OPEN [GOVERNMENT] DATA POLICIES AND PRACTICES

SELECT COUNTRY CASES

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Prologue

Open [government] data denotes the information generated by public organisations, and which can be freely used, re-used, and distributed by anyone. As such, open government data are considered key contributors to good governance, digital innovation, and economic development for a variety of reasons. Open data policies and practices increase transparency of government and enhance citizens' right to access to public information and their potential participation and interaction in the policy decision making domain. Equally, open data policies and practices foster accountability for providing information to citizens about what their governments are doing.

Furthermore, innovative utilisation of open data fosters evidence-based policy making leading to a more informed policy formulation process and policy implementation, and it creates a conducive environment for proactive public service provision and delivery. In addition, systematic utilisation of open government data improves the efficiency of government processes, as it potentially lowers operational costs and allows public organisations to devote less time on routine or repetitive tasks which can be performed by automated decision-making models (including AI).

Open government data are also important, as they potentially generate direct and indirect economic gains from their innovative utilisation. Their economic impact goes beyond the financial savings citizens and business realise by not having to purchase desired datasets or produce them themselves; commercial utilisation of open government data encourages job creation, incurs savings on resources and have a positive effect on productivity (OECD 2020). Moreover, entrepreneurs use data by transforming it to realise its full potential and at the same time foster solution-oriented collaboration between government and business.

This publication provides an extensive overview of open government data policies and practices implemented across the world that could be adopted to other national and local contexts. It covers some countries, leaders in the field, and the seven countries from Central Asia and the Caucasus participating in the capacity development project jointly implemented by UNDP Kazakhstan and the Astana Civil Service Hub and the Ministry of the Interior and Safety and the National Information Society Agency of the Republic of Korea.

We hope you will find the content of this publication informative and useful. Its ultimate aim is to contribute to acquisition of knowledge and experience, for enhancing one another's efforts and actions to establish open government data policy regimes, and to establish integrated open data portals, and publish and disseminate a comprehensive array of government datasets for wider use.

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II

Acknowledgements

About the Ministry of the Interior and Safety (MOIS)

The Ministry of the Interior and Safety (MOIS) is responsible for general affairs of the State Council, promulgation of Acts and subordinate statutes and treaties, government organisation and prescribed number of public officials, awards and decorations, government innovation, administrative efficiency, digital government, personal information protection, management of government buildings and support for elections and referendums. Furthermore, MOIS actively promotes local autonomy and decentralisation by supporting business, finance and taxation of local governments and mediating disputes among local governments. In addition, MOIS takes charge of establishing, supervising, and adjusting policies related to safety and disaster management such as emergency countermeasure, civil defence, and disaster prevention.

With the mission of leading government innovation for a sustainable future by providing more integrated and customised services for the citizens, promoting ethical and efficient use of digital technology, and strengthening private-public partnerships, MOIS has been leading the digital transformation of the public sector and collaborating with its partner countries to build a better digital society for all around the globe.

More information at https://www.mois.go.kr/eng/sub/a02/aboutMinistry/screen.do

About the National Information Society Agency (NIA)

The National Information Society Agency is a public institution founded by the Framework Act on Intelligent Informatization (Article 12), under the Ministry of Science and ICT and the Ministry of the Interior and Safety of Korea. Since its establishment in 1987, it has played a leading role in promoting national informatisation and the digital government of Korea. It has administered important ICT policies and infrastructure projects, including the Master Plan for the National Basic Information System (1987), the establishment of the Super High Speed Information Network (1995). 11 Initiatives and 31 Tasks for e-Government (2001 and 2003 respectively), the enactment of the Act on Promotion of the Provision and Use of Public Data (2013), and the establishment and promotion of the 5G+ Strategy and the National AI Strategy (2019).

With the emergence of the digital transformation era, NIA is working to develop and use key ICT technologies for introducing the DNA+ Strategy to successfully turn Korea into an integrated data-based society - DNA+ stands for Data, Network, AI, and the plus sign symbolises the pre-emptive response measures to various issues such as the digital divide among different social classes and overt-reliance on various ICT devices. Its ultimate goal is to resolve social issues and open the future for the nation with ICT.

More information at https://eng.nia.or.kr/site/nia_eng/04/10401000000002016093002.jsp

About the United Nations Development Programme (UNDP)

The United Nations Development Programme is the leading United Nations organization fighting to end the injustice of poverty, inequality, and climate change. Working with our broad network of experts and partners in 170 countries, we help nations to build integrated, lasting solutions for people and the planet.

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About the Astana Civil Service Hub (ACSH)

The Astana Civil Service Hub is a flagship initiative of the Government of Kazakhstan and the United Nations Development Programme. It was created in 2013 by 5 international organisations and 25 countries: now comprising 43 participating countries. The geographical range of its participants stretches from the Americas and Europe through the CIS, the Caucasus, and Central Asia to ASEAN countries, demonstrating that partnerships for civil service excellence is a constant and universal need for all nations.

Its mandate is to assist in the promotion of public service effectiveness by supporting the efforts of governments of the participating countries in building institutional and human capacity; and thus, contributing to the improvement of civil service systems in the countries of the region and beyond.

The Astana Civil Service Hub is a multilateral institutional platform for the continuous exchange of knowledge and experience in the field of public service development, aiming at supporting government in the region and beyond through fostering partnerships, capacity building and peer-to-peer learning activities, and evidence-based research.

More information at www.astanacivilservicehub.org

Table of Contents

List of Figures

List of Boxes

List of Tables

I. Introduction

The term "open government data" (OGD) refers to any data and information produced by public organisations, and which can be freely used, re-used, and distributed by anyone.[1] Conversely, government data may be considered open if it is made public in a way that complies with the open government data principles.

Open government data are considered key contributors to good governance, digital innovation, and economic development for several reasons. Open government data policies potentially increase transparency of government information contributing to the enhancement of citizens' right to access public information; they also increase the potential for their participation, interaction, self-empowerment, and social inclusion (OECD 2020b). In turn, transparency fosters accountability by providing information to citizens about what their governments are doing, and public engagement enhances governments' effectiveness and thus potentially improves the quality of its decisions (McDermott 2010). For example, publicising information on government spending, or on government contracts for supplies and services consistently and on a continuous basis.

Additionally, innovative utilisation of open government data fosters evidence-based policy making leading to a more informed policy formulation and implementation, and it creates conducive conditions for the proactive provision of public services. Furthermore, systematic utilisation of open government data can improve the efficiency of government processes by lowering operational costs, as it allows public organisations to make more informed decisions and devote less time on certain tasks, i.e., routine, or repetitive tasks which can be performed by automated decision-making models (including AI). Open government data can also improve the effectiveness of governments by aiding them to deliver better public services. One way that public service delivery is improved is making it easier for citizens to interact with government, e.g., by providing information, data, and services digitally.

> *Open government data is a public good, that should be delivered with a purpose, proactively, and with a focus on re-use, in line with user needs and its potential contribution to value co-creation.*

Open government data are also important, as they potentially generate direct and indirect economic gains from their innovative utilisation. The economic impact of open government data goes beyond the financial savings of citizens and business not having to purchase specific datasets or produce them themselves, and thus they potentially encourage job creation, savings on resources and have a positive effect on productivity (OECD 2020a).

Open government data policies need to be based upon robust strategies and action plans to facilitate their deployment and implementation. They provide the common vision and understanding in establishing government-wide data governance frameworks and data management capacities, which aims at building an overall environment that enables and incentivises public data use and re-use (OECD 2020a). Systematic publication of government datasets facilitates the use and re-use of public sector data which can potentially have considerable economic and social impact. Moreover, by making government datasets available the development of innovative digital solutions is also stimulated.

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[1] Re-use of information, data, or documents may be described as the use by persons or legal entities of documents in possession of public sector organisations In a less concentrated fashion. Re-use is described as the situation, where information collected or created by the government with the goal of governing well, is made accessible on request – as public sector information – or more actively, released to public use through a portal, or an API for any use – as open data.

Open data strategies and action plans also need to balance data openness with data protection and risk management. The strategies and implementation plans must incorporate the right rules for data protection, privacy, transparency, ethics, and digital rights. In this context, open government data should be published under an open license, effectively taking away the need for re-users to explicitly request data, without compromising their personal data privacy or confidentiality. Furthermore, time can be saved – at least from the user's perspective – by publishing data in an open format, e.g., CSV, a typical format for tabular data, which reduces – or eliminates – associated costs, effort and skills that may be required to transform the data into a suitable format for re-use; thus, enhancing digital rights.

In conclusion, it should be noted that open government data are not only manifested as published datasets on an Open Data Portal – the expected norm nowadays - as many other open data already exist. For instance, government organisations have created map data depicting plans for development, zoning land by usage, assigning land areas to postal codes, street names to streets, and house numbers to buildings, usually accompanied by coordinates for those areas, streets, and houses. The purpose of these practices is frequently related to the development of human habitats in general, property management, infrastructure maintenance, distribution of costs to maintain public services and income – the taxation to fund public services.

However, this government data is also open data, and has been accessible for a while, which is also made available to third parties. They, in turn use it combining it with other sources, to create user applications, that are completely unrelated to land development and infrastructure management. This is a vivid manifestation of open data potential in introducing innovative practices and generating economic gains.[2]

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[2] For example, Google Maps, while it is using varying data sources and advanced technologies primarily relies on government authorities' geospatial data for its functioning.

II. Access to Information (A2I)

Public access to information (A2I) is an essential driver of sustainable development. Accurate facts and figures are needed to ensure education for all, to foster inclusive economic progress, and to better protect the environment (UNESCO 2019). Access to information refers to information held by public organisations, and it is disclosed to the public that fosters government transparency and accountability and facilitates participatory decision making.

Any thriving society is built on well-informed, critical, and resilient citizens. Their ability to participate in, advocate for, and monitor peaceful and justly governed societies is facilitated by A2I. Without information, a better future for all is impossible. Hence, provision of access to information (A2I) to citizens is considered one of the essential components of a democratic country. In fact, access to information is perceived as a fundamental human right by the United Nations, and it assumes that every citizen has the right to request, seek and access information from public organisations.[3]

Access to information is also one of the key pillars to facilitating the building of an inclusive knowledge society and better governance. Availability of public information allows citizens to be aware of how public money is spent, and what agreements the government enters and with whom, as well as other information on government decisions which affect their lives, to be informed, make their own decisions, and take appropriate action.

A first step in establishing the right to information is the adoption of laws enabling an open government, that have been enacted by a large majority of countries across the world. Proper implementation of such laws can create a conducive environment for all participating parties. However, even though A2I laws have been adopted, their implementation remains a hurdle that is hard to surmount.[4] This is mainly due to a persistent knowledge gap, where the right to information is unknown to both the broader public as well as the public institutions themselves. Even though A2I is a fundamental freedom of the wider public, it is often perceived as a right or tool specifically for journalists and media. In addition, this knowledge gap also manifests itself in a lack of data about A2I implementation.

Greater openness benefits both citizens and governments. Open access to information can prompt better data management, helping governments make more informed decisions and provide more efficient public services. It is also considered a safeguard against mismanagement and corruption tendencies. Promoting transparency in the management of public finances or the decision-making process in parliamentary proceedings are useful tools to prevent excesses and reduce corrupt practices. Thus, increased access to public information can also increase trust in government by the public, as well as provide more possibilities for citizens to convey their needs and to be heard in general.

Progress in A2I is monitored by the SDG Indicator 16.10.2, that also tracks progress on A2I implementation.[5] By 2019, 125 countries had enacted access to information legal instruments. This, however, does not assume actual implementation of the legal provisions, as it is observed that in many countries the potential for access to information is not fully discovered and therefore, not utilised. There are several reasons for this: (1) a knowledge gap exists for both parties,

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[3] Against this backdrop, UNESCO serves as the United Nations custodian agency for Sustainable Development Goal (SDG) Indicator 16.10.2, on the number of countries that adopt and implement constitutional, statutory and/or policy guarantees for public access to information. The Organisation contributes to this target to ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements.

[4] See also appendix 2.

[5] As part of Sustainable Development Goal (SDG) 16, SDG Target 16.10 aims to "ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements". https://www.law-democracy.org/live/wp-content/uploads/2019/07/Combined.Report. Spotlight.Road-to-2030_final.pdf

government and public; (2) high level of confidentiality in public authorities; (3) lack of technical infrastructure; (4) absence of wide recognition and understanding of the significance of open data and its potential; and (5) inadequate or partial implementation of laws, i.e., not a timely update of information, absence of guidelines and instruments, etc (UNESCO 2019).

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https://www.law-democracy.org/live/wp-content/uploads/2019/07/Combined.Report.Spotlight.Road-to-2030_final.pdf

III. Public Sector Information (PSI)

Public Sector Information (PSI) is the information provided by public organisations. Public sector information is defined as information generated, created, collected, processed, preserved, maintained, disseminated, or funded by or for a government or a public institution considering the legal requirements and restrictions referred to in the OECD Recommendation (OECD 2008).

The PSI itself is a valuable resource that can provide great possibilities to improve the economic situation of a country, while at the same time advance social benefits for its citizens. In other words, private organisations may access relevant and useful information at low cost, process and analyse it, re-use it for its own purposes, e.g., to produce value-added products and services, and finally be generating more revenue to pay taxes and as a result, to boost the national economy.

According to the National Archives of the U.K. Government, the numerical estimation of the value that PSI can bring to the community including business, the public sector and other, consisted around US$ 2 billion in 2011.[6] The latest statistics indicate that the economic value of PSI in 2018 for the European Union countries and the U.K. amounted to US$ 60 billion approximately, and this figure is expected to rise to US$ 200 billion by 2030.[7]

Based on this information only, the enormous positive effects of PSI on various sectors such as enhancement of innovation, increasing commerce, better community engagement and involvement may be assumed. In addition, another significant factor is the increased transparency of government organisations which leads to the increased trust of citizens in state institutions. This is an important point in building a democratic country with sustainable and inclusive developed society, with a strong economy and active social protection.

Open and accessible information is not the end of the whole chain of PSI, but only the beginning. However, many challenges and barriers exist legally and practically in many countries around the world in ensuring the publication of PSI, accessibility to it, and most importantly, the ability to re-use it.[8] In this context, the European Parliament and the Council of the European Union, although they had adopted the first PSI Directive back in 2003, in 2017 and 2019 the document was upgraded with major changes focusing on the re-use of data.[9]

Challenges remain, however, such as lack of awareness about government policies and legislative changed regarding public sector information and access to information, absence of guidance or clear instructions, lack of collaboration among stakeholders in order to enable experience and knowledge sharing, or more adequate investment is required to improve the infrastructure of platforms for data publication, as well as the enhancement of the digitalisation and automation processes.[10] It is obvious that such issues are common across countries and they strongly intersect with others, such as disclosure policies, intellectual rights properties, copyright issues, and other related matters. Furthermore, technical obstacles exist which also need to be overcome. Support, release, publication, and other activities associated with the mass amount of

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[6] https://www.nationalarchives.gov.uk/information-management/re-using-public-sector-information/about-psi/psi-valuable/

[7] https://digital-strategy.ec.europa.eu/en/policies/psi-open-data

[8] Re-use means using public sector information for a purpose different from the one for which it was originally produced, held, or disseminated. https://www.nationalarchives.gov.uk/information-management/re-using-public-sector-information/about-psi/psi-must-re-usable/

[9] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1561563110433&uri=CELEX:32019L1024#ntr3-L_2019172EN.01005601-E0003

[10] https://www.oaic.gov.au/__data/assets/pdf_file/0027/7686/open-public-sector-information-from-principles-to-practice.pdf

public information require a good level of infrastructure, as well as a great deal of cybersecurity. In addition, the absence of a united format and/or standard for data generated by public institutions consequently leads to further issues associated with its unification, accountability, integrity, etc.

IV. Big Data

Big data is a phenomenon which emerged, as available datasets produced by various sources have grown larger and as the data users have become more aware of the added value obtained through the combination and linkage of different datasets produced by different actors, both private and public. Governments are no exception in generating an extraordinary amount of data and large datasets while delivering public services, from managing social security and welfare payments and health services through issuing passports and driving licenses to mention a few.[11]

The concept of "Big Data" loosely describes the volume, velocity, and variety of data, creating the phenomenon of rapidly increasing data generation,[12] gathering and mining along with the various steps therein. These include data capture, curation, search, analysis, sharing, storage, transfer, and visualisation – which are rapidly pervading every aspect of work in both the public and private sectors around the world. All these developments involve the capacity to search, aggregate, and cross reference large datasets – be it in text, image, numeric, or video formats – on an unprecedented scale, which however also present new challenges in the limitations, errors, and biases in its gathering and interpretation (Everest-Phillips 2019).

Big Data collection and analysis offer unprecedented and potentially revolutionary opportunities to improve the ways citizens and government interact. Big Data analytics and visualisation generate more and clearer information which may be used to strengthen service delivery, improve policies, inspire collective action and citizen feedback, prompt action, and motivate political causes along other.

Some of the consequences of Big Data rapidly increasing utilisation will impact the operational efficiency of the delivery of public services and the accuracy of strategic planning and policy making, as well as on the relations between citizens and the state. Central and local governments around the world are already both creating and using Big Data for developing policy, planning, and projects. Therefore, it is not surprising that, in recent years, the distinct but associated concepts of "Big Data" and "Open Data" have been playing a central role in government policy and promoting the legitimacy of policy formulation (Everest-Phillips 2019).

In sum, Big Data offers extraordinary opportunities and unique challenges to the ways citizens and government interact, leading to altering the nature of the state and the nature of the government. In the public sector, Big Data will alter the design, the delivery, and the monitoring of public policies. It will dramatically transform public services into better targeted, needs-based delivery. That will increase the accessibility, reach, and effectiveness of public services. By delivering to citizens the precise services they need, Big Data can significantly improve public trust in the government, and the result will boost the legitimacy of the state. At the same time, Big Data – along rapid and pervasive technological progress – will also have many disruptive effects, on labour markets, the economy and society, e.g., major international corporations will strengthen their capacity to view, understand and potentially manipulate society for private gain; an issue which will create the need for government intervention.

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[11] Yiu C. 2011. The Big Data Opportunity – Making Government faster, smarter, and more personal. In Ubaldi (2013).

[12] Big data are a product of increasingly inexpensive but disruptive technologies, including information sensing mobile devices, software logs, cameras, microphones, radio-frequency identification readers, and wireless sensor networks. In fact, commercial entities already exist that are pioneering methods to collect data remotely through 'crowd-seeding', effectively collecting local data from mobile phones for a range of interests and purposes.

Box 1. Examples of Big Data utilisation to improve service delivery

− In Istanbul, Turkey, the mobile operator Vodafone has deployed its huge database tracking travel patterns enabling a redesign of the city's entire bus route network to fit current needs rather than long established but often redundant service routes.
− In Dublin, Ireland, the City Council provides real-time estimates for bus arrival and transit times using predictive analytics.
− In Los Angeles, California, Big Data generated by magnetic road sensors and traffic cameras is used to control 4,500 traffic lights and thus regulate in real time the flow of traffic around the city, reducing traffic congestion by an estimated 16%.
− In Korea, five years of ambulance dispatch and placement data were analysed to identify vulnerable areas and thus determine the optimum placement of ambulances. The Public Sector Big Data Reference Analysis Big Data Model reduced the time required for the dispatch and arrival of ambulances by 49%.
− In Yerevan, Armenia, data of the mobile telecom operators were utilised to map the locations of infected individuals. Location mapping of infections served as a tool to take preventive actions against the spreading of the COVID-19 virus.
− In Kazakhstan, the "Digital Family Card" (DFC) system collects a multitude of different data at the family level, extracted from government databases, and it assesses the level of families' well-being. If families are exposed to risks, i.e., socio-economic, health, etc, the DFC generates social benefits proactively.
− In Indonesia, Big Data generated from national and provincial level active citizen feedback platforms and public posts on Twitter were combined to capture citizens' views on local issues providing a fuller picture of public opinion for decision makers to consider in the policy making process.

V. Open Government Data

Open data, or open government data (OGD) refers to any data and information produced by public organisations, and that can be freely, used, re-used, and distributed by anyone. Equally, government data may be considered open if it is made public in a way which complies with the open government data principles.[13]

The definition is a composite of the two main elements of open government data; "government data" and "open data", which are defined as follows:

- **Government data:** any data and information produced by public organisations; and

- **Open data:** are the data that can be freely used, re-used, and distributed by anyone, only subject to (at the most) the requirement users attribute to the data which make their work available to be shared as well.

Nowadays, open government data are considered a building block for open government, since they are perceived as a key enabler of improved service delivery, transparency and accountability, and public engagement. Government data are a strategic resource, carrying great potential for several beneficiaries, i.e., the Government, private sector and the wider economy and marketplace, and civil society and citizens.

Open data allow governments to utilise new evidence-based ways to make policy decisions and for allocating human and financial resources aimed at improving the overall efficiency of government operations, and delivering smart, innovative, and personalised public services proactively; while at the same time, raising the quality of interaction between the government and citizens; making it more effective, more efficient, and more transparent. Open government data can also be a powerful tool for public accountability by making existing information easier to analyse, process and combine, allowing for a new level of public scrutiny; and most likely a new level of public trust.[14]

> ### Box 2. Open Government Data Principles
>
> 1. **Complete:** All public data are made available. Public data are data that is not subject to valid privacy, security, or privileged limitations.
> 2. **Primary:** Data are as collected at the source, with the highest possible level of granularity, not in aggregate or modified forms.
> 3. **Timely:** Data are made available as quickly as necessary to preserve the value of the data.
> 4. **Accessible:** Data are available to the widest range of users for the widest range of purposes.
> 5. **Machine processable:** Data are reasonably structured to allow for automated processing.
> 6. **Non-discriminatory:** Data are available to anyone, with no requirement of registration.
> 7. **Non-proprietary:** Data are available in a format over which no entity has exclusive control.
> 8. **License-free:** Data are not subject to any copyright, patent, trademark, or trade secret regulation. Reasonable privacy, security and privilege restrictions may be allowed.
>
> *Source: https://public.resource.org/8_principles.html*

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[13] The list of open data principles has been updated, and ten principles have been identified aimed at evaluating the extent to which government data are open and accessible to the public. The principles are: (1) completeness; (2) primacy; (3) timeliness; (4) ease of physical and electronic access; (5) machine readability; (6) non-discrimination; (7) use of commonly owned standards; (8) licensing; (9) permanence; and (10) usage costs. See also open data essentials at http://opendatatoolkit.worldbank.org/en/essentials.html

[14] What should also be kept in mind, however, is that increased transparency is not an automatic driver of greater accountability. A government can be open, by being transparent, even if it does not embrace new technologies, and a government can provide open data and remain opaque and unaccountable (Robinson and Yu 2012).

Open government data also stimulates a competitive marketplace, for public sector services, as such data are used to generate innovative value-added services, as the private sector is among the primary users in commercially exploiting open government datasets.[15]

Furthermore, the expanding use of new technologies allows for open government data becoming a key enabler for citizen empowerment, higher participation, and public engagement, since analysis of datasets coming from various sources enables citizens to make more informed decisions based on evidence. Moreover, open government data can be utilised by civil society organisations to launch initiatives which exemplify the benefits of open government data to both the government and the public.

Nonetheless, for open government data policies to be effective they need to be based upon robust strategies and action plans that may facilitate their deployment and implementation, as they effectively provide a common vision and understanding in developing government-wide data governance frameworks and data management capacities, aimed at building an overall environment which enables and incentivises public data use and re-use (OECD 2020a).

Such documents should also be governed by an appropriate framework with respect to data protection, privacy, transparency, ethics, and digital rights. For example, published data should not compromise anyone's personal data privacy or confidentiality in general to protect their privacy. Or they should be published under an open license to be readily accessible by anyone, and in an open format, requisites which reduce or eliminate associated costs, effort, and skills required to transform the data into a suitable format for re-use; thus, ensuring digital rights for all.

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[15] Economic analyses have shown that when information is provided to the public – free of charge or at very low cost – individuals, developers, and private enterprises are more likely to take that information and create added-value products which they can then exploit commercially. This can increase the volume of private sector activities, that can stimulate the national economy and provide revenue to the government in the form of taxes (Ubaldi 2013).

VI. Open Data Policies, Practices, and Portals in select countries

Following the discussion on access to information, public information space, Big Data, and open government concepts, this section turns to open government data policies and practices in some advanced countries, i.e., Canada, Estonia, and the Republic of Korea and the European Union; as well as the seven countries from Central Asia and the Caucasus, participants of this capacity development project; namely Armenia, Azerbaijan, Georgia, Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan.

This outline begins with the definition of open data used in each country, and it continues with the policy and legal framework in place or in progress, and the governance structures that formulate, coordinate, and implement open data policy in each country. It goes on exploring their open data portals with respect to their functional design, the features they incorporate, i.e., existence of APIs accessing datasets, APIs with system-wide management capabilities such as CKAN,[16] manuals and documentation, search functions – including SPARQL query tools,[17] which enable filtering for searching by one or more of the many characteristics of datasets, or by policy domain data, e.g., "agriculture", "welfare", "economy", etc. Furthermore, it assesses whether they provide the possibility for users to request and rate datasets, and have features incorporated which foster the on-line interaction between publishers and re-users, such as discussion forums, feedback channels, and the possibility of notifications when new datasets become available.[18]

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[16] The Open-Source Data Management system (CKAN) was designed specifically for open data portals and provides a wide range of supporting capabilities including publishing, sharing, and using datasets. It is supported by many open data portals, including that of the EU as well as, for example, Canada and the Kyrgyz Republic, to name only a few.

[17] SPARQL is the short version for 'SPARQL Protocol and RDF Query Language', a standard query language and protocol for linked Open Data and RDF databases. Having been designed to query a great variety of data, it can efficiently extract information hidden in non-uniform data and stored in various formats and sources. And RDF is a standard for data interchange that is used for representing highly interconnected data. Each RDF statement is a three-part structure consisting of resources where every resource is identified by a URI. Representing data in RDF allows information to be easily identified, disambiguated, and interconnected by AI systems.

[18] Future research could focus on the content analysis of national open government data portals to provide a better understanding of the strategic execution of the open data concept in general, and implementation tactics of open data-driven initiatives. Such information as the type of government platforms, i.e., desktop and mobile versions; dataset platforms designed for operating systems, i.e., Windows, Mobile, Android, and Apple iOS; the algorithms and mechanisms of operation; the presence and type of the user identification in such systems; the type of services, i.e., informational, interactive, and transactional, paid e-services, etc; target audiences, i.e., e-services for citizens and business or exclusively for developers; peer-to-peer and civic engagement projects and other information is useful in analysing strong and weak points of open data implementation mechanisms from different points of view (Kassen 2019).

Canada

Open data definition

Open data is defined as structured data that is machine-readable, freely shared, used and built on without restrictions.

Policy and legal framework

Canada is a leading member of the Open Government Partnership, an international forum promoting transparent, participatory, inclusive, and accountable governance.[19] Canada is also a member of the Open Data Charter, a collaboration among 170 government and organisations working to promote open data based on as shared set of principles.[20] Canada joined the Digital Nations, in 2018, an international forum of leading digital governments.[21]

The National Action Plan on Open Government 2022-2024 is the country's guide for open government policy development and for open data as its most principal unique toolset. The Action Plan strives to achieve its objectives by opening data, focusing currently on enhancing timeliness, relevance, and quality of data to enable data-driven decision-making styled as Open Data for Results. It is worth noting that the National Action Plan for Open Government is a result of consultations with the broadly defined non-governmental sector represented in a multistakeholder forum. This forum involves organisations in the areas of transparency and anti-corruption, democracy, immigration, environmental protection, data and technology, AI, and Open Data.[22]

> ### *Box 3. Core policy premises of open data in Canada*
>
> 1. Data must be available as a whole, in a convenient and modifiable form and at no more than reasonable reproductions costs, preferably by downloading over the Internet.
> 2. Data must be provided under terms that permit re-use and re-distribution including their combination with other datasets.
> 3. Everyone must be able to use, re-use, and re-distribute, and there should be no discrimination against fields of endeavour or against persons or group, or restrictions to use for certain purposes.

The main legal instruments regulating government data are:

− Access to Information Act (1985; amended in 2022) sets policy directions as accountability, transparency and the overall goals pursued as open society, democratic society, and public debate.[23]
− Directive on Open Government (2014) outlines the definitions of Public Information and Open Data, the responsibilities of government organisations and monitoring and reporting requirements, and it includes the open government implementation plan.[24]

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[19] https://www.opengovpartnership.org/

[20] The Open Data Charter principles promote policies and practices that enable government and civil society organisations to collect, share, and use well-governed data, to respond effectively and accountably to the following focus areas: anti-corruption, climate action, and pay equity. https://opendatacharter.net

[21] Digital nations aim at harnessing the potential global power of digital technology and help one another to become even better digital governments, faster and more efficiently through sharing and learning from each other. Each participant agrees to lead by example and contribute with its expertise on a non-binding, voluntary basis. The participants are connected by the principles of user needs, open standard, open source, open markets, open government, connectivity, teaching children to code, assisted digital and a commitment to share and learn. https://www.leadingdigitalgovs.org/

[22] https://open.canada.ca/en/multi-stakeholder-forum-open-government

[23] https://laws-lois.justice.gc.ca/eng/acts/A-1/

[24] https://www.tbs-sct.canada.ca/pol/doc-eng.aspx?id=28108

Governance structure

The Treasury Board of Canada is the author of the National Action Plan on Open Government and thus the main custodian of open government data policy in the country and its main implementer.

