autonomous vehicle safety and efficiency (Lu, Zhang, Niu, & Fan, 2020). This technology improves operating efficiency by

connecting cars and infrastructure. Urban mobility advances increase transportation efficiency and reduce environmental impact by optimizing traffic patterns and reducing emissions.

Canada's local economic growth is heavily affected by 5G technology, particularly in rural and isolated areas where government efforts are concentrated on improving 5G coverage. The expansion helps small firms and industries embrace sophisticated technology, boosting local economies. Precision farming and agricultural automation using 5G technologies boost production. 5G provides the foundation for digital services that attract investment and create high-quality jobs, making it crucial to smart city development. These efforts show that 5G boosts innovation and development in Canada's digital economy.

2.13. Ireland

5G technology is transforming healthcare by enabling telemedicine and remote patient monitoring. For example, the Royal College of Surgeons in Ireland is using 5G to improve teleconsultations and remote surgical help, increasing patient access to specialist treatment regardless of location (Irish Government, 2024). Additionally, 5G's high bandwidth and low latency enable real-time health data transfer, which is critical for monitoring chronic illnesses and providing more responsive treatment.

Ireland is incorporating 5G technology into its transportation infrastructure to enable smart mobility solutions. Dublin is exploring 5G-enabled smart traffic management systems, which use real-time data analysis and adaptive traffic signals to optimize traffic flow and minimize congestion. Furthermore, the implementation of 5G enables autonomous car experiments and connected vehicle technologies, intending to improve road safety and streamline urban transportation networks.

The introduction of 5G boosts local economic development in Ireland by encouraging innovation and recruiting investors. The Irish government has emphasized 5G infrastructure to provide a conducive environment for innovative startups and established corporations, fostering improvements in finance and digital services. The availability of 5G in places like as Cork and Galway is boosting economic activity and job creation, consolidating Ireland's position as a major participant in the global digital economy.

2.14. Sweden

Sweden is utilizing 5G technology to enhance patient care through advanced telemedicine solutions. The high-speed and low-latency capabilities of 5G facilitate seamless remote consultations and real-time health monitoring, which are essential for the management of chronic diseases and the provision

of individualized treatment. Entrepreneurs in the health IT sector based in Stockholm are at the forefront of developing health solutions that leverage 5G technology, thereby enhancing access to healthcare across the nation.

In Sweden, the implementation of 5G technology plays a crucial role in the advancement of smart transportation systems and the development of autonomous driving capabilities. Gothenburg is implementing 5G technology to enhance linked car networks and advance traffic management systems, thereby improving road safety and efficiency (Swedish Transport Administration, 2024). The objectives of this initiative include the modernization of Sweden's transport infrastructure, the reduction of traffic congestion, and the promotion of sustainable urban mobility.

The Swedish government is actively advocating for innovation and technology investments, positioning 5G as a fundamental element of regional economic development. Sweden aims to establish a robust 5G network to enhance its digital economy and support technology clusters and enterprises that generate employment and economic vitality. The strategic focus on 5G aims to enhance Sweden's position in the global market and stimulate regional development across various sectors.

2.15. Iceland

Iceland is leveraging 5G technology to enhance its telemedicine capabilities. With Síminn and Ericsson's collaboration, 5G networks provide high-speed, low-latency connections that enable real-time remote consultations and diagnostics. This is particularly beneficial in rural and remote areas, where healthcare access is traditionally limited. The expanded connectivity also supports the development of AI-driven medical technologies and remote monitoring systems, improving patient outcomes and reducing strain on healthcare resources

In the realm of smart mobility, 5G is playing a critical role in the development of connected transport systems. Iceland is using 5G-enabled smart traffic management systems to enhance road safety and reduce congestion in urban areas like Reykjavík. These systems rely on real-time data to optimize traffic flow and enhance public transport efficiency, paving the way for the eventual deployment of autonomous vehicles

5G is a key enabler of Iceland's local economic growth, particularly in sectors like tourism, entertainment, and logistics. The introduction of 5G-driven solutions, such as augmented and virtual reality experiences for tourists, is helping to boost the economy by enhancing the country's cultural and natural attractions (Ericsson, 2022). Additionally, 5G infrastructure is attracting foreign

investments, fostering growth in tech-driven industries, and promoting Iceland's overall economic competitiveness.

2.16. Norway

The implementation of 5G technology in Norway is significantly transforming the healthcare landscape, particularly through the advancement of telemedicine and the improvement of remote monitoring functionalities. 5G facilitates instantaneous data transfer from distant health devices, thereby enhancing the quality of patient care and allowing for more accurate remote consultations (Helsenorge, 2024). Advanced telemedicine platforms are currently operational, facilitating remote diagnoses and treatment plans, especially in rural and underserved areas of Norway.

