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Understanding the Implementation of Indonesia's One Data Policy through Open Government Data: Evidence from Educational Institutions

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Keywords

Digital Government, open government data, One Data Indonesia Policy, Education.

Abstract

The Indonesian government faces similar challenges in managing bureaucracy amidst technological innovation and data management, which requires strategic policy-making. This research analyses the digital government framework in the implementation of the One Data Indonesia Policy, using Open Government Data (OGD) with Innovative Resistance Theory analysis. This study seeks to examine the implementation of the One Data Policy in the Indonesian government, specifically focusing on the management of environmental education data within the Ministry of Education, Culture, Research, and Technology (2019-2024).

This research will be based on these key questions: (1) How is the One Data Indonesia policy being implemented within the Ministry of Education, Culture, Research, and Technology? and (2) What challenges impede the implementation of the One Data Indonesia policy within the Ministry of Education, Culture, Research, and Technology? And (3) How can policy recommendations be formulated to develop a better strategy for the One Data Policy in Indonesia's education sector? Based on these questions, the study explores the implementation of the One Data Indonesia policy in education on government sector.

Introduction

Open government data policies have become increasingly strategic in the face of digital advancements (Leviäkangas, 2020). Furthermore, innovations in digital technology especially in open government data have enabled the generation of vast amounts of data, which require strategic management to produce effective and targeted policies. In this context, open government data has become an essential component for governments around the world, driving them to manage data as a key part of their policy strategies (Wirtz, 2022).

At the Indonesian government's policy level, discussions on big data policy and data-driven policy are based on the perspective and framework of digital government as a basic idea of open government data (Khairunnisa, 2024). In this idea, a big data policy drives strategies and sets of rules on how an organization collects, manages, stores, and analyzes data to achieve business goals. Meanwhile, a data-driven policy focuses more on analyzing large volumes of data to improve the quality of data-related policies, as part of the implementation of open government data (Attard, 2016; Jetzek, 2014). At this level, countries worldwide are increasing their focus and pursuing a transformation towards digital government and to implement open government data. This shift is in line with global trends in digital innovation, the development of cutting-edge technologies supporting digitalization, and innovations in machine learning and artificial intelligence that aid digital government processes (Wirtz, 2023).

Furthermore, nations are working to enhance the effectiveness of their bureaucracy and public services through digital government frameworks. Studies on open government data in China (2024), Australia (Fitzgerald, 2013; Hardy, 2017; Chatfield, 2017), the United Kingdom (Bates, 2014; Worthy, 2015), