Griffith UNIVERSITY

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The state of open data implementation in Indonesia

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REGIONAL OUTLOOK

Griffith Asia Institute

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Regional Outlook

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About the Authors

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Dian Tjondronegoro is a Professor in Business Strategy and Innovation, Griffith Business School. His expertise is in business applications of Artificial Intelligence (AI), cloud, and mobile technologies, specializing in information analytics, eHealth, and decision support systems. He has 19 years of R&D experience (since 2002), including 12 years of leading teams. He has received $9M+ competitive grants, industry linkage, and consultancy funding with clients in various sectors. Prof Tjondronegoro has published 147 papers, with an H-index of 34 and 5383 citations by 250 institutions in 79 countries and 80 research areas.
The focus of his career to date has been in forging and maximizing productive alliances between global industry leaders and the next generation of cross disciplinary experts and innovators. His primary research interest is applications of AI and machine learning for business analytics, decision supports, and health information management.

Alan Wee-Chung Liew

Professor Alan Liew is currently the Head of School, the School of Information and Communication Technology, and the Deputy Director of the Institute for Integrated and Intelligent Systems (IIIS) at Griffith University, Australia. Prior to joining Griffith University in 2007, he was an Assistant Professor at the Department of Computer Science and Engineering, Chinese University of Hong Kong. His research interests are in the fields of AI, machine learning, medical imaging, computer vision, and bioinformatics. He is leading the medical/health informatics stream in IIIS and is engaging with the Menzies Health Institute, the Gold Coast University Hospital, Queensland Health, and the Precision Medicine Data Platform (PMDP) on several collaborative projects. He has published extensively in these areas with two books and more than 250 journal and conference papers and holds two international patents.

Tom Verhelst

Dr Tom Verhelst is the Program Director at Griffith University's Relational Insights Data Lab (RIDL). In this role he works identify and fast-track innovative solutions that address long-standing urban and regional challenges by using "place," rather than discipline or agency, as the data linking framework. Dr Verhelst has strong global industry R&D experience in applying novel platform technologies towards scientific advancement to generate beneficial socioeconomic impacts. He previously worked as the Associate Director of R&D IT at UCB Biopharma (Top 30 Global pharmaceutical company) in Belgium and in the United Kingdom and as a program lead and consultant for PerkinElmer (Fortune 500 company) in Europe, the Middle East, North America, and India.

Damian Green

Damian Green, Deputy Director-General eHealth Queensland, leads Queensland's public health digital modernisation agenda, including Queensland's ICT response to the COVID-19 pandemic, virtual healthcare, digital hospitals, and digital rural and remote healthcare. Previously, as Executive Director, Digital Transformation at Gold Coast Hospital and Health Service; Damian led the delivery of Gold Coast Health's 2-year journey to become a fully digital hospital and was pivotal in driving continuous improvement in health service delivery and quality. Damian is a Fellow of the Australasian Institute of Digital Health, Fellow of the Australasian College of Health Service Management and Adjunct Professor School of Business Strategy and Innovation, Griffith University, and chairs the School's Industry Advisory Board. He is also a Board Director of the Gold Coast Primary Health Network and serves on the Boards of the Australasian Institute of Digital Health and the Australian eHealth Research Centre.

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Ausma Bernot is a PhD Candidate at the School of Criminology and Criminal Justice, Griffith University. She has six years of work experience with forensic science and research organisations across the globe, in particular China, where she had the chance to gain insights on how technologies are governed at provincial and national levels. Her current research focuses on the effects that the merging of infotech and biotech triggers in the fields of governance, surveillance, policing, and public safety. Bernot's doctoral research explores the dynamic interaction between surveillance technologies and social context and interrogates the totalisation of surveillance in China.

Rakibul Hasan

Rakibul Hasan is a Doctoral Researcher in International Business at the University of Vaasa, Finland. He obtained his Master of Science in Business Administration and Economics at Aalborg University, Denmark, and Bachelor of Business Administration at Jagannath University, Bangladesh. His research interests include artificial intelligence (AI) systems, robots, internationalization, business ethics, business process management, value creation, anthropomorphism, and sustainability. Rakibul's doctoral research explores the impact of AI systems on the internationalization process of firms.

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Dr Bahtiar Rifai is an economic researcher at the Indonesia National Research and Innovation Agency (BRIN). His research focused on knowledge-based economics, specifically in technology and innovation economics. He has six years of experience in working with digital economy, digital government research, and digital society studies. His recent research has explored the readiness of local governments for digital transformation, promoting local economic development through digital technology intervention, and digitalizing small medium enterprises by inducing digital technology to improve their business management and efficiency. Dr Rifai has extensive methodological experience with institutional analysis using soft system methodology and social network analysis.

Abstract

In 2011, Indonesia joined seven other countries in founding an international organisation Open Government Partnership (OGP) and consolidated a commitment to pursue a strategy of Open Government Data (OGD). In 2019 the country passed the Presidential Regulation on Satu Data Indonesia (One Data Indonesia), establishing a policy imperative to pursue OGD at national and sub-national levels. In this report, we draw from an Australia and Indonesia awards project, "Governing in the Digital Age," to showcase the critical dimensions of Satu Data implementation by Indonesian Government officials on the ground. The core top-down OGD components—government regulation and technical standards—are supplemented by bottom-up components of Satu Data Indonesia. On-the-ground experience with stakeholder engagement, digital literacy, social license, inclusion, and organisational culture in Indonesia has played an essential supporting role in unlocking the social and economic value of Satu Data. First, this report follows Indonesia's OGD journey from the political changes in the 1990s, experimentation with OGD in the 2010s, and OGD as a national caliber policy in the current day. Additionally, the report showcases the ongoing multi-fold government efforts to increase government transparency and efficiency with Satu Data Indonesia.

Abbreviations

AI	Artificial Intelligence
ASN	State Civil Apparatus
Bappenas	Ministry of National Development and Planning
BIG	Geospatial Information Agency
BPS	Central Bureau of Statistics
EGDI	E-Government Development Index
ICT	Information Communication Technology
IT	Information Technology
OECD	Organisation for Economic Co-operation and Development
OGD	Open Government Data
OGP	Open Government Partnership
SDG	Sustainable Development Goals

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1. E-government and Open Government Data in Indonesia

In 2019, Indonesia passed a Presidential Regulation on Satu Data Indonesia (One Data Indonesia), which mandated Open Government Data (OGD) to be implemented at a national scale. The pressure from the Central Government's commitment to OGD has accelerated both new advancements of Satu Data implementation and revealed pain points within Indonesia's ongoing efforts to advance OGD. In 2011, Indonesia was one of the eight countries that started the Open Government Partnership (OGP)—an organisation to advance open data internationally. Despite the early start, Indonesia's OGD journey is ongoing and its OGD rankings are similar to other countries in the region. This report aims to outline the current "state of play" of Indonesia's open data journey.