Norway is utilizing 5G technology to enhance smart mobility solutions, emphasizing the creation of connected vehicle infrastructure and intelligent transport systems. Cities such as Oslo are incorporating 5G technology to facilitate autonomous vehicles and enhance smart traffic management, to alleviate congestion and increasing transportation efficiency. The initiatives outlined herein aim to improve urban mobility while simultaneously advancing Norway's sustainability objectives through optimizing traffic flow and reducing emissions.

The Norwegian government is investing significantly in 5G technology, intending to foster economic growth and promote digital innovation throughout the nation. The deployment of 5G networks in Norway is intended to enhance local economies by supporting startups and digital enterprises, thereby cultivating a robust digital ecosystem (Innovation Norway, 2024). The anticipated investment is poised to bolster Norway's standing within the global technology sector while fostering economic growth across urban and rural regions.

2.17. Finland

By using 5G technology, Finland is transforming its healthcare industry. The Helsinki University Hospital has implemented 5G technology to facilitate remote operations and telemedicine services, allowing experts to perform intricate diagnostic procedures with exceptional accuracy from a distance (Finnish Institute for Health and Welfare, 2024). This technology significantly improves healthcare accessibility in remote regions and promotes patient results by enabling real-time data interchange and using modern diagnostic tools.

Mobility 5G technology is significantly influencing the transformation of urban transportation in Finland. The city of Helsinki is implementing 5G technology to provide autonomous car testing and

intelligent transportation solutions, such as real-time traffic control and dynamic public transit systems.The objective of this integration is to mitigate road congestion, enhance the efficiency of public transit, and make a positive contribution to a more sustainable urban environment.

Regional economic growth the 5G strategy of Finland encompasses the enhancement of local economic growth by means of technical innovation. In order to cultivate a strong digital ecosystem, the Finnish government has implemented 5G innovation clusters with the aim of attracting technology firms and startups. These clusters prioritize the development of smart city solutions, Internet of Things (IoT) applications, and innovative business models, thereby establishing Finland as a formidable participant in the worldwide digital economy.

2.18. Thailand

Thailand uses 5G to enhance its healthcare system, particularly telemedicine and remote health monitoring. Hospitals in Bangkok, such as Siriraj Hospital, are using 5G networks to connect patients in rural areas with specialists in urban centers for real-time consultations and diagnostics (Bangkok Post, 2024). This approach significantly improves healthcare accessibility and reduces the need for patients to travel long distances for medical treatment.

The deployment of 5G in Thailand is driving advancements in smart mobility, particularly in cities like Bangkok and Phuket. The government is integrating 5G into traffic management systems to ease congestion and support autonomous vehicle trials. This development is aimed at creating a more efficient and sustainable transportation system in the country's busiest urban areas.

Thailand's focus on 5G extends to stimulating local economic growth by fostering innovation and attracting foreign investment. The Eastern Economic Corridor (EEC) is a key area where 5G is being utilized to develop smart industrial zones, driving the country's digital transformation and creating new business opportunities. This initiative is expected to position Thailand as a hub for high-tech industries and boost economic growth.

2.19. Switzerland

Switzerland is one of the first countries to use 5G technology in healthcare, and telehealth and online patient tracking have come a long way. Switzerland's Digital Health Forum (2024) says that the University Hospital Zurich was one of the first to use 5G to allow virtual treatments and real-time consults. This has made it easier for people in rural areas to get specialized care. This fast connection

lets you use advanced diagnosis tools and share data easily, which improves both patient care and the efficiency of your business.

Mobility In the area of movement, Switzerland is using 5G to change the way cities' transportation systems work. Zurich is experimenting with 5G-connected autonomous vehicles and smart traffic management systems to reduce congestion and improve public transport reliability. These projects are part of a bigger plan to make the transportation network more sustainable and efficient. They use 5G to improve real-time traffic data and vehicle-to-everything (V2X) connections.

Growth of the local economy Switzerland's plan for using 5G to boost economic growth includes promoting a thriving tech environment and pushing new ideas. With the help of the Swiss Economic Development Agency, the government has started programs to make 5G innovation zones and help tech startups that work in new areas like IoT and smart towns. Switzerland wants to make itself more competitive globally and promote long-term economic growth by investing money into 5G infrastructure and research.

2.20. Taiwan

Taiwan is leveraging 5G technology to revolutionize its healthcare system, emphasizing telemedicine and remote diagnostics. Implementing 5G technology facilitates high-quality, real-time consultations between patients and providers, proving especially beneficial in remote and underserved areas (Taiwan Ministry of Health & Welfare, 2024). The National Taiwan University Hospital in Taipei is implementing 5G-enabled robotic surgery and artificial intelligence-based diagnostics to enhance patient outcomes.