The Canada Open Government Working Group (COGWG), consisting of members from the Treasury, area specific implementers, and public and research agencies as a sharing and collaboration forum, which promotes Open Data, open information, and public engagement principles across public bodies.[25]

Canadian open data policies are further entrusted to be thoroughly implemented by departmental information management senior officials in corresponding government organisations. These officials report performance or compliance issues to the Chief Information Officer (CIO) of the Treasury Department.

The Information Commissioner, an independent body with the powers to force access to records sought by individuals, ensures that unjustified refusals for provision of information are properly addressed and resolved.[26]

While government organisations are tasked with implementation, the non-governmental sector is involved in policy formulation. As already mentioned, the National Implementation Plans were a result of a multistakeholder forum. Furthermore, promotional and knowledge sharing events are organised regularly connecting both public organisations, experts, and activists.[27]

Portal

Canada's open data portal presents all available datasets by policy domain on its main page, and it provides an advanced search mechanism – employing numerous filters - for prospective users to search for datasets. The portal is also interactive as it allows users to provide feedback and evaluate datasets included in the portal and communicate with the publishers of the data.

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[25] https://open.canada.ca/en/maps/open-data-canada#cogwg

[26] https://www.oic-ci.gc.ca/en/information-commissioner-canada

[27] For example, in November 2022, the Canadian Access and Privacy Association (CAPA) Annual Conference took place discussing topics related to open government and open government data. Furthermore, the academia and research community and non-governmental organisations meet regularly all around the country.

Figure 1. Canadian Open Data Portal[28]
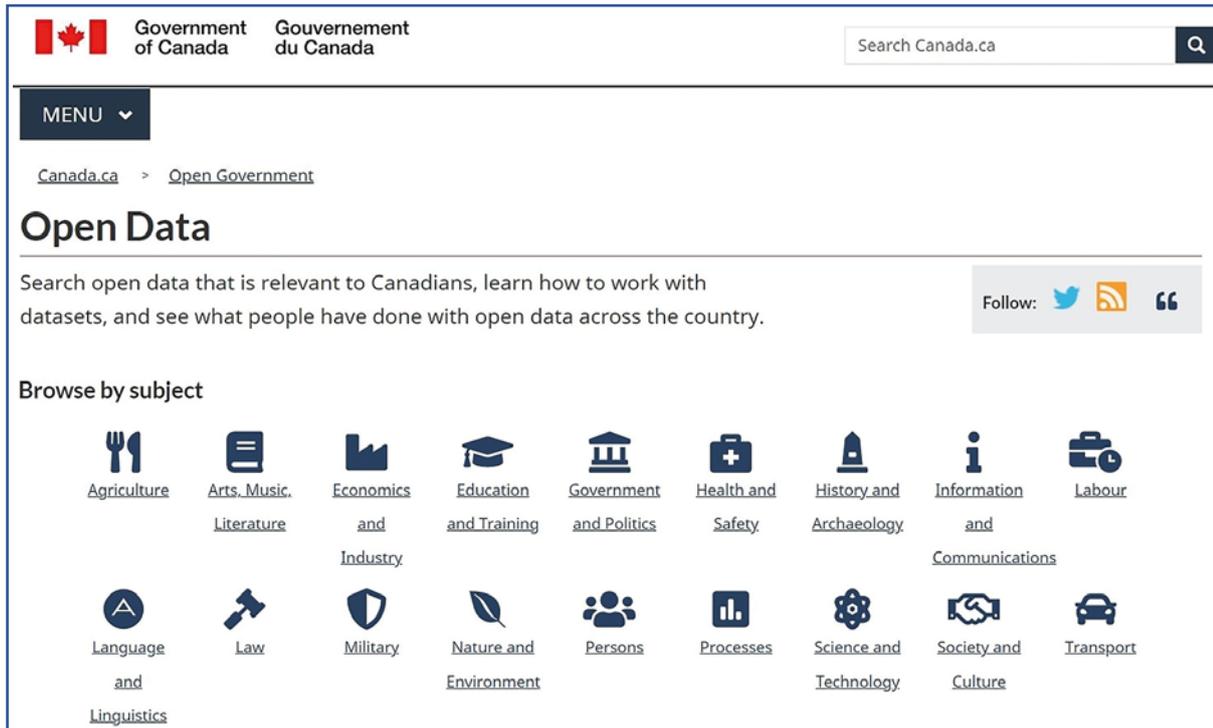
Open Data Canada also publishes applications, as well as open data user stories, and it contains an impressive number of APIs in its API Store and apps in the Apps Gallery which use open data, along with manuals and other documentation.[29][30] Many datasets from several policy domains are machine-readable and thus exportable to other software.

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[28] https://open.canada.ca/en/open-data

[29] Apps Gallery https://open.canada.ca/en/apps; Open data user stories https://open.canada.ca/en/stories; APIs https://api.canada.ca/en/homepage

[30] A good example of an API enabled dataset is the Canadian Crop Metrics, an application which allows users to look at specific regions and generate reports, graphs, and tables to compare current conditions to historical data of past years for eleven different types of crops. Weather data is also updated regularly, and yield estimates are updated monthly from July to October. https://open.canada.ca/en/app/canadian-crop-metrics

Estonia

Open data definition

Open data means data in machine-readable format, that have been made available to everyone for free and public use.

Policy and legal framework

Estonia is one of the founders (2014) and member of the Digital Nations and a member of the Open Government Partnership.

Estonia's Digital Agenda 2030 – the national digital strategy – does refer to Open Data by setting a goal for updating the action plan for re-usable data. The Action Plan is a development programme concentrated on improving the Open Data portal usability.[31]

The Public Information Act (2000) is the legal core of Open Data policy in Estonia, anchored in the constitutional rights promoting an open society and enabling the monitoring of the public sector.[32]

Governance structure

The Ministry of Economics and Communications is the government entity responsible for the Digital Agenda of the Government, including Open Data management.[33]

Open Knowledge Estonia, part of the Open Knowledge Foundation,[34] is a non-governmental organisation that influences open data policy in the country.

A set of government organisations are responsible for implementing the open data policies' different dimensions, i.e., the Estonian Information Systems Authority,[35] responsible for technical infrastructure, security, and data implementation; the Data Protection Inspectorate,[36] an independent body with wide supervisory powers and functions,[37] and Statistics Estonia,[38] that coordinates data governance and data requirements.

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[31] The Digital Agenda is adopted after discussions with multiple non-governmental organisations from the ITC sector, start-ups association, industry and entrepreneurs' organisations, local governments, and scientists.

[32] https://www.riigiteataja.ee/en/eli/522032022002/consolide

[33] The policy setter is the Cabinet of Estonia, and the Ministry is the policy owner and implementer.

[34] The Open Knowledge Foundation is a non-governmental organisation, an international network encompassing 40 countries using advocacy, technology, and training to unlock information, to create and share knowledge. The members of the Network operate independently, setting their own priorities for projects relevant to their country, but support each other, share expertise, tools, and materials on a regular basis through the Network, amplifying open knowledge activities around the globe. https://okfn.org/network/

[35] https://www.ria.ee/en

[36] https://www.aki.ee/en

[37] These include forcing owners of information – most often government organisations – to comply with requests of information and requirements for the maintenance of websites, as well as requirements concerning the establishment of databases. Enforcement is further strengthened by the right of the Data Protection Inspectorate to invoke certain provisions of the Law Enforcement Act or call for disciplinary action against unruly officials. Infringements of the Act are punishable by fines and may also entail other administrative sanctions.

[38] https://www.stat.ee/en

Portal

Estonia's open data portal features a selection of data that have been characterised as open. It currently contains 1,573 datasets from 2,220 publishers.[39]

Datasets are presented by policy domain, and an advanced search mechanism is provided to access the datasets database, employing several filters. The portal features a depository of applications created from open data for sharing. The portal is also interactive as it allows users to provide feedback and evaluate datasets included in the portal and communicate directly with the publishers of the data. Furthermore, it maintains discussions which can also be searched for by topic and it accepts proposals by portal users for the publication of new datasets. In this context, users are also able to vote in favour of dataset requests, thus increasing the probability that publishers will aim to publish the most requested datasets. Many datasets are machine-readable, supported by APIs and accompanied by manuals and other documentation.

Figure 2. Estonian Open Data Portal[40]
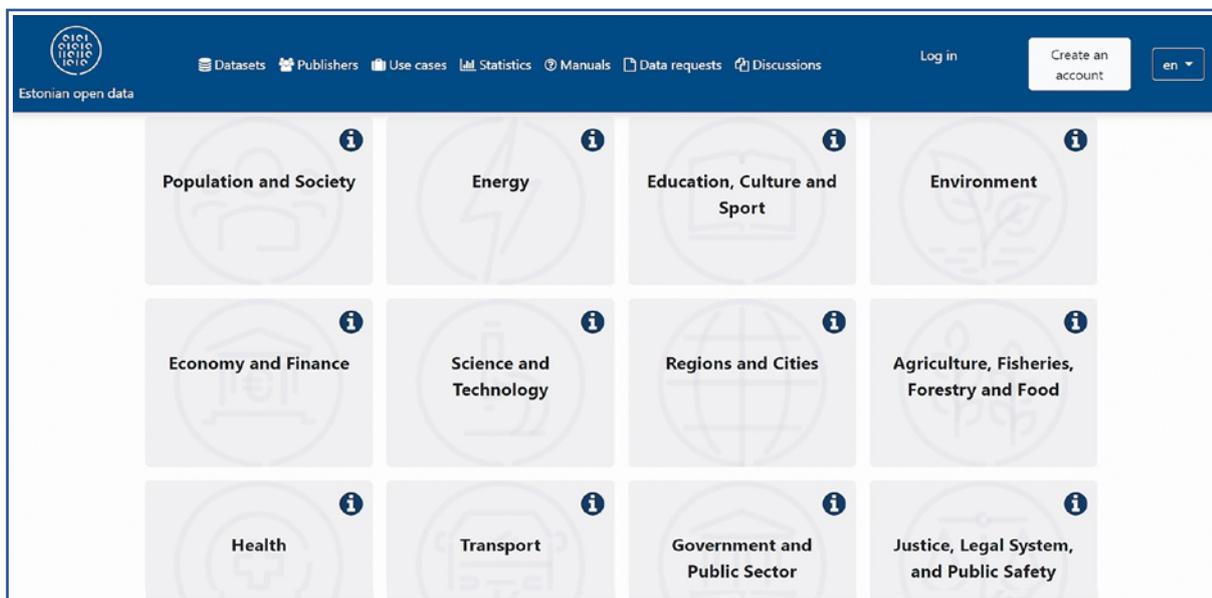
Republic of Korea

Open data definition

Open data refers to any data or information that can be downloaded from the Internet, and is available for all to access, re-use, and re-distribute freely. Open data that are created and retained by any public institution, is called open government data.[41]

Policy and legal framework

The Republic of Korea (hereinafter – Korea) is one of the founders (2014) and member of the Digital Nations and a member of the Open Government Partnership, as well as of the Open Data Charter, which it has adopted.

Since the enactment of the Act on Promotion of the Provision and Use of Public Data in 2013,[42] Korea has actively begun to implement open data policies. By ensuring that citizens have first access to open data and by assigning public institutions the duty to release their data to the public,[43] Korea promotes the efficient release and re-use of public sector data.

Furthermore, in 2020, the Act on Promotion of Data-based Administration was enacted to allow public institutions to share and re-use their data among and within, public sector organisations and analyse them systematically, aiming at improving citizens' quality of life. The Act defines data-based administration, as the Administration managing, sharing, and re-using data created by public institutions to formulate scientific policies and implement decision making.

In line with these Acts, initiated by the Ministry of the Interior and Safety, master plans are formulated every three years and an annual implementation plan pursuant to the relevant master plan is also prepared. The First Master Plan for Data-based Administration 2021-2023 is currently implemented, and the Fourth Master Plan for Promoting the Provision and Use of Public Data 2023-2025 will be implemented soon. Furthermore, the Personal Information Protection Act enacted in 2011 has ensured the stability of open data release by prescribing the full protection of personal and other sensitive information.

The Korean Administration recently announced a new plan, the Digital Platform Government Implementation Strategy, a major principle of which, along other, is that open data should be open by default in machine-readable digital format to meet citizens' needs and promote its re-use.[44]

Governance structure

The Ministry of the Interior and Safety is tasked with formulating open data policies and master plans, controlling the relevant government-wide infrastructure, and evaluating implementation, together with two other entities – the Open Data Strategy Council,[45] and the Data-based Administration Promotion Committee. These two entities deliberate and coordinate open data policies submitted by the Ministry and then monitor and evaluate implementation.

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[41] Open government data are legally defined as any data or information, including databases and electronic files, processed in optical or electronic form, and which are created or acquired and managed by any public institution.

[42] https://www.law.go.kr/eng/engMain.do (from this main page of the legal information website, details on each law can be seen after searching it by name, title, or keyword).

[43] Public institutions include state agencies, local governments, and other public institutions as defined in the Framework Act on Intelligent Informatization (2020).

[44] The Digital Platform Government is Korea's new vision, meaning that the citizens, businesses, and the Government work in collaboration to solve social problems and create new values based on a digital platform where all data are connected. Its key projects are building innovative infrastructure, promoting full access and use of high-quality data, transforming the way government works using AI and Big Data, and providing a safe and reliable digital platform.

[45] https://www.odsc.go.kr/eng

The Ministry also operates a Public Information Sharing Centre for ensuring data exchange among government entities and an Integrated Data Analysis Centre for collecting, analysing, and utilising integrally open government data.

The National Information Society Agency (NIA) – based on an agreement with the Ministry of the Interior and Safety – operates as the Open Data Center,[46] and as the institution specialised in Data-based Administration. The NIA is tasked with supporting the expansion of high-quality open data in the possession of public institutions and facilitating its creative use by the public sector.

Portal

Korea's open government data portal is the central (one-stop-shop) portal which provides Open Government Data created or acquired and managed by all public sector organisations. The Ministry of the Interior and Safety manages and operates the portal, according to the Act on Promotion of the Provision and Use of Public Data.