Indonesia's digital development

Open Government Data is transforming national governments worldwide and the relationship between those governments and their people, introducing transparency and accountability to the public service sector. The World Bank characterises OGD by two dimensions of data openness at a legal and technical level. First, the data should be legally open (placed in a public domain with minimal restrictions for data access). Second, the data should be technically open (posited in a machine-readable and non-proprietary format).[1] The Organisation for Economic Co-operation and Development (OECD) defines OGD more broadly as a philosophy partnered with a set of policies "that promote transparency, accountability and value creation by making government data available to all."[2] Democracy, innovation, civic engagement, and citizen centeredness are all principles that undergird the development of OGD.[2] The combination of these two definitions suggests that OGD is legally and technically open data in its creation and meets social purposes of transparency, accountability, and social value creation in its use.

Indonesia occupies a leading role in the Asia–Pacific region. In 2011, Indonesia and seven other countries—a number that has now grown to 78—instituted the Open Government Partnership (OGP) and launched its first national action plan the following year. To work effectively, open government and OGD must develop together, supported by a broader culture of openness. Indonesia's membership in the OGP institutionalises the national goals and commitments to open government and data. The overall values of the international partnership are *transparency, participation, innovation, accountability*, and *inclusion*.

On the ground, Indonesia develops concrete commitments biannually, delivering on the sixth OGD national action plan (2020–2022). The current project focuses on strengthening public services, anti-corruption, fiscal transparency, access to justice, community participation, and gender-perspective public policies. After the delivery of each 2-year plan, Ministries/Agencies hold a series of meetings with civil society organisations, drafting the national strategy through the principle of co-creation.

Figure 1: Indonesia's Open Government journey timeline

Note: Adapted from Open Government Indonesia (https://ogi.bappenas.go.id/en/perjalanan)
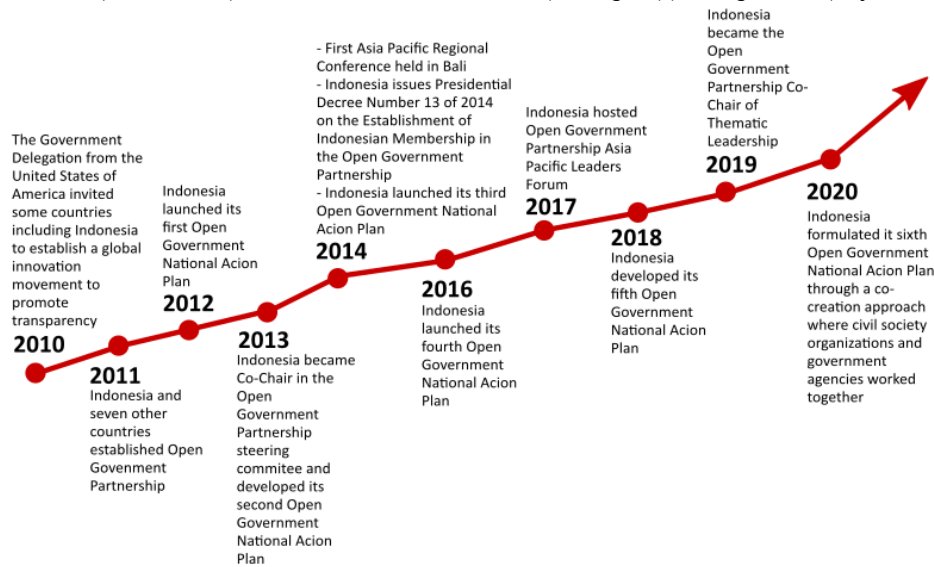
Albeit developing, the country's efforts have yielded strong results after a decade of work. The United Nation's E-Government Development Index (EGDI) is a critical relative measure of evaluating the performance of 193 national government member states of the United Nations. The report acknowledges that among the countries of lower-income levels, Indonesia has delivered on online service provision, with a high national Online Service Index.[3] Furthermore, the country is ranked highly number 57 among the UN members for its E-Participation Index, which measures the use of online services to facilitate the provision of information by governments to citizens, interaction with stakeholders, and engagement in the decision-making process. In 2020, the report also recognised the Indonesian Government's Task Force for Research and Technological Innovation for swiftly working on Artificial Intelligence (AI) models to help with COVID-19 diagnostics in Indonesia. The initiative allowed people to access self-checks for symptoms and see "virtual doctors" for medical advice, thus alleviating the workload of the medical system.[4]

Indonesian OGD performance indexed via various tools also suggests that while the number of datasets released to the public is not yet extensive, government readiness to embrace OGD is high. OpenData Barometer[5] is a multidimensional assessment looking at data availability and government readiness for open data and data openness impacts. The evaluation builds on four different information sources:

- government self-assessments
- peer-reviewed expert surveys
- detailed datasets assessment
- secondary data.

The open data initiative evaluation tool OpenData Barometer ranked Indonesia as number 37 out of 115 national governments measured.