In Taiwan, 5G plays a crucial role in developing smart transportation systems and autonomous vehicles. The city of Taoyuan is testing 5G-enabled smart traffic management systems that improve traffic flow and reduce congestion. Furthermore, 5G connectivity supports the integration of real-time data from various sensors and devices, optimizing public transport efficiency and safety.

Municipal Economic Development Taiwan is utilizing 5G technology to attract information technology investments and foster innovation, thereby enhancing economic growth. The government has identified the establishment of 5G innovation clusters and the promotion of IoT and smart manufacturing enterprises as priorities (Taiwan External Trade Development Council, 2024). These initiatives aim to enhance Taiwan's technological prominence within Asia while fostering economic growth.

2.21. UAE

The UAE is utilizing 5G technology to revolutionize healthcare with advanced applications such as remote surgeries and telemedicine. Leading hospitals in Dubai and Abu Dhabi are leveraging 5G's high-speed connectivity to conduct real-time consultations and diagnostics, greatly enhancing patient care, particularly in rural areas. This approach reduces the pressure on urban medical centers and offers more equitable healthcare access.

Regarding mobility, the UAE is pushing the boundaries of smart transportation through 5G. The Dubai Roads and Transport Authority (RTA) has initiated 5G-based autonomous vehicle trials, integrating smart traffic systems to reduce congestion and improve road safety. These developments are a part of the country's vision to become a leader in future mobility solutions.

The UAE's 5G initiatives are a key driver for local economic development, particularly in its push to become a global digital hub. The deployment of 5G fuels innovation in sectors like tourism, retail, and logistics. Free zones such as Dubai Internet City attract tech firms, with 5G infrastructure as a cornerstone of this digital transformation (UAE Government, 2024). These advancements are expected to boost the UAE's economy significantly.

2.22. Australia

Australia is making substantial progress in utilizing 5G technology to enhance healthcare delivery. The Royal Melbourne Hospital is leveraging 5G to enable high-definition remote consultations and real-time monitoring of patients with chronic conditions (Australian Digital Health Agency, 2024). This advanced connectivity supports telemedicine and telehealth services, improving patient access to specialist care and facilitating more effective management of health conditions across the country.

In the mobility sector, Australia is integrating 5G to improve public transportation and urban infrastructure. Cities like Sydney are deploying 5G-enabled smart traffic management systems and autonomous vehicles to alleviate congestion and enhance commuter experience. These systems use 5G to provide real-time traffic updates and facilitate communication between vehicles and infrastructure, contributing to a more efficient and sustainable transportation network.

Australia's economic strategy includes leveraging 5G to stimulate local economic development and innovation. The Australian government has launched the "5G Innovation Initiative," aimed at supporting tech startups and creating 5G-powered innovation hubs in major cities. This initiative

focuses on fostering advancements in smart cities, IoT, and other technology-driven sectors, positioning Australia as a leader in the digital economy.

2.23. France

5G technology is revolutionizing the French healthcare industry by enabling remote surgery and real-time telemedicine. One of Europe's first remote operations was successfully completed by the Strasbourg University Hospital using 5G technology, a significant accomplishment that highlights the technology's potential to improve healthcare. Furthermore, 5G is being used by France's national health service to enhance the effectiveness of linked medical equipment, including wearables and smart diagnostics, which provide patients with chronic illnesses immediate data transfer and continuous monitoring.

France is making the most of 5G to improve its transportation network, especially in major cities like Marseille and Paris. Because dynamic traffic signal regulation based on real-time data is now possible thanks to the introduction of 5G-enabled smart traffic systems, congestion has been greatly alleviated. Additionally, Renault and Peugeot are doing significant trials of driverless cars, which is one of the main ways that 5G is being used in this regard. The objectives of these programs are to lower emissions, lessen traffic accidents, and assist France's larger objective of being carbon neutral by 2050 (Le Monde, 2024).

To support regional economic development, the French government has made significant investments in 5G, especially in developing technology fields like artificial intelligence (AI) and the Internet of Things (IoT). By 2030, the introduction of 5G is predicted to provide around 400,000 new employments, mostly in innovation hotspots like Toulouse and Grenoble. In sectors like industry and agriculture, where IoT devices and automation fueled by 5G are enhancing operational efficiency, France's dedication to 5G is also spurring innovation. The expansion of these industries, which are expected to generate an extra €15 billion to the French economy by 2025, is evidence of the financial advantages of 5G.

2.24. Indonesia

Especially with regard to telemedicine and mobile health services, Indonesia is using 5G technology to improve healthcare quality and accessibility. 5G has lessened the burden on metropolitan healthcare facilities by enabling real-time, high-definition remote surgery between hospitals in Jakarta and distant places like Papua in a recent trial project headed by Telkom Indonesia. Additionally, 5G has

made it possible to send data and perform medical imaging at lightning-fast rates, enabling remote diagnostics and chronic illness monitoring. In order to improve cooperation in emergency circumstances, the government is spending more in 5G for emergency response systems, which will include linked ambulances equipped with live video feeds.