The main page of the portal presents categories of datasets by policy domain, as well as a listing of the most popular and most recently posted datasets. The portal contains 56,685 datasets and 10,421 open APIs from a thousand publishers as of December 2022.

The main feature of the portal is the Data Catalogue,[47] where data users can search for datasets using advanced search filters and keywords, download datasets in various formats, i.e., CVS, JSON, XML, and access APIs. For datasets not provided through the portal, anyone can make a request by simply filling out, and submitting, an application form.[48] Then, the public institution receiving the application decides whether the requested datasets can be made available following appropriate deliberation. If requested datasets can be released, they will be registered in the Data Catalogue. In case of a refusal for data provision, and if an applicant disagrees, then they can appeal the decision.[49]

The portal also provides tools for visualisation of datasets, crowd-mapping, and collaboration platforms where developers can exchange their experiences and use cases.

> ### Box 4. Basic principles of using open data in Korea
>
> 1. **Right to universal access.** Public institutions must enable anyone to readily use open data.
> 2. **Principle of equality.** Public institutions must guarantee that citizens can equally access and use open data.
> 3. **No impeding the use of open data.** Public institutions must not impede the use of open data by restricting or blocking user access.
> 4. **Guaranteed use of open data for gain.** Various activities including the use of open data for gain must be guaranteed by public institutions unless regulated by other laws.
> 5. **Duty of good faith.** Users must observe obligations prescribed under statutes, terms, and conditions of use to prevent any infringement of public interests.
>
> *Source: www.law.go.kr*

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[46] https://www.data.go.kr/en/ugs/selectPortalInfoView.do#portal_info

[47] The Data Catalogue is a feature intended to improve usability of large and otherwise heterogenous data ecosystems. It is sometimes defined as a collection of metadata records combined with data management and search tools (Guptill 1999).

[48] https://www.data.go.kr/en/tcs/dor/insertDataOfferReqstProcssView.do

[49] The Open Data Mediation Committee mediates disputes relevant to the refusal for open data by public institutions. https://www.data.go.kr/en/tcs/dor/insertTrublMdatReqstProcssView.do

Figure 3. Korean Open Data Portal[50]

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50 https://www.data.go.kr/en/index.do
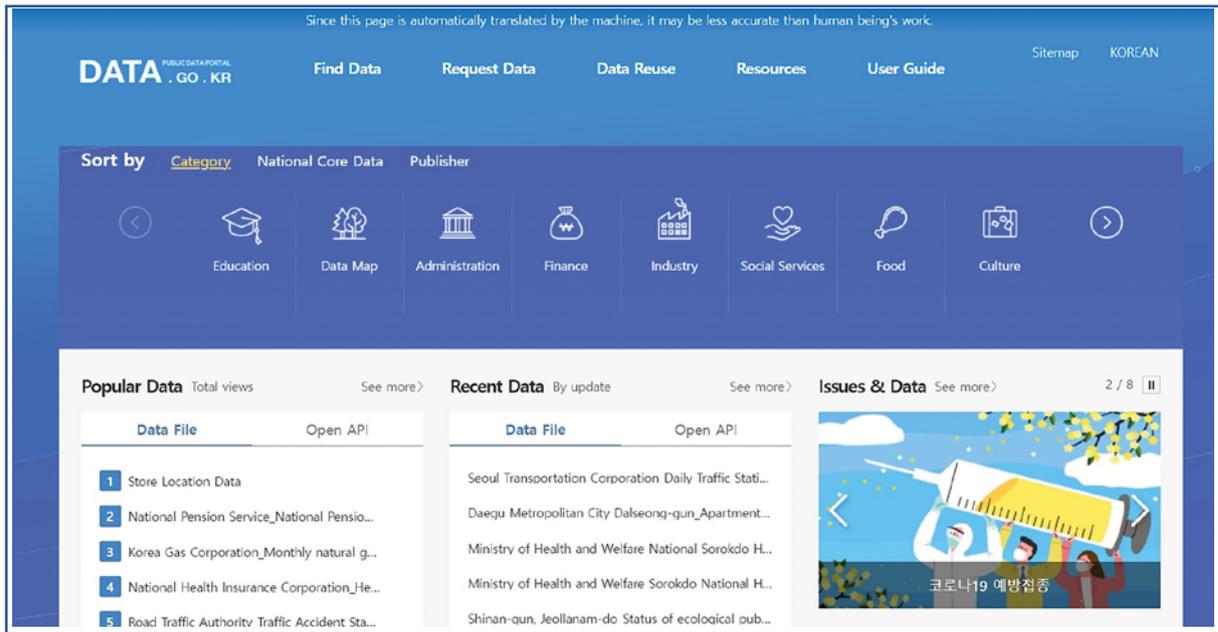
European Union

Open data definition

Open government data refers to the information collected, produced, or paid for by the public bodies and made freely available for re-use for any purpose.

Policy and legal framework

Open data policies of the European Union encourage the wide availability and re-use of public sector information for private or commercial purposes, with minimal or no legal, technical or financial constraints, and which promote the circulation of information not only for economic operators but primarily for the pubic – as they can play an important role in promoting social engagement – and for the development of new services based on novel ways to combine and make use of such information.[51]

Open data policies in the EU are further strengthened by enforcement action, which concentrates on "document" subset of information re-use. The legal instruments motivate policies of access and re-use of public documents by establishing redress measures.[52]

The EU has a strategy for data aimed at creating a single market for data that will ensure Europe's global competitiveness and data sovereignty. This strategy aims at data becoming an enabler for business, researchers, and public administration in nine priority data spaces.[53] Common European data spaces will ensure that more data becomes available for use in the economy and society, while keeping the companies and individuals who generate the data in control.[54] The EU involves and consults a range of non-government bodies in setting its strategic directions.[55]

- Directive 2102 (2016) on the accessibility of websites and mobile applications of public sector bodies.[56]
- Directive 1024 (2019) on Open Data and re-use of public sector information.[57]
- Data Governance Act (2022) on harmonising rules on fair access to and use of data.[58]
- Draft Data Act (proposed 2022) on setting up rules on who can use and access what data for

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[51] Therefore, the Member States of the European Union are encouraged to promote the creation of data based on the principles of 'open by design and by default' regarding all documents that fall within the scope of the relevant Directives.

[52] Members States are required to set up such redress bodies, which are independent and have the power to impose their decisions on other public organisations. The decisions they may impose can force the other public organisations to enable documents into re-use after their owners fail to grant access to documents to those who submit re-use requests.

[53] (1) Health; (2) Industry and manufacturing; (3) Agriculture; (4) Finance; (5) Mobility; (6) Green Deal; (7) Energy; (8) Public Administration; and (9) Skills. Synopsis report of the public consultation on the revision of the Directive on the reuse of public sector information | Shaping Europe's digital future (europa.eu)

[54] https://digital-strategy.ec.europa.eu/en/policies/strategy-data

[55] For example, for Directive 1024 (2019) the EC received 273 commentaries from citizens, associations, public organisations, and scientists. Synopsis report of the public consultation on the revision of the Directive on the reuse of public sector information | Shaping Europe's digital future (europa.eu).

[56] EUR-Lex - 32016L2102 - EN - EUR-Lex (europa.eu). It describes the policy goals of Open Data, re-use of public sector information and accessibility to websites as promotional to economy, competitiveness, and the single market. That is "to promote the use of Open Data and stimulate innovation in products and services" and "to improve the functioning of the internal market".

[57] EUR-Lex - 32019L1024 - EN - EUR-Lex (europa.eu). It describes public sector information as "information collected, produced, reproduced, and disseminated within the exercise of a public task or a service of general interest, is an important primary material for digital content products and services and will become an even more important content resource with the development of advanced digital technologies, such as artificial intelligence, distributed ledger technologies and the internet of things".

[58] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R0868

– which purposes across all economic sectors in the EU.[59]

Governance structure

The European Commission is the policy setter as it formulates the strategy. The European Parliament and the Council are the policy setters for primary legal acts such as EU Directives and the Member States as implementors. The EC also involves and consults a range of non-governmental entities in setting its strategic directions.

While the main implementers are the Member States, some responsibilities are shared with the European Commission. For example, the High Value Datasets,[60] a special priority Open Data Initiative, are defined and implemented by the Commission, as it is also tasked with laying down the implementing acts. The Commission also acts as the promoter for this policy area. In particular, the Commission facilitates cooperation among Member States staging various promotional and knowledge-sharing events, and it creates Open Data maturity reports.

Portal

The European Union Open Data portal's main page displays the number of available public sector datasets, with links, also grouped by catalogue, and by country. It also displays links to data stories and news, as well as to learning material on open data. It contains a search facility which allows for simple and more complex searches including for graphs utilising the SPARQL function. Results of searches include relevant material from any Member State of the Union.

Figure 4. European Union Open Data Portal[61]
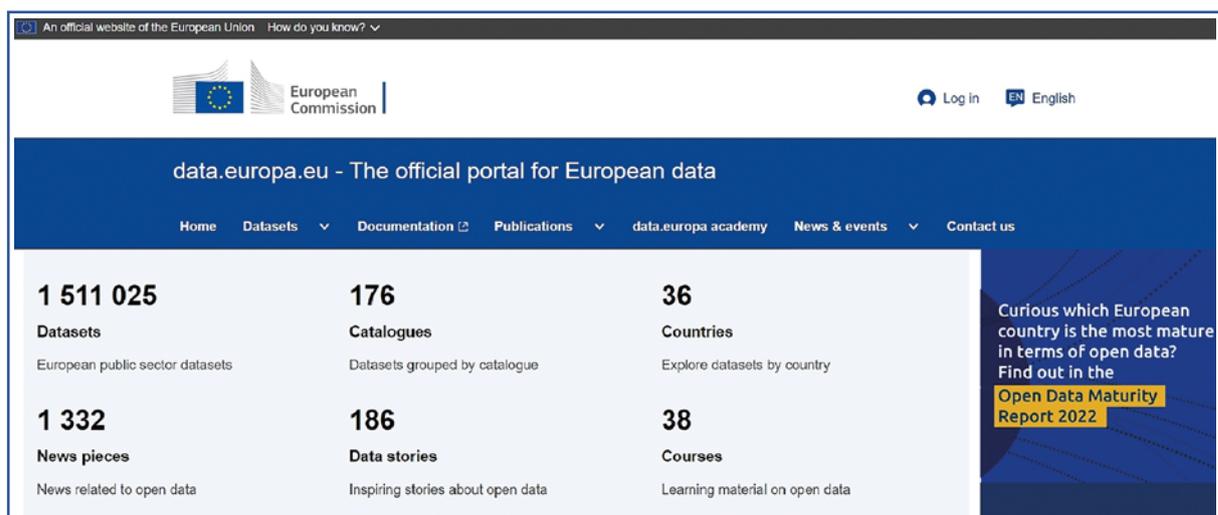
Furthermore, it provides an extensive listing of manuals and documentation, and it allows data users to communicate via a form for requesting specific datasets sorted by language, category, and subject. Use cases can be submitted by different users accessible through the data stories link. Additionally, APIs are available and other data tools such as web tools allowing data users to access, implement and share specific data provided by the Publications Office,[62] as well as mobile applications created by EU institutions and other bodies.

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[59] https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1113

[60] The High Value Datasets are focused on geospatial, earth observation and environmental data, as well as meteorological, other statistical, corporate and company ownership, and mobility data.

[61] https://data.europa.eu/en

[62] https://op.europa.eu/en/web/webtools/

Armenia

Open data definition

Open Data is data that is available to the public without verification of information about the requester and is provided without any additional requirements.[63]

Policy and legal framework

Armenia is a member of the Open Government Partnership (OGP) since 2011. Since then, Armenia has improved its processes and has implemented four national action plans and currently implementing a fifth aimed at improving open data policy making and implementation.[64] In all national plans the OGP is referenced as the platform guiding the idea of "open data" in Armenia.

> ### *Box 5. Open Government Data Principles in Armenia*
>
> – *Complete:* Digitally available to the extent possible.
> – *Primary:* Collected at its very source.
> – *Timely:* Released as early as possible.
> – *Accessible:* To the widest possible audience.
> – *Machine processable:* Allow for processing by software tools.
> – *Non-discriminatory:* Available to anyone without access control.
>
> *Source: www.crrc.am*

Armenia's Action Plan for OGP 2018-2020 implemented a series of town hall meetings and thematic public discussions with civil society organisations and media representatives that eventually led to five legislative initiatives and amendments in the field of open data. The OGP-Armenia National Action Plan 2022-2024 is currently implemented.[65]

In addition, Armenia is currently in the process of developing a data management strategy, which will include provisions about open data management.

The Government is also working on the legislative framework defining data policy, a self-assessment system in the field of freedom of information, and on access to cartographic spatial data and metadata to complement the existing legal framework:

- Law on Freedom of Information (2003).
- Law on Electronic Document and Electronic Digital Signature (2005).[66]
- Law on Personal Data Protection (2015).[67]
- Government Decree N 1521-Ն (2013) on minimum requirements for official websites.
- Government Decree N 1093-Ն (2015) establishes common technical requirements for security and interoperability of electronic systems used by public sector institutions.[68]
- Government Decree N 1204-Ն (2015) on registration, classification or storage of information delivered to or processed by the information holder.
- Government Decree N 572-Ն, (2017) obliges state institutions to provide individual electronic identification on electronic platforms or websites in case of provision of electronic services provided by law.[69]
- Government Decision N 1849-Ն (2019) regulates the transfer of electronically stored and processed personal data by state and local self-government bodies, among these bodies, as well as to resident legal entities and investment funds.

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[63] https://www.arlis.am/documentview.aspx?docID=149957

[64] (1) 2012-2013; (2) 2014-2016; (3) 2017-2018; (4) 2018-2020; and (5) 2020-2024.The Action Plans 1 to 4 are available at https://ogp.gov.am/en/previous-action-plans and the current plan at OGP Armenia | OGP-Armenia National Action Plan 2022-2024 (gov.am)

[65] https://ogp.gov.am/en/ongoing-action-plan/

[66] https://www.arlis.am/documentview.aspx?docid=120911

[67] https://www.arlis.am/documentview.aspx?docID=98338

[68] https://www.arlis.am/documentview.aspx?docid=128039

[69] https://www.e-gov.am/gov-decrees/item/28675/

Governance structure

The Deputy Prime Minister, in his capacity as the Chief Information Officer (CIO), chairs the Information Systems Management Board. The Information Systems Management Board coordinates digital transformation, digital society, economic reform programmes, and it cooperates with international partners and holds regular dialogue with the private sector.