Figure 2. Indonesia's Open Data Index breakdown

Note: Adapted from Open Data Barometer
(https://opendatabarometer.org/country-detail/?_year=2017&indicator=ODB&detail=IDN)
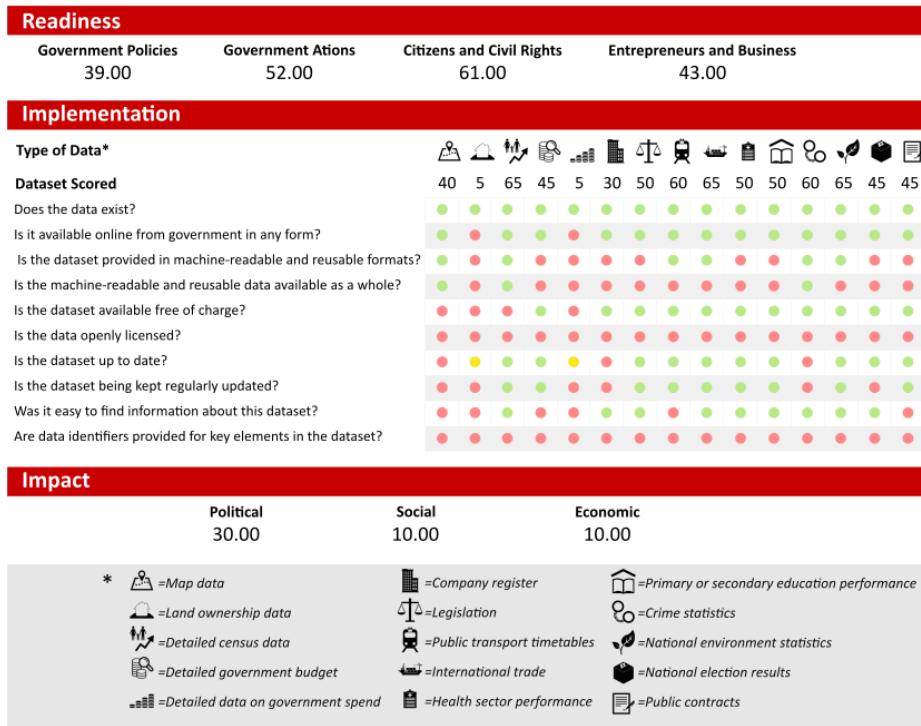
The number of open datasets in Indonesia continues to grow and expand. The Global Open Data Index collects government data and collates those data with the information gathered through volunteers. This index solely focused on the datasets that have been officially made available by the governments. The Global Open Data Index showcases the highlights of the OGD in Indonesia: air quality information, national statistics, national maps, and government budget. Procurement and federal laws are in the middle of being opened to citizens, as shown in Figure 2. These developments are well reflected on the ground. Indonesia's national statistics agency, Statistics Indonesia—Badan Pusat Statistik (BPS), is a crucial government actor molding open data policies in Indonesia. The index data from 2015 ranked Indonesia low at 61 out of 94, as shown in Figure 3.

Figure 3. Indonesia's global rank in the Global Open Data Index

Note: Figure accessible via https://index.okfn.org/place/?filter-table=indonesia, content licensed under the CC BY 4.0.
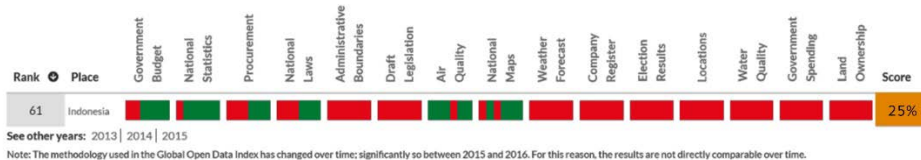
Some roadblocks in open data implementation have been open data readiness of entrepreneurs and businesses, the format of datasets released to date, data interoperability, the absence of a super system as a conveyor of systems between organisations, insufficient information technology (IT) infrastructure, and a lack of resources and training. Indonesia's socio-demographic disparities, gaps in digital literacy, unbalanced information communication technology (ICT) infrastructure provision

between regions, and the country's proneness to natural disasters pose further challenges. In 2014, the Government initiated the Satu Data Indonesia (Open Data Indonesia) draft bill, passed in 2019 as a Presidential Regulation. The goal of the regulation is twofold: to harmonise government data to achieve a more integrated government and organise the current Satu Data implementation efforts.

Evolution of Satu Data Indonesia

Indonesia's open data journey began in the late 1990's when a reform movement called for greater government transparency following an economic crisis. Available government data was one means of achieving the dual goal of increasing bureaucratic transparency and strengthening the economy. The 2008 Law of Public Information Disclosure was a paradigm shift for the country, mandating that the data should be open by default, not only upon request. It set Indonesia on a path of the government becoming more transparent to its citizens in its operations. Following the passing of the Public Information Disclosure Law, the authorities documented national election data as open data. In order to improve public services in some cities, such as the capital city Jakarta, government agencies created online channels for citizens, such as mobile apps such as Jakarta Smart City (JAKI), to report issues with floods, traffic, and public services, among others.[6]

This section presents discussions that follow the key milestones in Satu Data Indonesia's development from 1998 when the Freedom of Information Bill was announced. By incorporating legal reform and rapidly developing new technologies for open data, Indonesia has established itself as one of the leading countries in the Asia-Pacific region. Satu Data Indonesia created more transparency in government operations as well as efficiency in the provision of public services.

Figure 4. Evolution of Satu Data Indonesia

Reform Movement
The economic crisis in the late 1990s promotes the amendment of constitution, government transparency and efficiently, anti-corruption measures, and bureaucratic reform.

1998

Freedom of Public Information
Several non-government and civil sector organisations propose a bill to the government that lay the foundation for openness approach for public information.

2000

Second Amendment of the 1945 Constitution
Second Amendment of the 1945 Constitution of Republic Indonesia emphasise the citizens' right to data and information (Article 28 F).

Central Information Commission
The commission was form in line with the Right to Information Act 2005 to develop draft regulations and technical framework, and to resolute disputes around public sector data.

2005

2008

Open Government Partnership
Indonesia becomes one of the eight founding members (Brazil, Indonesia, Mexico, Norway, Philippines, South Africa, United Kingdom, and the United States) for launching global open government partnership initiatives.

Law No. 14 of 2008 on Public Information Disclosure
Data become openly accessible by default. It ensures citizens' right to information and fosters transparency and accountability.

2011

Open Government Indonesia
The country initiates the Open Government Indonesia and regional pilot projects.

2012

Major Impediments of Opening Government Data
The country start facing berries/major challenges in opening public sector data due to institutional factors.

Indonesian Open Data Portal
Government launches open data portal (www.data.go.id) to enhance public data and information transparency.

2013

Satu Data Indonesia
As part of the Open Government Indonesia program the nation initiated a policy called Satu Data Indonesia/ One Data Initiative.

2014

National Secretariat
The National Secretariat is formed by personnel/experts from the Ministry of Foreign Affairs, Bappenas, and the Executive Office of the President staff to administer open government implementation.

2015

Presidential Regulation on Satu Data Indonesia
The Government establishes obligations of an integrated data-management service and aims to overcome institutional challenges to successful implementation of Satu Data Indonesia.

2017

Developing draft of a Presidential Regulation of Satu Data Indonesia
The nation's Executive Office of the President and Bappenas engage with experts and public opinions (government, and non-government agencies) towards developing provisions

2019

The late 1990s to late 2000s: Foundational work

While the Indonesian Constitution 1945 acknowledges the freedom of information dissemination, the recent push towards openness of public data mainly started from the Reform Movement in 1998, followed by the financial crisis in Indonesia. Several non-government and civil sector organisations proposed a bill to the government along with the second amendment of the constitution, that further empathised with citizens' rights

to data (Article 28 F) and laid the foundation for Law No. 14 of 2008 on Public Information Disclosure. The law facilitated the shifting from data that were closed by default to become openly accessible by default. It aims to ensure citizens' right to information and fosters government transparency and accountability.