In Indonesia, 5G technology is starting to play a major role in alleviating extreme traffic congestion, especially in Jakarta. Jakarta currently employs AI and real-time traffic monitoring to better efficiently control traffic with the installation of 5G-enabled smart traffic systems. In order to improve traffic flow and lower accident rates, the Ministry of Transportation has teamed up with Huawei to implement 5G-powered vehicle-to-everything (V2X) communication systems, which are now being tested on important metropolitan routes. In addition, testing of autonomous public buses powered by 5G are already underway in a number of locations with the goal of improving urban transportation's efficiency and safety.

The Indonesian government sees 5G as an important driver for growing the country's digital economy, especially by fostering the country's thriving startup and tech sectors. The 5G Smart Industry innovation lab in Batam is a prime example; it works with regional producers to incorporate 5G into industrial processes, increasing automation and cutting costs (GSMA, 2022). Additionally, as part of its national 5G strategy, the government intends to increase 5G coverage in important economic centers with the goal of generating $36 billion in economic value by 2030. It is anticipated that the emphasis on digital infrastructure would help boost the finance and e-commerce industries, offering millions of customers quicker, more dependable services.

2.25. Italy

Italy is integrating 5G to revolutionize its healthcare system, especially in telemedicine and remote care. The Italian National Institute of Health has conducted several 5G trials to enable remote consultations and real-time patient monitoring. In regions such as Lombardy, 5G-connected devices have been used to instantly transmit patient vitals to healthcare providers, improving emergency response times. The adoption of 5G in smart hospitals also includes robotic surgery and AI-based diagnostics, providing more accurate and faster medical decisions.

Turin and Milan are implementing 5G-enabled smart traffic systems that can dynamically manage traffic lights based on real-time conditions. Italy is also at the forefront of testing autonomous vehicles, with the first 5G-powered autonomous driving trials conducted in Turin (5GAA, 2024). These

advancements are expected to reduce congestion and accidents, improving overall traffic safety and urban mobility.

5G is vital to Italy's strategy to modernize its industrial and digital economy. The Italian government has launched multiple initiatives to integrate 5G into the manufacturing, tourism, and agriculture sectors. In the Veneto region, 5G is used to optimize supply chains and implement smart agriculture solutions, such as precision farming, that rely on real-time data collection and automation. Additionally, Italy's small and medium-sized enterprises (SMEs) are expected to benefit from 5G by improving their digital capabilities, helping to enhance productivity and competitiveness in global markets.

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, 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 focus on improving interoperability, investing in digital infrastructure, fostering collaborations, and continuously evaluating and refining initiatives for patient-centered care.

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C. Progress of Smart Cities in ASEAN 6 (Indonesia, Thailand, Vietnam, Singapore, Malaysia, and the Philippines).

I.   Introduction

The development of smart cities in the ASEAN 6—Indonesia, Thailand, Vietnam, Singapore, Malaysia, and the Philippines—has accelerated in recent years as these countries harness digital technologies to address the challenges of rapid urbanization. Governments in this region are increasingly integrating digitalization into public services to enhance urban living, focusing on areas such as transportation, healthcare, energy management, and governance. The six countries represent a diverse range of economic and technological development stages, making them ideal case studies for understanding smart city progress in Southeast Asia. By examining the diverse experiences of these countries, this paper provides a comparative overview of both the successes and obstacles encountered in government-led digitalization. It will highlight key initiatives, outcomes, and challenges, analyzing how digitalization has improved public services and what barriers—such as regulatory issues and technological gaps—still exist. Through this analysis, the paper aims to provide insights into the future potential of smart cities in the ASEAN 6, emphasizing their role in regional growth and innovation.

II.   Discussion and Findings:

1. Smart Cities in Government Operations

Smart cities in the ASEAN 6 are not only transforming public services but are also being shaped by government digitalization efforts. As governments adopt digital technologies, they lay the foundation for smarter urban management, enhancing everything from public safety to transportation. In Singapore, for example, the government's Smart Nation initiative has seamlessly integrated digital tools like AI, IoT, and big data, revolutionizing public services such as healthcare, urban planning, and environmental monitoring. Government-led digitalization enables more efficient resource management and data-driven decision-making, accelerating smart city development. In Malaysia, the Smart City Framework aligns closely with national digitalization strategies, driving initiatives that enhance urban sustainability and digital inclusion. Vietnam and Thailand's governments have embraced digitalization as a catalyst for smart city growth, with initiatives like Vietnam's e-government platform and Thailand's smart infrastructure projects reshaping urban services. Conversely, smart city projects also push governments to further digitalize, as the demand for real-

time data, efficient governance, and seamless public services grows. Indonesia and the Philippines, despite slower progress, are seeing how government digitalization can support smart city initiatives by improving connectivity and infrastructure. Ultimately, smart cities and government digitalization are mutually reinforcing, with each driving advancements in the other to create more efficient, sustainable, and responsive urban environments.