The Ministry of High-Tech Industry is responsible for digitalisation and data policy. Another key player in the policy area of open government data is the Personal Data Protection Agency – subordinate to the Ministry of Justice – however, with sufficient autonomy to make decisions independently regarding cases of personal data processing.

Furthermore, EKENG – the e-Government Infrastructure Implementation Agency – focuses on the operation, maintenance, and support of the Government IT infrastructure and it is appointed as the Operator of the Government Interoperability Platform.[70] The goals and objectives of the Agency are: (1) to ensure maintenance of the registry for those processing personal data; (2) to ensure protection of the rights of subjects of relations connected with the protection of personal data; and (3) to ensure, within the scope of its competence, lawful processing of personal data.[71]

Moreover, according to the Law on Freedom of Information, the state and local self-government entities managing information are obliged to appoint officers responsible for freedom of information. It is also noteworthy that state bodies have a legal obligation to publish the information about which they receive requests regularly; at least five or more times.

The Freedom of Information Centre (FOICA) - founded by journalists and lawyers in 2001 - promotes the application of the Law of Freedom of Information, it contributes to the transparency and openness of the Government system, and it stimulates civil society involvement in the governance system.[72] The Centre plays an active role in the development of the OGP Armenia Action Plans, and monitoring of implementation against commitments.

Portal

There is no integrated Open Data Portal, although there is growing demand for developing one. Different government databases are available in several government websites.[73] Government databases which are open and accessible range from legislation, international agreements to social information, property registers, business entities, etc.[74]

Specifically, the "e-draft" portal of legal acts was created in the context of the OGP. It is a tool for direct participation in decision-making processes for all citizens, without discrimination based on age, professional or other grounds.

Furthermore, an interactive Budget in Open Data format has been established, and a system of feedback by citizens on state services provided was introduced.[75]

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[70] The Office of the Prime Minister has delegated implementation of most of the major cross-governmental systems and infrastructure-related solutions to EKENG, considering its accumulated institutional memory, knowledge, and expertise.

[71] https://www.moj.am/en/structures/view/structure/32

[72] FOICA's main activities are fostering the Open Government Partnership Initiative in Armenia by setting up a productive dialogue and cooperation between the government and civil society. http://www.foi.am/en/overview

[73] See for example https://docs.google.com/document/d/1OobeCsOySBkVP8r-ily5EJkytG8pGwHsmp6ii9w5zMo/pub and https://publicadministration.un.org/egovkb/Portals/egovkb/MSQ/Armenia_28012021_112454.pdf

[74] Mapping-Open-Data-in-Armenia_English.pdf (kolba.am)

[75] https://gnahatir.am/am/

Figure 5. Example of an open data platform in Armenia: SCRA[76]
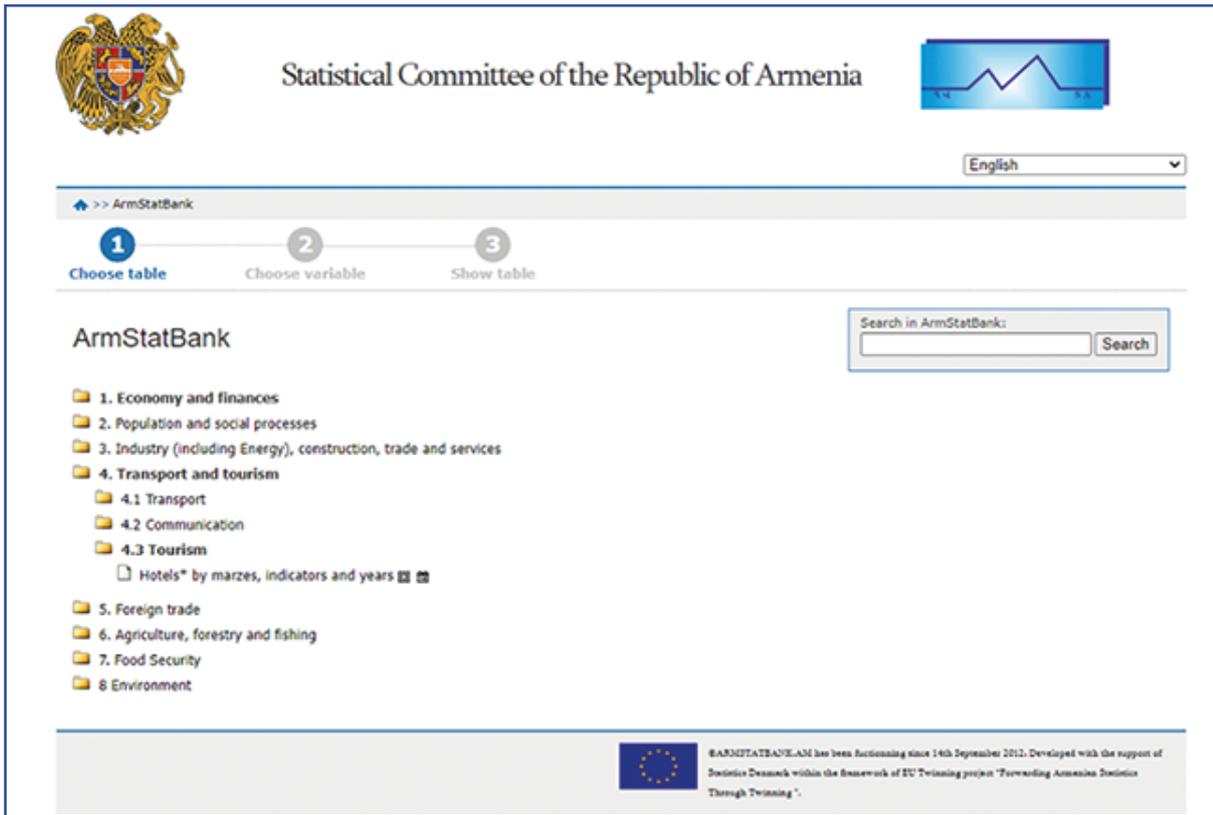
Open data in the public domain are provided under an open license allowing it to be downloadable without monetary or other restrictions and has a format that can be processed by an open-source software tool.

Figure 6. Example of an open data platform in Armenia: EITI[77]

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[76] https://www.armstat.am/en/

[77] https://www.eiti.am/en/
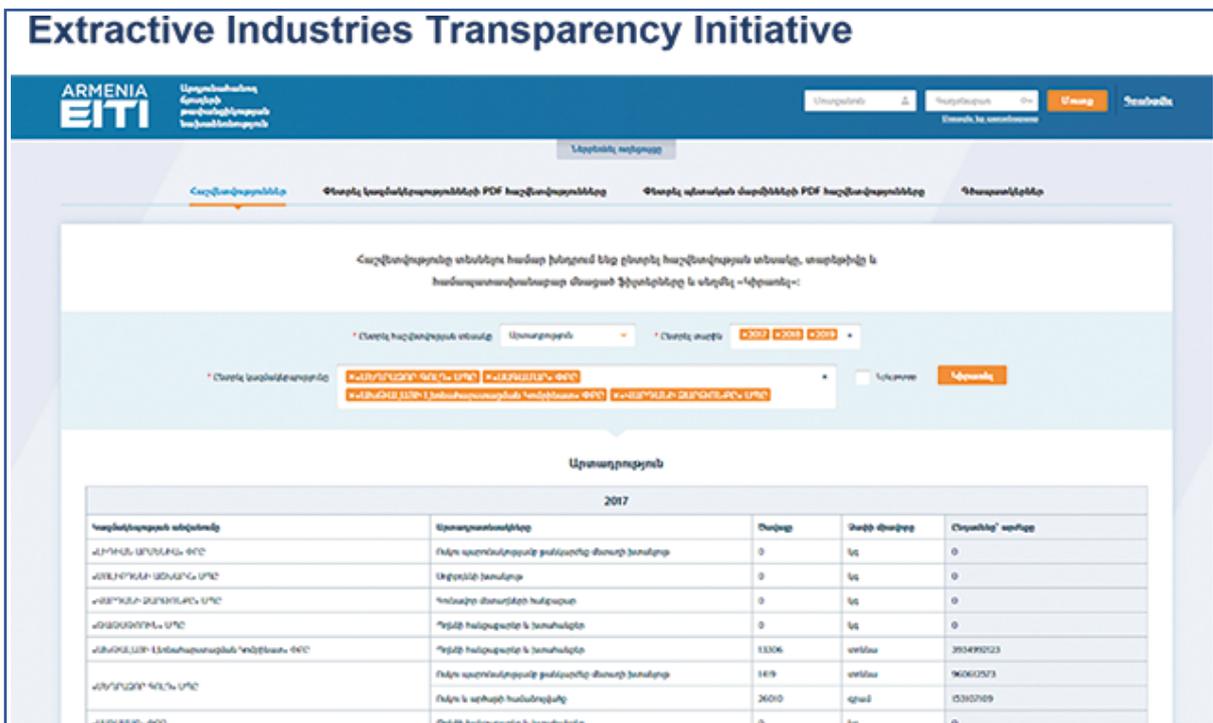
Figure 7. Example of an open data platform in Armenia: Judicial Information System[78]

Azerbaijan

Open data definition

Open data is data that is openly accessible, exploitable, editable, and shared by anyone for any purpose, even commercially.

Policy and legal framework

Azerbaijan joined the Open Government Partnership in 2011, however its National Strategy on Increasing Transparency and Combating Corruption was first adopted in 2007, which specifically included several measures aimed at the promotion and development of OGP principles. Three National Action Plans on the Promotion of Open Government have been adopted in the Republic of Azerbaijan, in 2012, 2016 and 2020, respectively. The establishment of the ASAN Service is an example of the implementation of the country's OGP commitments.

The relevant legal framework is:

- Law on Information, Informatisation and Protection of Information (1998).[79]
- Law on State Secrets (2004) governs the treatment of information as state secret, its protection and use, and its classification or declassification for the purpose of security.[80]
- Law on Access to Information (2005) regulates the right of everyone to access to information guaranteed by international law and the Constitution, and to secure transparency in governance in the process of building a free and democratic society.[81]
- Law on Personal Data No 9980IIIQ (2010) regulates the collection, processing, and protection of individual data, formation of the individual data section of the national information space, as well as issues related to cross border transmission of individual information and it defines the rights and responsibilities of public institutions, legal and natural persons functioning in this sphere.[82]

Governance structure

The Ministry of Digital Development and Transport (MDDT) and the Innovation and Digital Development Agency under the same Ministry are responsible for digital transformation, including open government data management in the country.[83]

Portal

Azerbaijan has a dedicated open data portal as a component of the Open Government policy created to increase the interaction and transparency between the state and civil society.[84]

The portal was first created in 2015, but it has been revised since. The 2022 version has an expanded volume of machine-readable data targeting application developers, along with data in human-readable format. Furthermore, the process of adding new services is simplified and extended search facilities have been incorporated. The portal also provides APIs along with the necessary documentation. Datasets classified as open are uploaded in the portal following approval by the relevant government authorities. If citizens or business are interested in obtaining other datasets, not included in the portal, they may apply to government agencies for information.

[79] https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/83695/92621/F1512682825/AZE83695%202.pdf

[80] https://rm.coe.int/azerbaijan-analysis-of-legislation-on-access-to-information-december-2/16808ae03c

[81] https://rm.coe.int/azerbaijan-analysis-of-legislation-on-access-to-information-december-2/16808ae03c

[82] https://rm.coe.int/azerbaijan-analysis-of-legislation-on-access-to-information-december-2/16808ae03c

[83] https://mincom.gov.az/en/view/organization/35/

[84] http://www.opendata.az/en

Figure 8. Azerbaijan Open Data Portal[85]
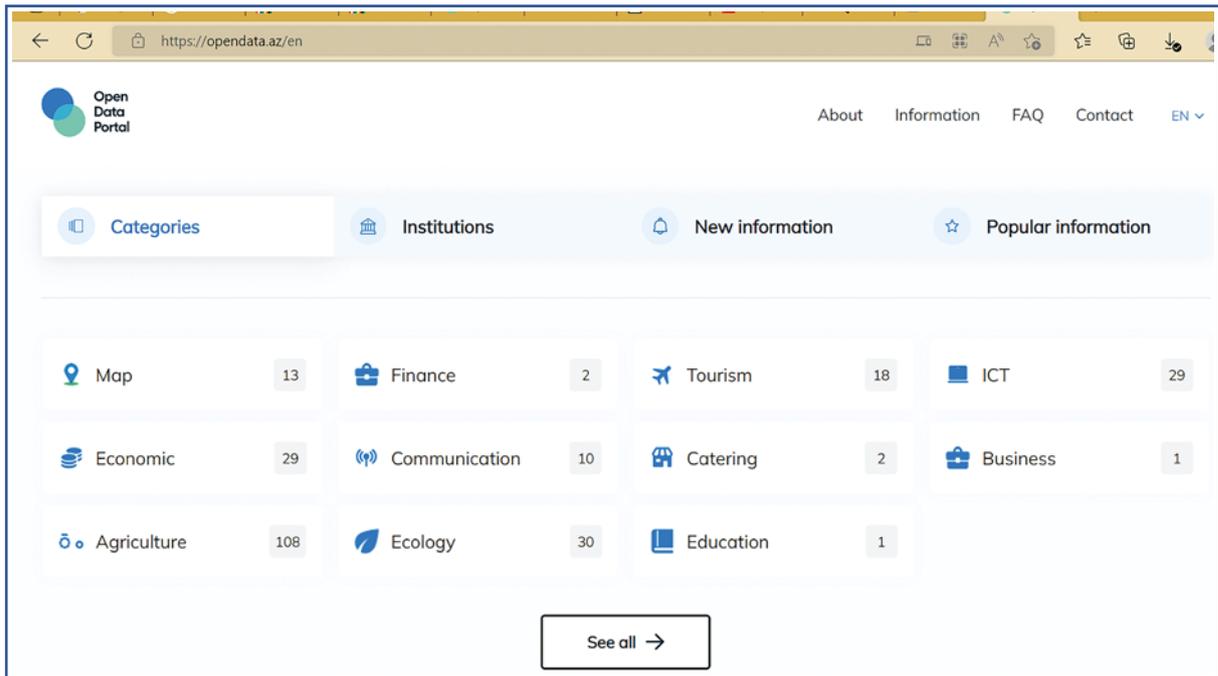
The following Figure shows the types of datasets contained in the open data portal of Azerbaijan by intended audience.