The early 2010s to mid 2015s: Open Government initiatives and challenges

In 2011, the global initiative of OGD commenced, where Indonesia became one of the eight founding members for launching OGP. Beside Indonesia, other members were Brazil, Mexico, Norway, Philippines, South Africa, United Kingdom, and the United States. Consequently, the country began the OGD initiatives in 2012 and started regional pilot projects in Central Borneo Province, Indragiri Hulu Regency, and Ambon City. The Open Government Indonesia established a National Secretariat in coordination with the Executive Office of the President (KSP) and the Ministry of National Development Planning (Bappenas) to develop policies and foster transparency and innovation (see Figure 5). The Government created a policy named Satu Data Indonesia and launched an open data service portal (data.go.id) for the public to enable the use and re-use of government spatial and non-spatial data. However, such initiatives faced major impediments due the institutional voids, such as the absence of standard technical guidelines, lack of data management skills, and bureaucratic procedures.

Figure 5. Key government institutions of Satu Data Indonesia

Note: Adapted from OECD (n.d.) and Indrajit (2018)
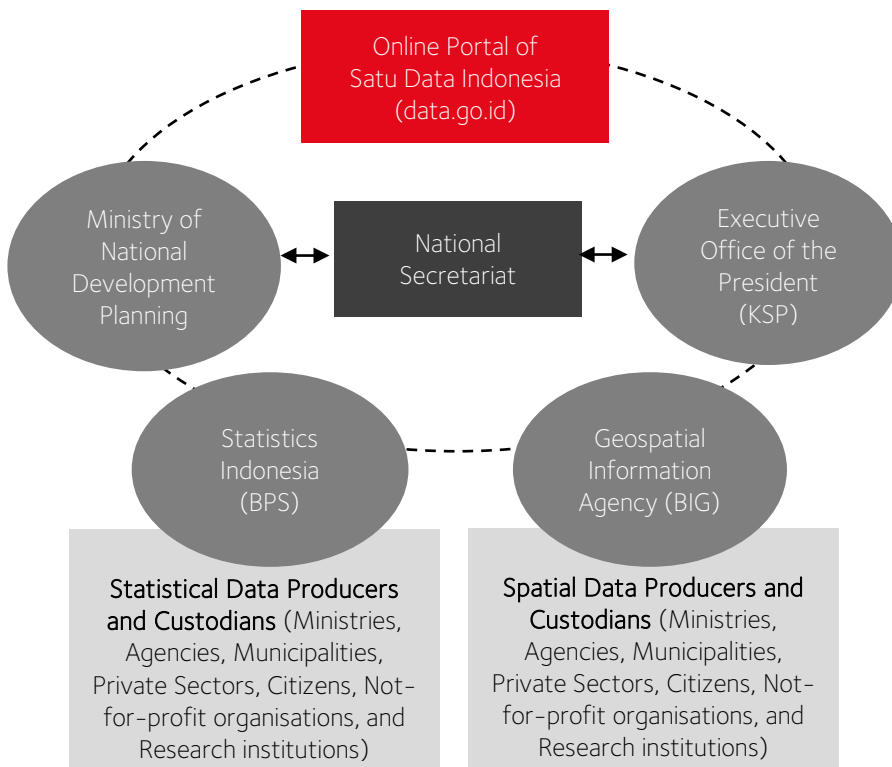
Mid 2015s to present: Implementing Satu Data Indonesia and beyond

To overcome the challenges mentioned above and to enable data standardisation and the successful publication of public data, a Presidential Regulation on Satu Data Indonesia was initially drafted by engaging with experts and public opinions (government and non-government agencies). To achieve this, both KSP and Bappenas acted as key coordinators.

At the same time, they collaborated with the Central Bureau of Statistics (BPS), the Geospatial Information Agency (BIG), and the Ministry of Information and Communication. In May 2017, more than 100 representatives from the private sector, civil society, and government agencies provided input into the draft of the Presidential Regulations. Among the key recommendations discussed was the need for cross-agency teams to improve the institutional silos of the government agencies, requests for the Satu Data Indonesia data custodians to incorporate non-government data (e.g., data produced by research institutions), and including a precise mechanism for involving civil society organisations to be included in Satu Data policy-making.[7] After a 2-year drafting period, the Government signed a Presidential Regulation in 2019 to establish obligations of an integrated data management service and aim to overcome institutional challenges to successfully implement Satu Data Indonesia.[8]

At the time of writing, despite having formal provisions in place and positive governance initiatives, there are still some hindrances to successfully implementing Satu Data Indonesia. Like in many countries, they stem from the constraints of institutional factors such as data standardisation, data interoperability, and the inability to include other stakeholders (e.g., civil society) in ecosystems. These challenges are now being actively addressed by government and non-government stakeholders using the 2019 Presidential Regulations.

2. Governing in the Digital Age project: Australia Awards Indonesia

Griffith University started the Governing in the Digital Age project in 2021 to offer knowledge exchange between Australian expert stakeholders and Indonesian Government officials, directly working towards improving OGD. The following section proceeds in the following ways: first, we introduce the project and its aims and propose a conceptual framework of the ground-up OGD implementation and its interaction with the regulatory aspects of the OGD. We present the bottom-up perspective of working on expanding and improving Satu Data Indonesia through on-the-ground case studies. Second, we illustrate the different parts of the conceptual framework by integrating academic and grey literature and present them through the case studies of Satu Data Indonesia implementation on the ground.

Introduction of "Governing in the Digital Age"

The Australia Awards Indonesia Short Course Award "Governing in the Digital Age: The Use of Data for Better Policies and Public Services," run by Griffith University's leading experts from the Griffith Business School and Griffith Sciences, sets out key learning outcomes for creating, managing, and using data for public services and policy delivery—governing with data. The course aimed for a gender balance and included 23 participants (12 female, 11 male) in various positions, including Deputy Director, Section Chef, Heads of Unit, Researcher, Statistician, Senior Planner, Data Curation and Data Scientist and Analyst. The participant organisations and government agencies include the Ministry of National Development Planning/BAPPENAS, Indonesian National Research and Innovation Agency (BRIN), Bureau of Statistics Indonesia (BPS), and the Indonesian Ministry of Finance, among others.

The Indonesian Medium-Term National Development Plan's (RPJMN 2020–2024) priority policies include industrialisation and digital transformation. Digital literacy and capacity in managing and analyzing data (including big data) present challenges for Indonesia to capitalise on digital technology advancements in policy development. Big data strengthen governance, financing, research, the health sector, public digital literacy, and digital transformation in basic service infrastructure. Indonesia is suited to accelerate digital transformation with over 70 million smartphone users. Approximately 30% of the population is under 30 years of age, and mobile penetration is proliferating; however, the potential for the Indonesian Government to use digital technologies to deliver better, timelier, and more affordable public services is far from being realised.

The RPJMN mentions the Indonesian One Data policy concerning bureaucratic reform. It is expected that data across the country will be synchronised under this policy, and previous conflicting regulations and inter-agency agreements will be phased out. The aim is to make data freely accessible to government agencies. The private sector is also allowed to contribute to the initiative. Open Data Policy is expected to widen access to government data as part of government's service to public. Governments and policymakers increasingly use data to inform decisions as policy inputs, but even in Australia, they often struggle to use data appropriately. To be effective, data needs to be coupled with understanding its limitations and the human stories that underpin and explain it.

Beyond top-down open data policies: Changemaking on the ground

To achieve the economic and social value that the gradual implementation of OGD can unlock, technical and legal standards alone are not sufficient. Governments much engage in a multi-modal OGD development strategy. Lessons from other countries suggest that organisational culture, digital literacy, stakeholder engagement, and maintaining trust are crucial for optimal use of the data when made publicly available. In Figure 6, we illustrate the core elements of successful OGD implementation (technical standards, policy, and legal aspects) and the satellite aspects of OGD implementation that help achieve the OGD goal of generating social and economic value for society.

Figure 6. The critical aspects of OGD implementation to achieve social and economic value with OGD.
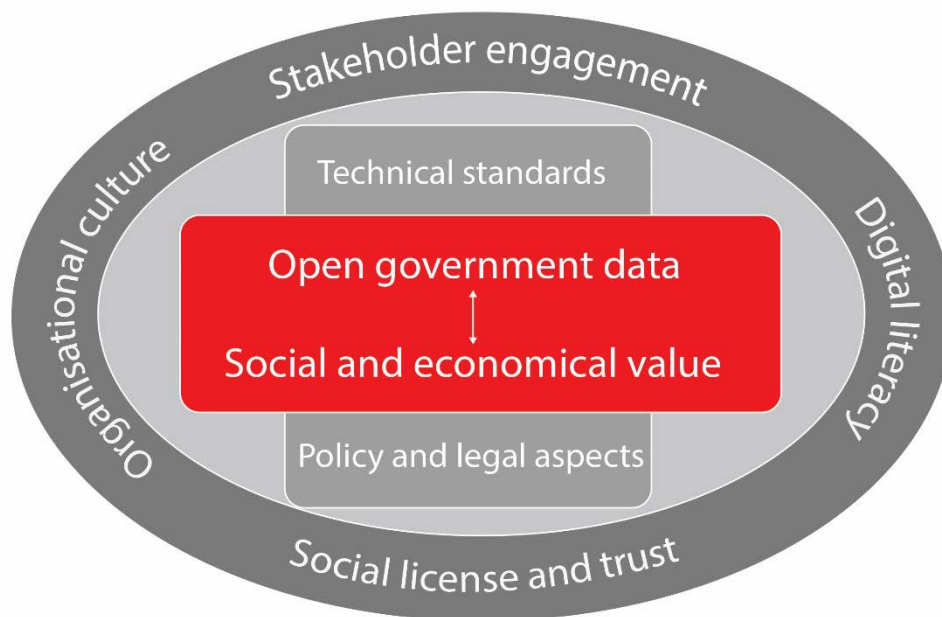
The "Governing in the Digital Age" project highlighted the state of open data implementation in Indonesia and the most advanced initiatives that are taking place in the country through individual award project presentations. These presentations highlighted the state of Open Data Indonesia implementation and the proactive initiatives tackling the emergent challenges on the ground as the policy develops and matures. A key takeaway message is an intersectional one: OGD aims to create more transparent, agile, and inclusive governments worldwide. On the ground, the "Governing in the digital age" participants show how important it is to merge policy, technical, research, and social advocacy skills to achieve that goal. In the below sections, we unpack these key aspects to provide examples of their implementation on the ground.

Open Government Data's social and economic value

Open Government Data offers transparency and increases public trust in the government and social and economic value. The more datasets are unlocked, the more value can be created by integrating and analyzing the data. Data can be quickly retrieved and analyzed only if presented in a standardised machine-readable format. During the OGD journey, government and non-government actors can contribute to developing innovative data-driven solutions.

The value from OGD is created when the data opened is being used. Several factors can encourage users to employ OGD data. It is not enough for the responsible government

agencies to ensure the quality of data, the web (such as government portals), service, and social media quality.[9] There was to be sufficient OGD collaboration space between government and non-government, and open data user satisfaction must be achieved. For example, if open data users find data difficult to find, is of poor quality, or is impossible to analyze, their motivation to use the available data will be reduced.[9] In Indonesia, most data is freely available online, but only a fraction of that data is in a machine-readable format.[10]

During the OGD journey in Indonesia, government and non-government actors have made significant efforts to advance data-driven innovations with the available resources. During the COVID-19 outbreak, the Indonesian Government developed a mobile application, SMILE to track vaccine delivery and distribution logged by health workers in real-time.[11] Among the non-governmental actors, Pulse Lab Jakarta—an innovation facility jointly funded by the United National and the Government of Indonesia—delivers some essential data-driven interventions for better government services. In 2021, among other completed projects, Pulse Lab analyzed behavioral barriers of female business owners in using digital tools, contributed to an information management system for disaster preparedness, and contributed data insights for safer public transport for women traveling at night[12].

Although most concrete benefits will be revealed after the national implementation of Satu Data, the country has already presented a few economic success stories.

Using procurement data to identify fraud and corruption in public procurement

Indira Malik (Corruption Eradication Commission)

Indira's project has an ambitious goal of identifying cases of corruption through big data. Since 2004, KPK has brought 240 corruption cases to the court, and there are over 2 million packages submitted annually. Indira has identified that there are several phases in the procurement project:

1. procurement planning,
2. procurement preparation,
3. selection process,
4. pre-selection.

While there is a dashboard that is currently in use to monitor and visualise these processes, there are some issues that are commonly reported. Two key challenges are issues with data standardisation and the data format changes from the national level agency, which requires the KPK must change the data mapping format. Indira has attacked the problem in two ways:

1. using a big data detection system for unusual activities in the procurement process,
2. she has advocated for one national data standard to be promoted by the Bappenas agency through the existing connections that she created with other government servants attending the AAI GDA course.

Her request for Bappenas is to help define a data standard for each government sector.