2. Countries analysis

2.1. Singapore

Singapore's strategic approach to government digitalization and its vision for a Smart Nation has positioned the country as a leader in the global development of smart cities. Since its independence in 1965, Singapore has experienced a remarkable evolution from a developing nation to a technologically advanced and highly urbanized city-state (Lin, 2024). Singapore has consistently emphasized the importance of innovation and technology in driving economic growth and improving the quality of life, particularly given its land and natural resources constraints. The Smart Nation initiative, launched in 2014, marked a pivotal moment in the government's endeavors to enhance urban living, public services, and sustainability through digital technology. In 2024, Singapore achieved a notable position, being ranked fourth in the e-government rankings published by Waseda University. This ranking serves as an indication of the country's substantial progress in the realms of smart city initiatives and digital governance.

In recent years, Singapore has achieved significant advancements in amalgamating governmental digitalization and developing smart city initiatives. The Smart Nation initiative in Singapore represents a comprehensive effort that positions the country as a global leader in advancing smart cities. This initiative aims to enhance the quality of life, bolster economic competitiveness, and promote sustainability by integrating digital technologies across all facets of urban living. 5G and Digital Infrastructure The comprehensive nationwide 5G coverage in Singapore plays a crucial role in advancing the objectives of the Smart Nation initiative (KVY Technology, 2024). The infrastructure is vital in advancing smart transportation, healthcare, and various public services. It enables a range of innovations, including AI-driven solutions and IoT systems (The Edge Singapore). Sustainable development and green infrastructure are pivotal in Singapore's urban planning, with a commitment to enhance the greenery of 80% of its buildings by 2030. This initiative aims to enhance urban resilience while decreasing energy consumption by implementing green infrastructure,

including energy-efficient buildings and rooftop gardens. Implementing artificial intelligence (AI) and digital siblings is crucial for effectively achieving these environmental goals.

Despite its advancements, Singapore faces challenges in its ambition to develop a smart city, especially concerning cybersecurity and digital inclusivity. The government's paramount concern is cybersecurity, which is attributed to the heightened threat of cyberattacks arising from digital systems' interconnectivity. In the year 2023, Singapore undertook significant enhancements to its Cybersecurity Strategy, emphasizing the safeguarding of critical digital infrastructure and the development of resilience in the face of cyber threats. Another challenge involves ensuring digital inclusivity, especially for the elderly, who may face difficulties adjusting to technological advancements' swift evolution. The government has recognized this issue and is in the process of formulating initiatives aimed at addressing the digital divide.

In light of its increasing reliance on digital technologies, Singapore places significant emphasis on data privacy and cybersecurity. The city-state demonstrates a strong commitment to fostering a secure digital environment, which is essential for protecting the personal data of its citizens while also enabling the safe implementation of emerging technologies (The Edge Singapore). Singapore's smart city framework serves as a paradigm for cities globally, demonstrating the potential of technology to create a more sustainable, efficient, and livable urban landscape as it progresses in innovation. In the forthcoming years, Singapore's strategy regarding government digitalization within smart cities will continue to focus on incorporating emerging technologies, such as artificial intelligence, big data, and the Internet of Things, into public services and urban governance. The government is exploring supplementary data-driven governance models to improve policy implementation and decision-making. Singapore, characterized by its strong foundation and continuous commitment to innovation, is poised to maintain its status as a global exemplar in advancing smart cities in the foreseeable future.

2.2. Thailand

Thailand is positioning itself as a leader in the ASEAN region regarding the advancement of smart cities, integrating cutting-edge technology with sustainable urban design to create future cities. Once a predominantly agricultural nation, Thailand has experienced rapid urbanization, with Bangkok emerging as a major economic hub. However, this rapid growth has led to significant challenges, such as traffic congestion, environmental pollution, and increased pressure on infrastructure. In response, Thailand launched the "Thailand 4.0" strategy in 2016, signaling a commitment to digital transformation. This strategy aims to modernize the country's infrastructure and economy through

advanced technology. As of 2024, Thailand is ranked 18th in the Waseda University e-government rankings, indicating progress in integrating digital technologies into government services.

Despite these advancements, Thailand faces several challenges in smart city development. The increasing reliance on digital systems has raised cybersecurity concerns, necessitating robust protective measures (Bangkok Post, 2024). Additionally, a significant digital divide exists between urban and rural areas, highlighting disparities in technological access. To address these issues, the Thai government has launched various initiatives. The Eastern Economic Corridor (EEC) project integrates intelligent technology into urban infrastructure, aiming to alleviate traffic congestion and reduce pollution through the enhancement of electric vehicle (EV) infrastructure and modern traffic management systems (Energy Efficiency Conservation Office, n.d.).