Figure 9. Types of datasets included in the Open Data Portal in Azerbaijan

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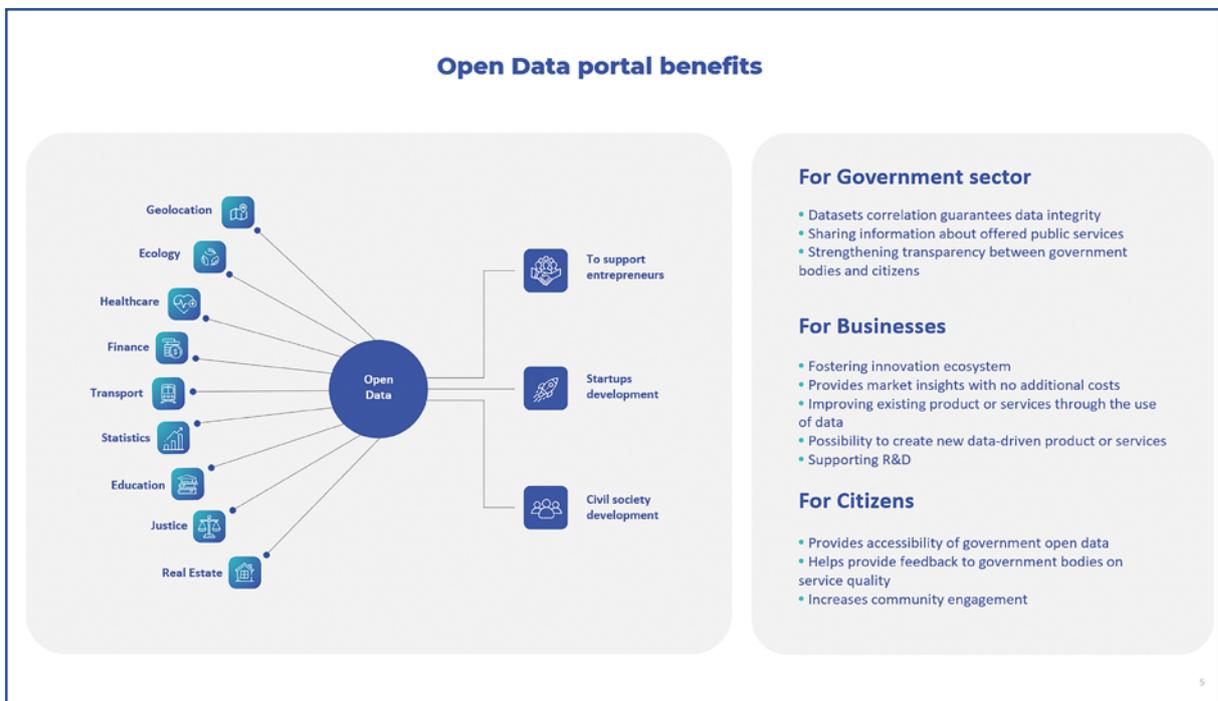
Georgia

Open data definition

Open data is public information available via the unified portal in machine-readable format.

Policy and legal framework

Georgia is a member of the Open Government Partnership since 2011. Notably, Georgia has been having close co-operation with the EU's Open Data support network as signified for example by inclusion of Georgia in a few Open Data Maturity reports.[86]

Georgia recognises that openness and transparency of the public sector dictates a standardised open data policy and the existence of a multi-functional and interactive portal which publishes data in open formats. To ensure this, Georgia has a precisely defined action plan for updating the legal framework and the open data portal to adhere to latest trends in this policy area.

Its open data policy is governed by the following legal instruments:

- General Administrative Code, Article 28 "On availability of public information"
- Government Resolution No 219 (2013) "On Electronic Request and Proactive Disclosure of Public Information".

Governance structure

The Digital Governance Agency is responsible for open government data policy and monitoring. It is also responsible for defining the unified standards for data publishing and for ensuring the availability of open data.

Portal

The portal currently features 174 datasets across several categories.[87] The main page of the portal allows for searching through the available datasets, while it also displays the major categories by policy domain, and datasets that have been frequently viewed.

The portal has a section for developers where open data in the form of APIs are available. Along with the data, detailed metadata are published. Other sections, such as applications and analytics are still work in progress, so are sections for feedback and interaction between data publishers and users.

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[86] For example, 2021: Open Data Maturity Report for Georgia

[87] Education and science; Environmental protection; Geographic data; Employment economic culture; Governance and politics; Population construction society; Agriculture; Social security; Transport; Tourism; Finance; and Healthcare.

Figure 10. Georgian Open Data Portal[88]

[88] https://data.gov.ge/
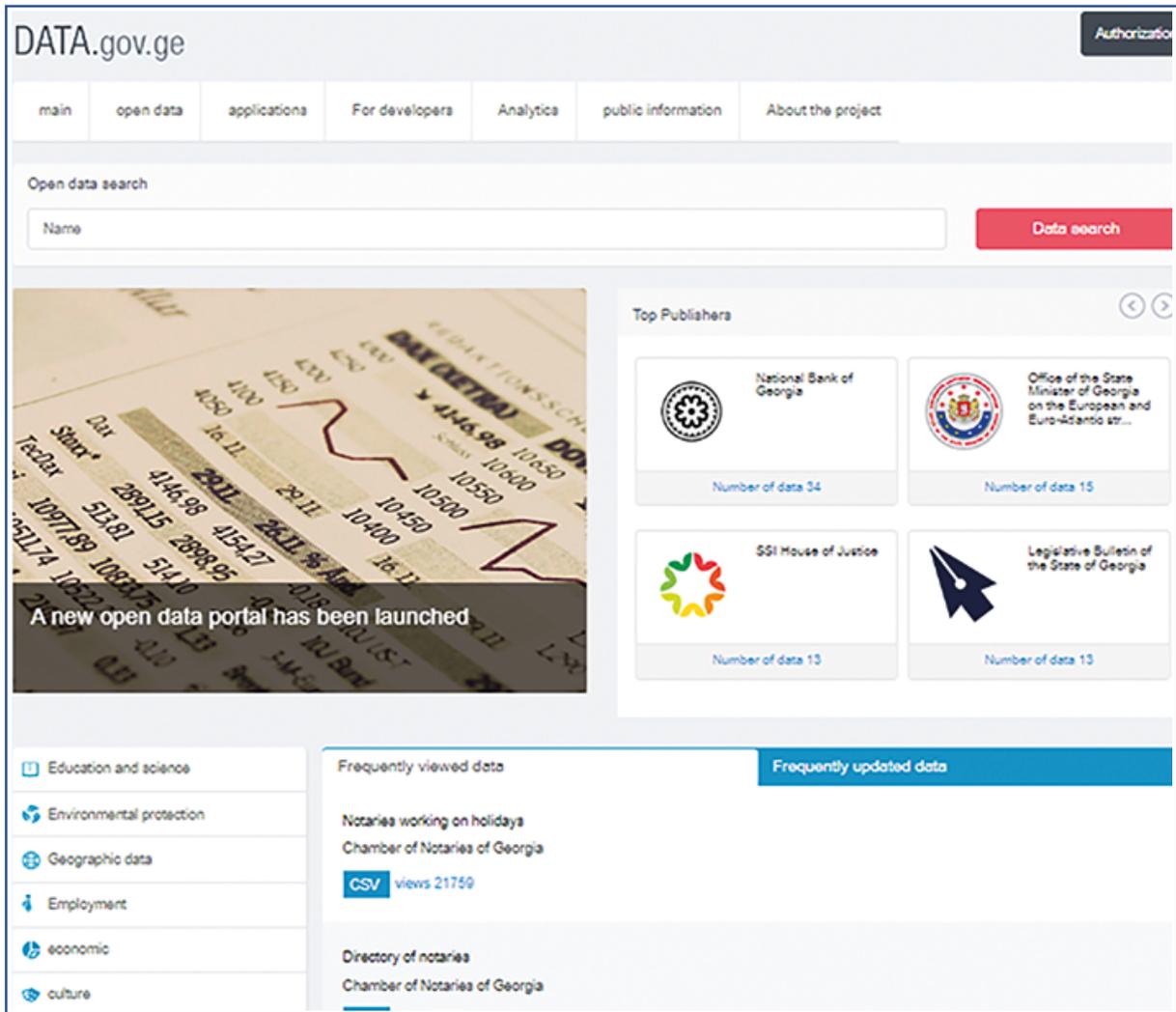
Kazakhstan

Open data definition

Open data is data presented in a machine-readable format and intended for further use, re-publication in an unchanged format.

Policy and legal framework

Kazakhstan's e-Government Strategy "Digital Kazakhstan" (2018-2022) refers to Open Data among its domains aimed at developing Open Data use cases.[89] Access to information is briefly outlined or referred to in several other strategic documents, for instance in the National Development Plan 2025 (2018), where a particular reference stipulates the importance of access to information as a tool to reduce corruption. The Concept for the Development of Public Administration 2030 also refers to open data policy issues.[90] A new strategic document recently came into effect, the "National Project Technological Breakthrough through Digitalisation, Science, and Innovation" (2022), which supersedes the Digital Kazakhstan Strategy, and it contains many KPIs about access to information.

The following legal instruments delineate open data policy in Kazakhstan:

- Law on Access to Information (2015) regulates open data policy, defining both information,[91] and Open Data.
- Law on Informatisation (2015).
- Decree of the Government of the Republic of Kazakhstan (2021) "On Approval of a Unified List of Open Data of state bodies posted on the Internet portal of data".

Governance structure

The implementation of the strategy is the responsibility of the Ministry of Information and Social Development.[92] The Ministry is responsible for motivating various state organisations to granting access to information and publishing Open Data. The Ministry also cooperates with the Commission on Access to Information, which consists of state bodies functionaries, parliamentarians, and several civil society representatives, including human rights, anti-corruption, disabled people, technology and data entrepreneurs' associations, consumers, and researchers.[93] The Ministry of Digital Development, Innovations, and Aerospace Industry is also a policy implementer, with lesser powers, but is mostly responsible for technical issues as opposed to the Ministry of Information and Social Development, which is responsible primarily for content.

Working level implementation of the Law on Access to Information, including Open Data, is facilitated by the imposition on all state bodies to dedicate a structure or appoint an information steward.[94]

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[89] Microsoft PowerPoint - KAZAKHSTAN (unescap.org)

[90] Decree of the President No 522 (26.02.2021).

[91] Definition of 'information': information about persons, objects, facts, events, phenomena, and processes recorded in any form.

[92] The initial implementing organisation for the strategy was ZERDE which was dismantled in August 2022.

[93] https://www.gov.kz/memleket/entities/qogam/documents/details/251570?directionId=451&lang=ru

[94] This is similar to the Canadian Government Directive, that assigns responsibility to certain positions across all government organisations.

Portal

The main page of the Open Data portal of Kazakhstan contains a listing of datasets by policy domain,[95] as well by level and type of government entity, i.e., central government authority, local executive authority, and quasi-public organisations.

It also contains links for datasets, where they can be explored across several classifications, i.e., by government agency, by date, by policy domain, etc. Other links lead to "developers" section which includes APIs and documentation and a dashboard and to "mobile apps", all available through the open data portal.

Figure 11. Kazakhstan Open Data Portal[96]

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[95] Public sector; Healthcare; Innovations and communication; Information; Culture and sports; Population and society; Education and Science; Legal system and public safety; Industry; Agriculture, forestry, hunting and fishing; Construction and housing and communal services; Trade; Transport; Labour, employment, and social security; Finance; Ecology, environment, and civil protection; Economy.

[96] https://data.egov.kz/

Kyrgyzstan

Open data definition

Open data is data in a machine-readable format that is publicly available under an "open" license which it ensures that it can be freely used, re-used, and redistributed by anyone for any legal purpose.

Policy and legal framework

Kyrgyzstan is a member of the Open Data Partnership.

The National Development Strategy 2018-2040 (2018) outlines the contours of the country's digital transformation. Its vision is to transform Kyrgyzstan into a smart country and a developed information society based on innovation and knowledge, effective, transparent, and accountable government without corruption, with extensive digital content and active participation of citizens of the country as users of innovative and advanced technologies, which may stimulate competitiveness, and the well-being and public security of the country.[97]

The Concept of Digital Transformation Digital Kyrgyzstan 2019-2023 (2019) defined the conditions for digital transformation and the introduction of new methods and processes made feasible by digital technologies for enhancing the competitiveness of the country and the well-being of its citizens.

The Concept of Open Data 2022-2024 (2022) defines the principles of disclosure of open data concerning information collected, stored, processed, or published by state organisations. The Concept tasks are: (1) improving the regulatory framework; (2) ensuring the functioning of the Open Data portal; (3) providing access to more datasets; (4) implementing measures for ensuring the sustainability of the Open Data Portal; (5) verify, clarify, promote, and evaluate public value deriving from the open data policy initiatives; and (5) conducting broad information campaigns. The Concept also outlines the priority directions for increasing the level of accessibility of information through the implementation and promotion of the Open Data Initiative, as well as the expected results from the introduction of this initiative in Kyrgyzstan.[98] It accompanied by the Action Plan for the implementation of the Open Data Concept.

The current legal framework on Open Data is:

- Law on Access to Information (1997).[99]
- Law on Informatisation (1999) that established the legal principles for information protection, liability, and compliance.
- Law on Access to Information held by State Bodies and Local Government Bodies (2006).[100][101]
- Law on e-Government (2017), Article 12 on public information and open data.
- Law on Personal Information (2018), that is harmonised with the Strasbourg Convention for the protection of individuals regarding automatic processing of personal data.[102]

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[97] National Digital Transformation Programme, p. 63. https://policy.thinkbluedata.com/sites/default/files/National%20Development%20Strategy%20of%20the%20Kyrgyz%20Republic%20for%202018-2040%20(EN).pdf

[98] http://cbd.minjust.gov.kg/act/view/ru-ru/219184?cl=ru-ru

[99] https://www.rti-rating.org/wp-content/uploads/2020/05/Law-on-ATI-Guarantees-Kyrgyzstan.pdf

[100] Amended in 2013 (Law No 22), 2014 (Law No 35), 2016 (Law No 224), 2017 (Laws No 47 and 130), and 2022 (Law No 53).

[101] http://cbd.minjust.gov.kg/act/view/ru-ru/202010

[102] https://edps.europa.eu/data-protection/our-work/publications/legislation/council-europe-convention-no-108-data-protection_en

– Law on Electronic Governance (2020).[103]
– Executive Order of the Cabinet (2022) approved the Open Data Concept and Action Plan.