The core of OGD implementation

Open Government Data implementation must be government-led to provide national technical guidelines through standards and simultaneously introduce bureaucratic incentives through regulation and policies. The alignment between technical standards and regulations can be complex as it needs to match the horizontal layers of the government bureaucracy hierarchy and the vertical layers of reporting. When OGD initiatives were piloted through regional projects in 2012 government agencies created their own data management systems working in silos.[13] The interoperability issues were acknowledged and addressed via the 2019 Presidential Satu Data regulation that preceded numerous stakeholder consultations. The Regulation primarily aims to improve the quality of data governance nationally by creating national interoperability between government actors and datasets.[14]

Technical standards of Satu Data Indonesia

Achieving clear technical standards is one of the foundational elements for successful OGD implementations. Technical clarity enables service agencies, platforms, and applications to process data effectively and allow the exchange of data within or outside organisations. The technical and detailed work of enhancing the technical standards of Satu Data Indonesia has been at the forefront of Satu Data Indonesia's implementation.

Standardisation in information technology and management can be achieved by focusing on three areas that can enhance data accessibility and interoperability: enabling technologies, process architecture, and data publication.[15] Enabling technologies refers to tools and automation systems that government agencies use to create, manage, and publish data (e.g., the internet, artificial intelligence, or open linked data). Process architecture refers to decision-making procedures or principles on data use, reuse, and sharing that ensure the safety and reliability of data. Data publication refers to the use of standardised methods for publishing and sharing the data along with appropriate industry-standard formats (e.g., XML, CSV) and data catalogues. The three strategies are being explored by various OGD stakeholders, such as Pulse Lab Jakarta and government OGD research teams.

While Indonesia has developed a data publishing platform named Satu Data Portal, the Government is yet to untap value from the portal due to a lack of technical standardisation in information and data management. In an interview after the passage of the 2019 Presidential Regulation, the Executive Office of the President of Indonesia explained the issue with an example of rice production. Different government authorities, such as the Ministry of Agriculture, the Ministry of Trade, and the Indonesian Bureau of Logistics, produce data on rice production. The datasets are not integrated and cannot be used for joint government planning or budgeting.[14] This lack of dataset integration also produces redundant datasets.

Standardisation and integration have the capacity to enhance accessing the datasets inducing search, metadata, and legitimate licensing. It will also help agencies to develop information management roadmaps that explicitly recognise legacy data (non-digital) and put in place a common data migration strategy. In case any software or automation tools become obsolete, it will make sure that data are stills accessible and can be integrated with the modern tools. Technical standards are the main priority of the current Satu Data national planning.

Smart civil servant data integration system towards big data state civil apparatus (ASN)

Heni Sri Wahyuni, Indonesia National Civil Service Agency

Heni's project tackled the key challenges of Satu Data—data integration and sharing. Data integration is one of the most significant IT problems facing the Indonesia government today, an issue that extends to the State Civil Apparatus (ASN) data. ASN data is trapped in data silos and not currently integrated. Heni created an ASN Information System Integration Schema that aligns the data integration relationships between the key stakeholders of the information system ecosystem. She is benchmarked her project against the mandate of the 2019 President Regulation to ensure that the data can be shared and interoperable among institutions become one ASN data as part of, structuring regulation and providing open government. Heni's goal is to follow the timeline outlined by the 2019 Presidential Regulation and improve the ASN management process into human capital towards a world-class bureaucracy by 2024.

Regulatory and legal aspects of Open Data Indonesia

A clear policy framework outlines government duties, roles, and reporting, structures government budget allocation, and, more broadly, validates the work of people and organisations. A robust set of policies provides direction for open data implementation—the who, what, and how of Open Data. Through participation in OGP, Indonesia supports other countries in their OGD journey and received support, monitoring, and independent auditing from the organisation. The carefully drafted 2019 regulation "requires the harmonisation of data obtained by each ministry and agency, so that it is more accurate, up to date, integrated, accountable, accessible, and shareable."[16]

Despite Indonesia's ongoing involvement in e-government and open data regulatory initiatives since 2011, regulatory challenges remain as the country moves towards opening government datasets and creating processes around data creation, storage, and sharing. The trial-and-error process started in 2012 with regional pilot projects in three areas: Central Borneo Province, Indragiri Hulu Regency, and Ambon City. The number of projects was later expanded. The pilot projects did kickstart experimentation with OGD, however, due to a lack of standardisation of OGD initiatives, the pilots created systems that do not necessarily "talk" to each other. These problems were clearly expressed by government and non-government actors during the consultation meetings for the 2019 Presidential Regulation, which sets harmonisation between government ministries and agencies as the overarching requirement of the policy.

To iron out the regulatory challenges through policy, a bottom-up approach to innovation is essential to ensure that the voices of changemakers are incorporated and institutionalised. The participants of the "Governing in the Digital Age" project have tackled this challenge in two ways: first, by improving capacity for policy design, and second, by locating concrete policy challenges and advocating for change.

## Enhancing the evaluation result through the e-Monev System

Heri Heriyadi and Prakosa Graha (BPS/Statistics Indonesia)

Through this joint project, Heri and Prakosa focused on e-Monev—an application for monitoring of annual work plans of ministries and institutions in Indonesia that was first introduced in 2012. Working together, they formulated policy recommendations to elaborate an e-Monev system to improve the quality of development evaluation. In the first step of reviewing the regulation, Heri and Prakosa found that the evaluation results have not provided feedback for future development planning; redundant functions of the system were present due to cross-regulation issues, therefore resulting in the evaluations not being effectively used. After months of knowledge-sharing meetings and discussions with various government institutions, the team produced a set of policy recommendations to improve and effectively utilise e-Monev.

Stakeholder engagement

The stakeholders of open data initiatives are data producers (ministries, agencies, NGOs, regional government bodies, and research institutions, among others) and data consumers (private sector, media, citizens, and other government bodies). OGD benefits from interactions between all stakeholders, and specifically among the data producers and data consumers. Such interactions can help boost innovative applications of OGD, identify data quality issues, and suggest improvement strategies.