The Smart City Pilot Program, introduced in 2023, represents a crucial initiative in exploring innovative urban management techniques. This program, implemented in cities like Phuket and Chiang Mai, focuses on IoT-based waste management systems and energy-efficient construction practices. These efforts have already shown positive results. Thailand's national vision includes establishing 105 smart cities by 2027, with 36 towns and municipalities across 25 provinces certified as smart cities (International Forum for Governance, n.d.). Plans are underway to add 15 more by the end of the year. This initiative is a key component of Thailand's "Thailand 4.0" strategy, which seeks to leverage technology to improve digital infrastructure and quality of life.

Thailand's smart city development prioritizes intelligent living, advanced energy solutions, sustainable environments, and innovative healthcare systems. Phuket is a leading smart city, recognized for its sustainable management and digital infrastructure achievements. Other notable cities include Samyan Smart City in Bangkok and Wang Chan Valley in Rayong, known for their pioneering smart city strategies. The Digital Economy Promotion Agency (Depa) provides financial incentives, such as a 50% reduction in corporation tax for smart city-related companies, to attract investment and accelerate program implementation. Collaborative efforts, including partnerships with international networks like Mastercard's City Possible initiative, facilitate global exchanges of ideas and solutions.

Overall, Thailand's smart city development aims to grow the economy while addressing environmental challenges and improving urban living conditions. This comprehensive strategy is designed to enhance Thai cities' livability, sustainability, and resilience. By integrating cutting-edge

technology with sustainable urban design, Thailand is positioning itself as a leader in smart city advancements within the ASEAN region.

2.3. Indonesia

Indonesia exemplifies the strategic implementation of government digitalization to address urbanization challenges and enhance economic growth through the development of smart cities. As one of the largest and most populous nations in Southeast Asia, Indonesia has encountered considerable urban challenges due to rapid population growth and economic advancement. Recognizing the necessity of digital transformation to tackle these challenges and improve public services, the Indonesian government has been making significant strides since the early 2000s.

Significant advancements have been made in integrating digital technology into municipal administration and governance. According to Waseda University's e-government rankings, Indonesia is projected to rank 23rd by 2024. This ranking highlights the strengths and weaknesses of Indonesia's approach to smart city development. Notable efforts include the development of Nusantara, an ambitious smart city project located on the island of Borneo. Nusantara is designed with a focus on environmental sustainability and advanced technology, featuring 65% green spaces, extensive use of the Internet of Things (IoT), and efficient public transportation systems (The Wall Street Journal, n.d.). This initiative aims to address funding and environmental challenges while establishing a model for urban development both within Indonesia and internationally (Techopedia).

In addition to Nusantara, Indonesian cities such as Makassar, Jakarta, and Bandung are active participants in the 100 Smart Towns Movement. These cities prioritize digital transformation to enhance the quality of life for their citizens through innovative technology in public services. For instance, Makassar has introduced telemedicine services and digital support for small businesses under the "Sombere and Smart City" initiative (International Organization for Migration, n.d.). Additionally, Sumedang has improved public health outcomes and reduced stunting through data-driven governance (OpenGov Asia ANTARA News). The Smart Province program aims to extend these initiatives to a provincial level, improving coordination and implementation of smart city development across larger regions.

Despite these advancements, Indonesia faces several challenges in smart city development. The increasing dependence on digital technology has highlighted the importance of cybersecurity, prompting the government to develop a comprehensive framework to enhance protections.

Additionally, disparities in digital access between urban and rural areas present significant hurdles. Addressing this digital divide involves exploring enhanced funding for internet infrastructure and initiatives to improve digital literacy. Moving forward, Indonesia's focus will be on enhancing digital infrastructure, expanding effective initiatives, and tackling cybersecurity and access issues. Through continued efforts, the country aims to improve urban living conditions nationwide and achieve its smart city development goals.

2.4. Malaysia

The development of smart cities in Malaysia exemplifies a strong commitment to digitizing government processes to facilitate urban transformation. Since gaining independence in 1957, Malaysia has experienced significant economic growth and urbanization. The demands on infrastructure and public services have intensified in rapidly expanding urban areas like Kuala Lumpur and Penang. The government has prioritized smart city initiatives to address these challenges and enhance the quality of urban life.

In 2024, Malaysia ranked 29th in Waseda University's e-government rankings, marking significant progress in its digital governance initiatives. This ranking underscores Malaysia's dedication to advancing technology within public administration and urban management while also pointing out areas where improvement is possible. The focus on smart city development is seen as essential to tackle urban challenges such as traffic congestion, pollution, and resource management, with intelligent technologies playing a critical role in the government's strategy to optimize service delivery and promote sustainable development.