Governance structure

The Ministry of Economy is the government entity responsible for open data development in the country, developing national open data initiatives as part of the efforts to improve the quality of public services for citizens. In fact, entrepreneurs and IT developers are actively relying on and anticipating further increase in data collected and provided by public agencies as open data. The Ministry is backed by the National ICT Council as a coordinating body on policy level. In 2016 the State Committee for Information Technologies and Communications was formed. Open data policy formulation is part of its mandate.[104]

Portal

The Open Data portal was launched in 2019. It currently contains 646 datasets from 15 government organisations. The portal includes most relevant information about the open data provided by state authorities, regional authorities, and other organisations, as well datasets accompanied by documentation and links to published data.

Figure 12. Kyrgyzstan Open Data Portal[105]
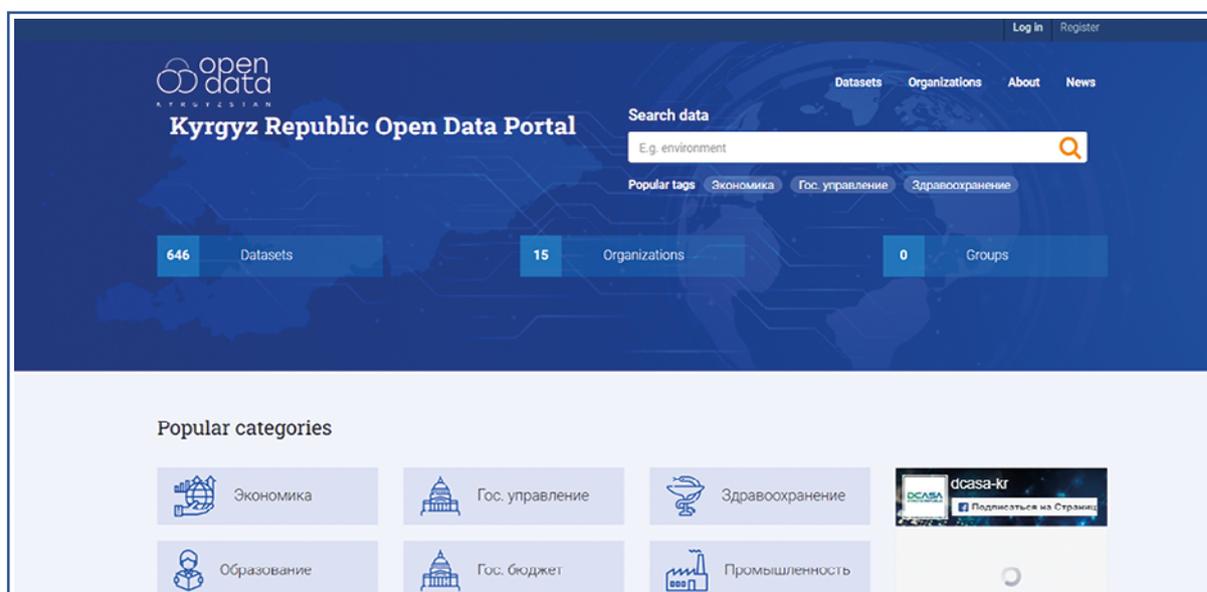
A communication interface for interaction with data owner organisations of socially significant data is also implemented. The main features of the Open Data portal are search for datasets using specific criteria and keywords; visualisation of data using tools for creating diagrams, graphs and displaying cartographic data; discussion forum for dialogue between the state and users to determine priorities for datasets supported by CKAN API framework and SPARQL query syntax.[106]

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[103] http://cbd.minjust.gov.kg/act/view/ru-ru/112113?cl=ru-ru

[104] https://www.devex.com/organizations/state-committee-for-information-technology-and-communications-kyrgyzstan-126663

[105] https://data.gov.kg/

[106] CKAN is an Open-Source Data Management system supporting, managing, and using datasets in open data portals, while queries with SPARQL syntax expand users' search options.

Tajikistan

Policy and legal framework

The National Development Strategy 2030 (2016) envisions building an effective public administration through the development of the necessary elements of e-government in order to implement an open data policy.[107] The Concept of the Digital Economy (2019), based on the National Development Strategy 2030 depicts the vision of using digital technologies to achieve the highest goal of Tajikistan's long-term development, namely improving the standards of living of the country's population, reaching the standards of middle-income countries as soon as possible.

The Concept also aims at generating digital dividends on issues that are critical to national development, such as job creation, GDP growth, transformation of the service sector and improving the quality of life of the population. The Concept envisages a gradual, step-by-step digital transformation (three phases: 2022-2025, 2026-2030, and 2030-2040).

Key initiatives and measures of the first stage are strengthening and developing further the policy, regulatory, and legal framework for key processes in the digital economy, such as identification, authentication, privacy, personal data control, data management and open data regulation, as well as information security and cybersecurity regulation. Later, the development of a Single Republican Open Data Portal is envisioned.

– Law on the right to access to information (2008).

Governance structure

The Ministry of Industry and New Technologies is the government entity responsible for digital transformation policy. The Ministry of Economic Development and Trade is the custodian of the Concept of Digital Economy.

Portal

Tajikistan is in the process of identifying, designing, and developing the digital exchange ecosystem, including the Open Data Portal. The key initiatives of the digital exchange ecosystem are depicted in the figure below.

Figure 13. Digital exchange phase 1 key initiatives in Tajikistan

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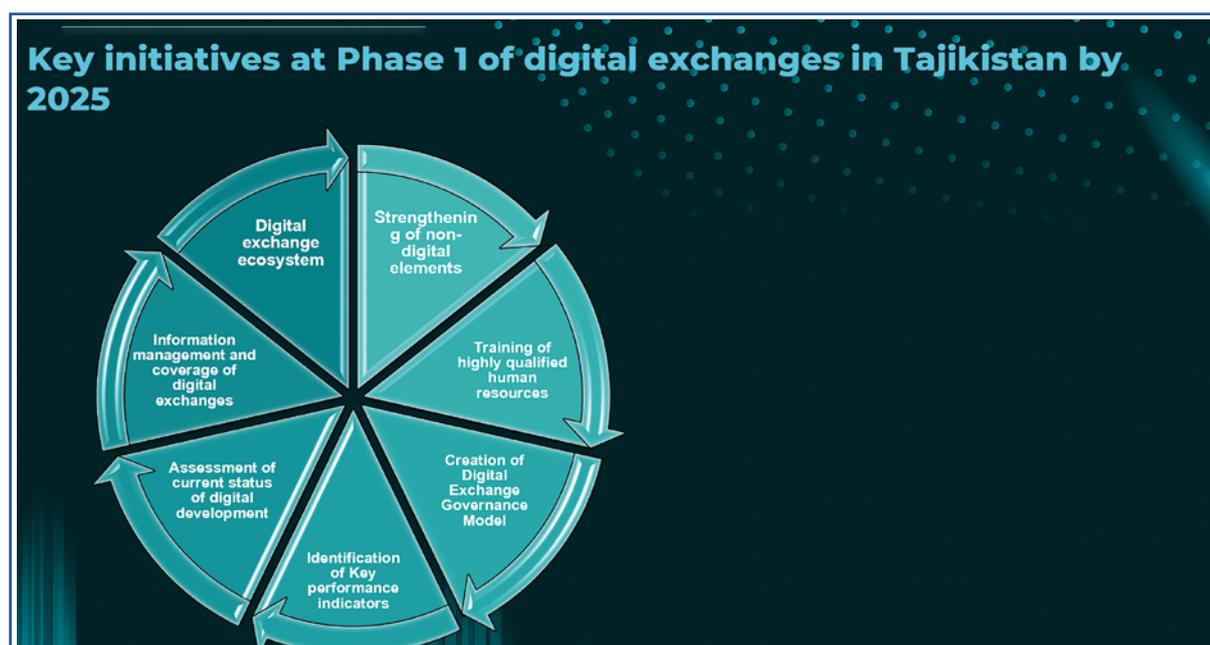
[107] http://nafaka.tj/images/zakoni/new/strategiya_2030_en.pdf

Uzbekistan

Open data definition

Open Data is a certain type of information in a machine-readable format – except for information constituting a state secret and intended for official use – not limited by law, not protected by copyright, patents, and other restrictive mechanisms.

Policy and legal framework

Uzbekistan is a member of the Open Data Charter.

Legal instruments governing open data policy and implementation are:

- Law on Guarantees and Freedom of Access to Information (1997).[108]
- Resolution of the Cabinet of Ministers (2015) on measures for further improvement of the Government Portal, considering the provision of open data.
- Decree of the President (2019) on additional measures to ensure openness and transparency of public administration, as well as to increase the statistical potential of the country.[109]
- Resolution of the Cabinet of Ministers (2020) on measures for further development of the open data sector.[110]
- Decree of the President (2021) on additional measures to ensure openness of the activities of state bodies and organisations, as well as effective implementation of public control.
- Decree of the President (2022) on additional measures to ensure the openness of the activities of state bodies and organisations, as well as the effective implementation of public control.

Governance structure

The Department for Monitoring and Coordination of the Open Data portal – under the State Committee on Statistics - is responsible for the coordination of the state bodies and organisations' activities with respect to the formulation, maintenance and updating of the open data lists and the timely reflection of relevant information on the Open Data portal.[111]

Portal

The portal is presented in three languages and consists of the following sections: Home, Developers, Portal News, Popular Data, Organisations, Feedback, and Terms of Use of Information.

The portal provides data in several different formats, i.e., XML, CSV, JSON, XLS and PDF. It also provides for sending requests for additional types of information and it contains forms for people with visual impairments and a questions and answers section.

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[108] https://www.rti-rating.org/wp-content/uploads/Uzbekistan.pdf

[109] https://lex.uz/docs/4277344

[110] The objectives of the Resolution are: (1) improve the transparency and accountability of government agencies; (2) create databases for implementation of the Open Government Framework; (3) develop civil society to potentially monitor activities of the government agencies; (4) facilitate the development of the market of services in the form of open data in the global information network of Internet; (5) enhance public confidence to government agencies; (6) save public funds for development of socially useful services; and (7) maximise the possibilities for exchange of data among government agencies. https://lex.uz/docs/5184574

[111] https://stat.uz/en/press-center/news-of-committee/news-of-committee-2019/3381-5617-the-department-of-monitoring-and-coordination-of-the-open-data-portal-was-established-in-the-state-committee-on-statistics-2

Figure 14. Uzbekistan Open Data Portal[112]

Table 1. Open Data portal features in select countries   37
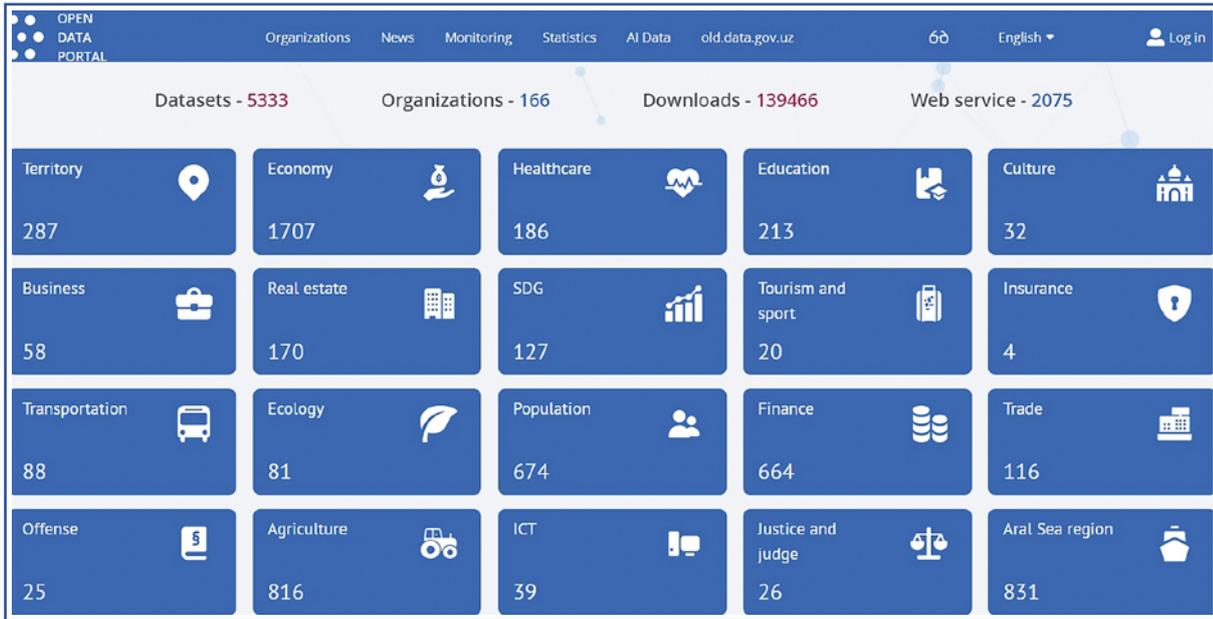
Table 1. Open Data portal features in select countries

Portal Feature	CAN[113]	EST[114]	KOR[115]	AZE[116]	GEO[117]	KAZ[118]	KG[119]	UZB[120]	EU[121]
Search	Y	Y	Y	Y	Y	Y	Y	Y	Y
Advanced search (filters)	Y	Y	Y	Y	N	Y	N	N	Y
Users can enter information in the portal	Y	Y	Y	N	N	Y	N	N	Y
Users can provide feedback	Y	N	Y	Y	Y	Y	N	Y	Y
Promoting use cases	Y	Y	Y	N	N	Y	N	N	Y
Use cases can be submitted by different users	Y	Y	Y	N	N	N	N	N	Y
Users can evaluate selected datasets	Y	Y	Y	N	N	N	N	Y	Y
Portal allows users to find information and news on current open data topics	Y	Y	Y	Y	N	N	N	Y	Y
Interaction between users and data publishers enabled	Y	Y	Y	Y	Y	Y	N	Y	Y
Tabular / machine readable data available	Y	Y	Y	Y	N	Y	Y	Y	Y
Geospatial data available	Y	Y	Y	Y	Y	Y	N	N	Y
Data tools available	N	Y	Y	Y	N	Y	N	N	Y
API availability	Y	Y	Y	Y	N	Y	N	N	Y
Availability of manuals and documentation	Y	Y	Y	Y	N	Y	N	N	Y
Languages available in	English, French	Estonian, English	Korean, English	Azerbaijani, English Russian	Georgian, English	Kazakh, English, Russian	Kyrgyz, Russian, English	Uzbek, Russian, English	In all 24 EU official languages

Legend: *Y = feature available; N = feature not available.*

[113] https://open.canada.ca/en/open-data
[114] https://avaandmed.eesti.ee/
[115] https://www.data.go.kr/en/index.do
[116] https://opendata.az/en
[117] https://data.georgia.gov/
[118] https://data.egov.kz/
[119] https://data.gov.kg/en/
[120] https://data.egov.uz/eng
[121] https://data.europa.eu/en

VII. Discussion

Contemporary open data portals should contain a multitude of datasets - all machine-readable, if feasible; a search function - preferably an advanced one; an inventory listing of available datasets by policy domain, subject, publishing organisation, date uploaded, etc; as well as links to manuals and documentation allowing users to become familiar with their content. Furthermore, well-functioning open data portals ought to include APIs and their specifications, and other data management tools allowing users to access the data by utilising a variety of software applications. In addition, open data portals should ideally be fully interactive allowing for a multi-way communication among publishing organisations, open data users, use case authors, etc. in this context, they should also include forums for discussion, as well as feedback, and evaluation features.