Figure 7. Stakeholders of open data.
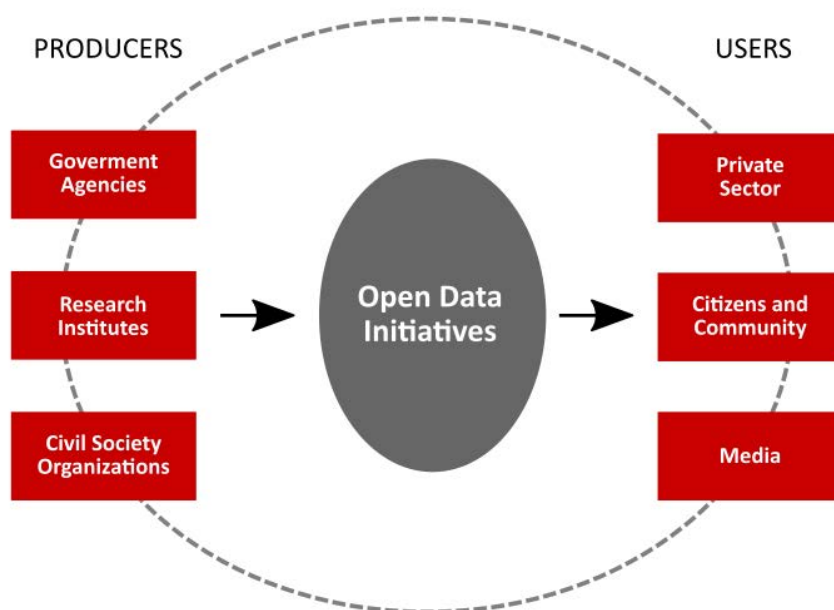
Data producers need to follow standards and provide relevant data to the public. In Indonesia, Bappenas and BPS are the government bodies that offer guidelines to data producers to make the data available, which can then be made open for data consumers. As mentioned above, interoperability, quality, and standardisation of the data produced are key to data use and adoption. In Indonesia, one of the challenges is the availability and quality of data from these government institutions.[17] Indeed, under the aim of turning Indonesia into a world class bureaucracy by 2024, government agencies are seeing ongoing efforts in melting data silos and accelerating data integration across the state civil apparatus, namely central and local governments.

On the other end of the OGD initiatives are the data consumers. In 2013, the private sector and the media were found to have the highest appetite for government data, such as real-time weather or traffic information.[18] The private sector can incorporate accurate data into their products and services, while the media can work with data-driven journalism. At the public level, awareness of the benefits of OGD remains insufficient and specific data analyst skills are needed to take advantage of these benefits. In an experimental budget transparency project, Open Data Lab Jakarta showed that continuing interaction between government agencies and data users could generate trust and increase public participation.[19]

Digital literacy

The increase in digital literacy across the board can help fostering the broader open data culture and involvement of a multi-stakeholder community. Digital literacy refers to a skillset of accessing and using information via digital tools to live and participate in modern day society. OGD is creating data publics—open government datasets available online for anyone who can understand and use them. A high level of digital literacy at individual and organisational levels is prerequisite to engaged use of OGD more broadly. Unfortunately, digital literacy in Indonesia is not strong, and digital literacy movements "tend to be voluntary, incidental and sporadic".[20] Limited civil society engagement and use of the data that is already available for Indonesian citizens has been widely reported in academic literature.

In 2022, the Katadata Insight Center and the Communications and Information Ministry of Indonesia conducted the 2021 Indonesia Digital Literacy survey with 10'000 respondents aged 13–70 in 524 cities.[21] The results found that on a scale of 0 to 5, the medium literacy was at 3.49 points, only 0.02 points higher than the 3.47 result in 2020. The results of the digital literacy index survey can be read and downloaded via *status.literasidigital.id*. The levels of digital literacy in Indonesia are also varied across regions, generations, and socio-economic backgrounds.[22] Among of the key issues of digital literacy in Indonesia is the lack of skills, resources, and training of teachers required to teach students basic digital literacy skills. Indonesia's level of digital literacy within the ASEAN region is comparable to its neighbors, such as Singapore, Malaysia, or Vietnam.[23] The Indonesian Government is proactively advocating this issue, which pursues the broad OGD economic vision of innovation. The Ministry of Communication and Information annually measures and tracks the development and gaps in digital literacy skills in the country. The Ministry also has announced the National Digital Literacy Movement (SiBerkreasi) and launched a portal (event.literasidigital.id/) for continuing digital literacy events online. The representatives of the Ministry are guided by the broad goal of equipping the population to participate in the digital economy:

> *"Digital literacy plays an important role in creating human resources that can use the internet to encourage productivity and innovation, especially in the digital economy sector".[24]*

The participants of the "Governing in the Digital Age" project recognise the challenges of digital literacy in Indonesia. Two case studies presented below showcase the best practices employed to engage with the on-the-ground building of digital skills.

Strengthening sectoral statistics by guiding village government in managing data: A pilot project in Desa Pesanggrahan, Batu Municipality

Dwi Esti Kurniasih (BPS/Statistics Indonesia of Batu Municipality)

Dwi Esti's project undertook the challenging task of village government grassroots training to manage data. There are 83,820 administrative villages in Indonesia, but many do not have well-established data management practices. Data management practices are in turn crucial for the quality of policy making at the national level. In the inclusive message of her work, she has acknowledged that even the smallest of data creators matter in the larger infrastructure of big data and cannot be left out as Indonesia moves to the big data age. Dwi Esti started the pilot project with one village—Desa Pesanggrahan in Batu Municipality, East Java Province. She has created open-source resources that could be freely used for big data management, provided on-the-ground training to village governments and established collaborations with the University of the ITS Suraya. Dwi Esti's work is part of "quick wins" programs carried out by BPS for optimising and standardising sectoral statistical development with a focus on villages.

Village administration and information system

Miracle Ginuny (Bappeda West Papua)

Miracle works in the province of West Papua, which has one of the lowest human development outcomes out of the 34 Indonesia's provinces (HDI 65.26 in 2021), including low life expectancy and high poverty rates. The province had a poverty rate of 21.70% and rural poverty rate of 33.20% in 2020. Therefore, poverty reduction has been the key development target, with the official goal to reduce poverty by 2,3% per annum to deliver on zero poverty SDGs target by 2030. Miracle's project focused on creating the Village Administration and Information System (VAIS), which would improve the quality of village data and information management to support better decision-making process for better village governance, development planning and basic services delivery. While focusing on village development like Esti Dwi's project, Miracle's main goal was to collect disaggregated data from Indigenous Papuan populations, which make up approximately half of the province's population. Miracle observes that such disaggregated datasets have been missing in the past 20 years of special autonomy in the province and hopes that the information collected can support better village governance.

Organisational culture

In the past, government agencies did not have to report their data on an open platform and with the little culture of sharing data. OGD implementation causes a shift in how these government bodies work, breaking them away from siloed work. It also makes them more transparent and accountable.