In recent years, Malaysia has launched various smart city programs, integrating technology and sustainable practices to advance urban living. Kuala Lumpur, for instance, improved its position by 16 ranks, reaching 73rd in the 2024 Smart City Index (Free Malaysia Today, 2024). It is now emerging as a leading smart city in Southeast Asia, due to advancements in digital infrastructure, public services, and transportation systems. Cyberjaya, recognized as Malaysia's premier IT hub, is also implementing a comprehensive master plan to enhance its role as a center for innovation and digital ecosystems. This plan involves the creation of four distinct zones across the city, focusing on business, innovation, retail, smart transportation, healthcare, and digital creativity.

One major initiative is *MySmart Wilayah 2030*, a plan to develop smart cities in Malaysia's federal territories through the application of digital technology (CIDB Malaysia, n.d.). This initiative aims to

improve education, security, health, and environmental conditions, with the goal of creating resilient and sustainable cities by 2030. Additionally, under the 12th Malaysia Plan, five smart cities are projected to be established by 2025. This initiative leverages advanced infrastructure and technology to address urban challenges like traffic congestion, sustainability, and public safety.

However, the development of smart cities in Malaysia is not without its challenges. The increasing reliance on digital systems has heightened concerns about cybersecurity. In response, the government has bolstered its cybersecurity framework and invested in advanced security measures. Furthermore, the digital divide between urban and rural areas presents a significant challenge, as not all citizens have equal access to technology. To ensure the benefits of smart cities are shared more equitably, Malaysia is enhancing its digital infrastructure and promoting digital literacy.

Malaysia's smart city strategy aims to build on successful initiatives, expand digital infrastructure, and address challenges related to cybersecurity and access. By focusing on sustainability, technological innovation, and the improvement of citizens' quality of life, Malaysia aspires to take a leading role in advancing smart city initiatives in the region.

2.5. Philippines

The Philippines, with its historical context of rapid urbanization and economic growth, has increasingly adopted smart city initiatives to address urban challenges and improve public services. Since gaining independence in 1946, the country has experienced significant population growth, particularly in major urban areas like Manila. This growth has led to several challenges, notably congestion, pollution, and insufficient infrastructure. The government of the Philippines has recognized these issues and prioritized digitalization to enhance urban management and improve the quality of life. The imperative for smart urban planning in the Philippines has become increasingly evident as cities face mounting difficulties from rapid growth. Smart cities are essential in addressing traffic congestion, improving public safety, and delivering efficient public services. The government's strategy involves integrating technologies, such as intelligent traffic systems and digital infrastructure, with the goal of promoting sustainable urban development.

Significant progress is being made in the Philippines toward developing smart cities. Various projects and strategies are being implemented to enhance urban living by integrating technology and sustainability. The government is working on six major smart city projects in urban areas like Manila, Cebu, and Davao (PIDS, 2024). These initiatives include improving command centers, developing

public transportation systems, and incorporating digital infrastructure. Cebu City, for instance, is implementing a Bus Rapid Transit (BRT) system and a Digital Traffic System to improve urban mobility and reduce congestion. Davao City is advancing its Converged Command Center and deploying electric buses to promote sustainable transportation.

The Department of Science and Technology (DOST) is leading efforts to transform 80 local government units (LGUs) into smart and sustainable cities by 2028. This initiative is part of the broader "Digital Cities PH" program, which aims to foster digital transformation across the country. The program has generated significant employment opportunities in the IT-Business Process Management sector and continues to promote economic development. Key areas of strategic focus in the Philippines' smart city development include improving emergency and crisis response systems, optimizing traffic management, and delivering efficient e-government services. Environmental sustainability is also a priority, with initiatives to promote eco-friendly transportation and create green spaces in urban areas.

These initiatives align with the Philippines' overarching goal of leveraging technology for economic recovery and sustainable urban development, positioning the country as a competitive participant in the ASEAN Smart Cities Network. In the coming years, the Philippines is expected to continue expanding smart city initiatives, strengthening cybersecurity protocols, and addressing inequalities in technology accessibility to achieve its smart city goals.

2.6. Vietnam

Vietnam, characterized by a lengthy path of economic reform and rapid development, is increasingly allocating resources towards smart city initiatives aimed at managing urban growth and enhancing public services. Since the late 1980s, Vietnam has experienced significant economic growth and urbanization, a transformation initiated by the implementation of the Đổi Mới economic reforms. The increasing demand for smart cities can be attributed to challenges such as inadequate infrastructure, pollution, and traffic congestion, which are prevalent in urban areas like Hanoi and Ho Chi Minh City. To address these challenges and foster sustainable urban development, it is essential for Vietnam to implement smart city initiatives. The government has recognized the importance of digitization in enhancing public safety, optimizing urban administration, and delivering efficient services. Consequently, numerous smart city initiatives have been implemented with the objective of enhancing the functionality and livability of urban areas.