Eight of the countries – the EU is excluded from this analysis - have dedicated open data portals for making government data available to citizens and business. These portals are available in in the countries' official languages, and in the case of the countries in Central Asia and the Caucasus, they are also available in English, fully or partially. In these dedicated open data portals users may find numerous datasets, the majority of which are machine-readable, and are searchable by policy domain and subject in all instances. In some cases, more advanced search tools are incorporated, such as SPARQL query tools which enable filtering for searching by one or more of the many characteristics datasets possess. Conversely, the existence of API enabled datasets is not common in most cases, nor the publication of open data use cases by users. A similar situation exists in the ways and means of communication between the data publishers and the users, except for the more advanced open data portals examined.

Most countries reviewed have a strategic document or a national action plan that delineates their vision for open government data policy formulation and implementation. In some cases, such documents are solely focused on open data policy and implementation process, and in some others, the objectives for promoting open government, and by extension open data, are included in national development plans, as part of their overall development objectives. Existence of these documents is important because they provide a common vision for government-wide open data management, and the development of a conducive environment where open public data are used and re-used, thus having a considerable economic and social impact potentially. It is also important that these documents delineate the appropriate rules for data protection, privacy, transparency, ethics, and digital rights.

As expected, governance structures for open data policy formulation and implementation differ widely among the countries reviewed. In some cases, they comprise a single organisation, public in all such instances, that consults and interacts with other stakeholders at least in the policy formulation process. In some other, they comprise a multitude of different organisations, that are all involved in different aspects of open data policy formulation and implementation. In two countries, non-government organisations seem to play a decisive role in formulating and implementing open data policies in the respective countries, i.e., Armenia with FOICA (Freedom of Information Centre) and Estonia with OKF (Open Knowledge Foundation).

Seven of the ten countries reviewed are members of the Open Government Partnership (OGP),[122] an international forum that includes 77 countries and 106 local governments, which cooperate in promoting transparent, participatory, inclusive, and accountable governance with the objective to provide a roadmap for better implementation of open data policies by its members. Three countries are also members of the Open Data Charter (ODC),[123] explicitly denoting that they

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[122] Canada, Estonia, Korea, Armenia, Azerbaijan, Georgia, and Kyrgyzstan.
[123] Canada, Estonia, and Korea.

have formally adopted the set of the ODC principles and best practices for the release of government open data. The same three countries are also members of Digital Nations, another international forum of leading digital governments aimed at helping one another to become even better digital governments, by sharing experiences and learning from each other.

VIII. Epilogue

It is widely agreed that open data policies and their practical manifestations contribute positively to good governance, innovation, and digital development. Accordingly, it is imperative for governments aspiring to be transparent, accountable, participatory, and trustworthy, as well as create a conducive environment for new economic and commercial opportunities, to further enhance their open data policies and their open data portals.

Hence, this publication ends with a short examination of various open government data related aspects that countries ought to pay attention to. To start with, government need to have long-term strategies in place, that address policy, technical, economic, social, institutional and implementation aspects, while considering the local context. These are important not only for the means they employ to foster open data, i.e., the establishment and operation of integrated open data portals, but also for increasing the potential for the accomplishment of envisioned long-term outcomes.

Therefore, countries ought to adopt strategies which do not only aim for quick results, by concentrating on the quick and frequent publication of open government datasets. On the contrary, countries ought to aim long-term with their open data initiatives. Thus, they ought to focus on the quality aspects of data and its timeliness, as lack of quality data – data that are primary, complete, accurate, timely and readily usable (e.g., machine-readable) - may hinder the achievement of their intended goals. They also ought to look at disclosure and copyright terms, and make sure that open data are license-free and carry no disclosure and copyright restrictions, as these conditions would enhance the public's right to use, and re-use open data for individual and commercial purposes. In sum, lack of quality data may effectively result to loss of public interest and confidence in the utility of open government data, as well as losing the potential for value creation from open data.

Furthermore, as different public organisations generate their own datasets, using different formats and standards, governments ought to develop standards and formats that are uniform across the potential publishers of open data, effectively easing access efforts and costs for potential users. In the meantime, governments ought to make sure that technical manuals and detailed documentation describing the structure and the nature of the data are widely available, thus ensuring the efficient handling and analysis of published datasets. They also ought to provide machine-readable datasets, as often as possible, while utilising robust data management practices, aimed at decreasing the efforts and costs associated of acquiring and using published open government data. Adherence to such practices would ensure the quality of datasets made available to the public.

Moreover, according to the accessibility principle, open government data should be free or provided at minimal cost, as it is assumed that government data carry no costs, being already a product of public administration processes. However, collecting, converting, and diffusing public data involve some costs which need to be accounted for, i.e., public labour costs and acquisition and maintenance of appropriate software applications. For instance, converting data to machine-readable format that can be shared conveniently, is a time consuming and therefore costly process. Thus, governments ought to adopt appropriate models for gathering, converting, and diffusing government open data which would minimise the associated efforts and costs. In this context, governments ought to review existing workflow systems for gathering data and their integration, validation, public, update, and re-use. To this end, data collection and management systems should employ databases, whose data can eventually be speedily converted and with minimal effort, and at the same time be compatible with a variety of analytical software tools.

Conversely, given the complexity and cross-cutting nature of open government data, governments ought to put into place the most appropriate and suitable institutional structures, bestowed with the task of coordination, oversight, and implementation of open data policies

and practices. In this context, they ought to create a conducive ecosystem involving all key stakeholders, that is essential to generate value of open data initiatives in social, economic, and political terms.

Governments also ought to work towards establishing a new organisational culture that is oriented towards effective data management and data sharing. A culture that is conducive to continuous upgrade and enrichment of open data portals with new value-generating datasets, in response to popular demand by potential users. In this context, governments ought to pursue initiatives that raise the capacity and awareness of public servants to understand the significance of open data initiatives and the potential impact of publishing reliable, timely, and robust datasets. Similarly, governments ought to also pursue initiatives to raise the awareness of citizens and business alike of the broader benefits of open government data utilisation; and at the same time undertake research to establish public information needs of citizens and business, as well as identify the barriers to datasets use and re-use.

Additionally, governments ought to develop their capacity to conduct, interpret, and utilise the outputs of data analyses to inform better decision making and the formulation and implementation of better targeted policies. This entails the capacity to debate the meaning of data and to find ways to put into use for the benefit of society.

In conclusion, publishing data and making it open is not sufficient to create value. Various engagement models and strategies need to be in place to allow for a two-way communication to take place between the public sector and all potential users of government data, i.e., individual developers, SMEs, civil society organisations, and citizens, academics, and large companies. This is important with respect to governments focusing on user needs and for users to provide feedback on the datasets they would like to see released as a priority, which they consider of greater value or more likely to be used by the community and application developers alike.

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X. Appendices

Appendix 1. Open data and other international and sectoral indices scores

Entity	OECD Open, Useful, Reusable Data Index[124] (2019)	Open Data Barometer Index[125] (2016)	Open Data Maturity Index[126] (2021)	Open Data Inventory Index[127] (2021)	Right to Information Rating[128] (2020)	Open Data Inventory (ODIN)[129] (2020)	WB Statistical Capacity Index[130] (2021)	UN e-Gov Index[131] (2022)	GovTech Maturity Index[132] (2022)	World Bank Control of Corruption Index[133](2021)	TI Corruption Perception Index[134] (2021)
Canada	0.73	76	-	76	93	76	-	0.8511	0.769	1.65	74
Estonia	0.51	-	94	70	95	70	77.8	0.9393	0.956	1.54	74
Korea	0.93	72	-	70	97	70	-	0.9529	0.991	0.76	62
E.U.	-	-	78	-	-	-	-	-	-	-	-
Armenia	-	-	-	57	102	57	94.4	0.7364	0.722	0.07	49
Azerbaijan	-	-	-	56	113	56	80.0	0.6937	0.775	-0.83	30
Georgia	-	-	17	69	91	69	87.8	0.7501	0.608	0.69	55
Kazakhstan	-	-	-	62	60	62	78.9	0.8628	0.817	-0.24	37
Kyrgyzstan	-	-	-	48	87	48	90.0	0.6977	0.578	-1.12	27
Tajikistan	-	-	-	41	50	41	-	0.5039	0.309	-1.34	25
Uzbekistan	-	-	-	-	59	63	-	0.7265	0.813	-0.81	28

[124] This Index benchmarks the design and implementation of open data policies at the central level. It provides policy evidence of the main achievements and challenges related to the long-term sustainability of open data policies across OECD member and partner countries.

[125] A global measure of how governments are publishing and using open data for accountability, innovation, and social impact. It provides data for 30 countries which have adopted the Open Data Charter. https://opendatabarometer.org/?_year=2017&indicator=ODB

[126] It assesses the level of open data maturity, i.e., policy development and sophistication of the open data portals, in the European Union's Member States (EU27), the participating European Free Trade Association (EFTA) countries Iceland, Norway, and Switzerland, the participating Eastern European Partnership (EEP) countries Georgia and Ukraine, as well as Montenegro and UK. The assessment measures maturity against four open data dimensions: policy, impact, portal, and quality of data. https://data.europa.eu/en/publications/open-data-maturity/2021

[127] The Open Data Inventory (ODIN) assesses the coverage and openness of official statistics to identify gaps, promote open data, policies, improve access, and encourage dialogue between national statistical offices and data users. Scores are expressed on a scale 1 to 100, with 100 indicating availability of a large data inventory. The 2021 edition covers 187 countries. https://odin.opendatawatch.com/

[128] The Right to Information rating assesses the strength of the legal framework for the right to information in a country using 61 indicators in seven categories - (1) right of access; (2) scope; (3) requesting procedures; (4) exceptions and refusals; (5) appeals; (6) sanctions and protections; and (7) promotional measures. Even though the rating does assess the quality of implementation, the existence of strong laws is a prerequisite. The rating score ranges from 0 to 150. https://www.rti-rating.org/rating/

[129] The Open Data Inventory (ODIN) measures how complete a country's statistical offerings are and whether their data meet international standards of openness. The overall score is a combination of data coverage and data openness sub-scores. https://odin.opendatawatch.com

[130] This index intends to assess the maturity of national statistical systems. It consists of 5 key pillars: (i) data use; (ii) data services; (iii) data products; (iv) data sources; and (v) data infrastructure. https://data.worldbank.org/indicator/IQ.SCI.OVRL

[131] It is a composite index of three sub-indexes, i.e., on-line service, human capital, and telecommunications infrastructure measuring the state of e-government development of the 197 countries United Nations Member States. https://publicadministration.un.org/egovkb/en-us/About/Overview/-E-Government-Development-Index

[132] Covering 198 economies using consistent data sources, It measures the state of public sector digital transformation in four respective areas, i.e., supporting core government systems, enhancing service delivery, mainstreaming citizen engagement, and fostering GovTech enablers. https://www.worldbank.org/en/programs/govtech/gtmi

[133] This index captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests. Lowest possible score is -2.5 and highest possible score is +2.5 https://info.worldbank.org/governance/wgi

[134] This is the most widely used global corruption ranking in the world. It measures how corrupt each country's public sector is perceived to be, according to experts and businesspeople. It is measured on a scale 1 to 100, where a score of 100 indicates absence of corruption. https://www.transparency.org/en/cpi/2021

Appendix 2. Legal Instruments on Access to Information

Country	Title of legal instrument	First adopted	Last modified
Canada	Access to Information Act	1983	2019
Estonia	Public Information Act	2000	-
Korea	Official Information Disclosure Act	1996	2020
Armenia	Law on Freedom of Information	2003	2003
Azerbaijan	Law on Rights to Obtain Information	2005	-
Georgia	General Administrative Code	1999	-
Kazakhstan	Law on Access to Information	2015	2023
Kyrgyzstan	Law on Access to Information held by the State	2007	-
Tajikistan	Law on Right to Access to Information	2002	-
Uzbekistan	Law on Principles and Guarantees to Freedom of Information	1997	-

Appendix 3. High Value Open Datasets - OECD and EU

OECD	European Union
- Business information	- Companies and company ownership
- Geographic information	- Geospatial, earth observation and environment
- Meteorological information	- Meteorological
- Social data	- Statistics
- Transport information	- Mobility
- Companies and company ownership	
- Legal information	

Appendix 4. Open Data Readiness Assessment Framework (ODRA)

The World Bank's Open Government Data Working Group developed an Open Data Readiness Assessment (ODRA) methodological tool which can be used to conduct an action-oriented assessment of the readiness of a government or individual agency to evaluate, design and implement an Open Data initiative. As part of the Open Government Data Toolkit, this tool is freely available for others to adapt and use.

The ODRA is a diagnostic and planning tool, it is not a measurement tool. It is intended to provide recommendations for action on existing good practices elsewhere, and it is not a prescription for Open Data, nor is it a formal evaluation tool. The output of any diagnostics needs to be carefully and critically considered in the context of the particular circumstances in which it has been run.

The overall purpose of this tool is to provide a plan of action for an Open Data programme, as well as initiating a robust and consultative dialogue among relevant stakeholders. In this sense, use of this tool is the beginning of a process and not the end or the result of a process. Furthermore, the tool is a "living" document and will be subject to continuous updating and revision based on experience from actual practice.

The Readiness Assessment Framework has been designed to support an economic and action-orientated assessment of the readiness of a national, regional, or municipal government - or even an individual agency or an individual sector - to evaluate, design and implement an Open Data Programme. The Assessment Team should be able to adapt it easily to other organisational circumstances as necessary. The ODRA consists of two documents: the User Guide and the Methodology.

The ODRA tool is part of the "Open Data Toolkit" published and made freely available for other to adapt and use at http://opendatatoolkit.worldbank.org/en/.

Users can access the ODRA tool and its unofficial translations in French and Russian online at the following link http://opendatatoolkit.worldbank.org/en/odra.html.

A recorded training session on the methodology can be accessed at the same link.