To implement the interoperability of OGD, all levels of government (national and sub-national) must work together. However, local government agencies in Indonesia often lag. Satu Data has been designed to allow different levels of government to work together by organizing roles, tasks, and responsibilities. In 2016 nine national-level government agencies were selected to participate in a Satu Data pilot implementation, and efforts to implement OGD across national and sub-national government levels are currently ongoing. Drawing from a case study of the Pontianak city government, Arthur Glenn Maail[13] observed that local government agencies need additional support in supporting the implementation of Satu Data: first, existing laws and regulations should be reviewed to ensure that local-level data producers are incentivised to run data management systems by the Satu Data technical standards; second, capacity building is required for local government officials; third, digital tools for data entry should be developed to shorten data entry time and minimise data entry errors; last, standards that exist at hierarchical levels but within a single line agency should be reviewed to ensure uniformity. Alignment between national and sub-national levels of Indonesian Government agencies will be a crucial factor for OGD implementation nationally.

Promoting digital technology transformation in Indonesia through research activities

Bahtiar Rifai (BRIN; National Research and Innovation Agency)

Enhancing research capability for policy design can accelerate digital transformation. This has been the critical advocacy message that Bahtiar, cordially known as Bobby, has promoted. Collaboration is the key to accelerating technology adoption in Indonesia. Called "actively transformational" by project evaluators, Bahtiar's project focused on:

1. promoting the capacity of digital transformation through widening the culture of data sharing and integration and
2. promoting digital transformation through speeding up digital technology adoption, and
3. accelerating digitalising government data.

Among his contributions are an 11-series podcast, an academic paper publication, an evaluation of local governments readiness to engage in digital transformation by research, and an offline knowledge-sharing session for 25 social science researchers. Strengthening research capacity on digital technology can sharpen contextual, coordination and cognitive of digital transformation in government sector. At the heart of his advocacy is a collaborative model of sharing data and digital data utilisation for research and policy making inputs.

Social license and inclusion

OGD not only promises tangible economic returns but increased social inclusion in national governance and development. In a study of 28 countries in the Global South, Van Schalkwyk and Cañares found OGD can contribute to access and participation, which may suggest a more participatory approach to governance.[25] To release opportunities for social impacts, national governments must overcome challenges, such as privacy concerns, data sharing and integration standardisation, and larger switches towards data-driven approaches.

Sustainable Development Goals (SDGs) were adopted by all member countries of the United Nations in 2015 and support strategies to end poverty, improve health, education, and income inequality, and spur economic growth. They have since become part of the development of Satu Data Indonesia in a continued and structural way. World Bank argues that OGD can help achieve SDGs by "providing critical information on natural resources, government operations, public services, and population demographics," which can later be converted into government policies.[26]

Pulse Lab Jakarta is an organisation created by the United Nations and the Government of Indonesia to work towards gender equality, disability, and social inclusion. The Pulse Lab works with Bappenas to support Satu Data Indonesia's work by applying a human-centered design to data governance. The result of the Lab can break down SDG measures from real-time data in Indonesia and use those insights to inform the policy.[27]

Integrated procurement process between government and social/creative enterprises

Adelita Asthasari Siregar (Directorate of Industry, Tourism, and Creative Economy Ministry of National Development Planning/Bappenas)

Adelita advocates for including social enterprises in a data pool for the procurement processes and linking this back to performance evaluations. In creating the loop of inclusion and accountability and by institutionalising the work of social and creative enterprises, Adelita proposes that social causes can be a part of routine government work, and not ambiguous unachievable goals. Her ideas are now further supported with a new presidential regulation, signed in January 2022, that clearly defines a social enterprise as that which commits to supporting at least one of the SDGs and contributes at least 51% of their profits to that purpose. The importance of Adelita's advocacy is highlighted in the context of the post-pandemic economic recovery, where social enterprises have established themselves as significant contributors to tackling social, economic, and environmental issues.

3. The future of Open Data Indonesia

In 2022, Satu Data Indonesia marks 10 years in the making. In that time, government and non-government actors have made significant progress. In 2011, Indonesia became a founding member of the international OGP, making a long-term commitment to OGD. In 2014, the Satu Data Indonesia portal (https://data.go.id/) was launched and as of June 2022 the portal provides access to 88,169 datasets.

As part of the OGP commitments, Indonesia sets biannual open data actional plans and reports against them. The action plans are drafted by national officials responsible for OGD goalsetting and are subject to OGP's Independent Reporting Mechanism, which monitors the action plans and their completion. As per the fifth action plan (2018–2020), which took place during the COVID-19 pandemic, 12 out of the 19 commitments (63%) were either completed or substantially implemented.[28] During the 2-year period, Indonesia improved the online legislative information system, fiscal openness across multiple government sectors, and national public service complaint handling system. At the time of writing, the sixth action plan (2020–2022) constituted 24 commitments, with emergent policy areas focused on civic space, social accountability, and inclusion of marginalised people.[29]

Indonesia's Government has displayed an ongoing commitment to advancing government transparency, research innovation, and community engagement. Currently, the central and local governments are working towards data integration nationally with a roadmap to turn Indonesia into a world class government by 2024. Complete data integration across government stakeholders would not only lead to improved policy making and better public services, such as disaster management or infectious disease control, but would also encourage more government transparency and accountability. Through big government data, Satu Data changemakers have already launched projects to identify fraud and corruption in government procurement processes. Research institutions, such as the National Research and Innovation Agency, work with government actors to advance Satu Data. Additionally, efforts to engage community and neighborhood groups will become more commonplace as more open data in machine-readable format becomes available. Indonesian groups, such as Pulse Lab Jakarta, work towards SDGs.

Indonesia's open data journey is not yet complete. The 2020 United Nations E-Government Readiness Index ranks Indonesia as 88 out of 193 countries. Although Indonesia's ranking has sharply increased since 2018, the country is still not in an open data leadership position. According to the Ministry of National Development and Planning (Bappenas), in 2022, the country faces several ongoing challenges in its open data journey.[30] First, the scale of the data governance structure (632 data trustees including 84 ministries and agencies in 34 provinces) sharpens issues with data and metadata standardisation, lack of participation in data registration and use, and other discrepancies between data requirements and production. Further, policies are not fully harmonised between the central and regional levels of government, which impedes data integration and sharing. Last, a lack of human resources in digital technology exists and the distribution of skilled labor is uneven across the country.

During the last two decades, the Indonesian Government has shown a firm commitment to OGD implementation. In the next 2 years, Indonesia will implement the 2019 Satu Data Presidential regulation requirements nationwide, with most of the work planned to be completed by 2024. Once datasets are integrated on one unified national platform, the data will be made available freely to all data consumers.

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