In recent years, Vietnam has initiated several projects aimed at the development of smart cities, particularly in key urban areas such as Da Nang, Ho Chi Minh City, and Hanoi. Hanoi has emerged as a leader in the smart city initiative, implementing a comprehensive strategy that is systematically divided into three distinct stages. The initial phase (2018–2020) established a foundational framework through the development of infrastructure, e-government services, and intelligent systems across various sectors such as education, healthcare, and transportation. The concluding phase, designated as post-2025, aims to fully transform Hanoi into a sophisticated smart city characterized by a knowledge-based economy. In contrast, the preceding phase, spanning from 2020 to 2025, focuses on enhancing existing systems and their integration into a digital economy (Hanoitimes, 2024). Ho Chi Minh City, recognized as the economic center of Vietnam, is advancing its smart city initiative with an emphasis on sustainability and digital transformation. The city's objectives encompass the advancement of big data, cloud computing infrastructure, and intelligent solutions aimed at enhancing environmental sustainability, traffic management, and healthcare. To address its notorious traffic congestion, Ho Chi Minh City is investing in renewable energy sources, particularly solar energy, while also implementing advanced transportation technologies (Vu Phong, n.d.). Da Nang is recognized for its commitment to evolving into a sustainable and livable urban environment, integrating smart city initiatives with eco-friendly urban development. The city has received numerous accolades for its initiatives, notably the ASOCIO Smart City Award (Bao Chinh Phu, 2023). Furthermore, Da Nang is focusing on the development of green infrastructure, the enhancement of smart tourism, and the improvement of public safety, with the objective of evolving into a smart city by the year 2030.

These initiatives are integral components of a broader national strategy aimed at establishing sustainable smart cities by the year 2030. This strategy also encompasses collaboration with international partners, including South Korea. Vietnam engages in the ASEAN Smart Cities Network (ASCN), fostering regional cooperation in the advancement of smart cities. Upon thorough examination, it is evident that Vietnam's initiatives in smart city development are steering the country towards urban environments that prioritize environmental sustainability and digital transformation, resulting in cities that are efficient, livable, and sustainable.

III.   Conclusion:
In conclusion, the six ASEAN countries—Indonesia, Thailand, Vietnam, Singapore, Malaysia, and the Philippines—have demonstrated significant strides in utilizing government digitalization to build

smart cities, transforming urban landscapes across the region. Each country's journey toward smart city development is shaped by its unique history, current urban challenges, and economic growth, but all share a common goal: to improve the quality of life for their citizens by leveraging digital technologies. Government initiatives, such as smart traffic management, IoT-based environmental systems, and digitalized public services, have resulted in measurable improvements in urban management and service delivery. These countries also face similar challenges, including cybersecurity concerns, technology access disparities, and the need to upgrade infrastructure to support smart city technologies. Despite these obstacles, the success of individual projects in cities like Singapore, Jakarta, Hanoi, Kuala Lumpur, and Manila shows the potential for continued progress. ASEAN's participation in smart city strategies will be key to the region's future development. Through regional collaboration, sharing of best practices, and collective investments in digital infrastructure, ASEAN nations can enhance their smart city initiatives. The ASEAN Smart Cities Network (ASCN) provides a platform for coordinated efforts, and future strategies should focus on building cybersecurity resilience, bridging the digital divide, and fostering sustainable development across urban areas. By continuing to embrace digitalization, ASEAN countries are well-positioned to create innovative, sustainable cities that are prepared for future growth and technological advancements.

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9. Methodology

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.

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 0,1,2,3,4,5,6 and Score 7 in **8 levels**; Max Score is the maximum score of the sub-indicators.

This will generate the Normalized Score which ranges from 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.

List of Main Indicators and Scoring points

No	Indicators	2024
1	Network Infrastructure Preparedness (NIP)	Norm Score x **8%**
2	Management Optimization (MO)	Norm Score x **12%**
3	Online Services (OS)	Norm Score x **14%**
4	National Portal (NPR)	Norm Score x **6%**
5	Government Chief Information Officer (GCIO)	Norm Score x **10%**
6	Digital government Promotion (EPRO)	Norm Score x **10%**
7	E-Participation (EPAR)	Norm Score x **8%**
8	Open Government Data (OGD) & DX	Norm Score x **10%**

9	Cybersecurity (CYB)	Norm Score x **10%**
10	The emerging technology in Digital government (EMG)	Norm Score x **12%**

Main 10 Indicators and 37 Sub-indicators List

10 Major Survey Items	37 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 3-6 e-Disaster, e-Mobility and Smart city 3.7 Usages of AI and Web3
Convenience of homepage and portal site – NPR (Status of National Portal)	4-1 Information 4-2 Technical 4-3 Functionality
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
Digital Government Promotion -EPRO	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 10-4 The Application of AI

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                       │   Press Release   │
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10. Acknowledgement

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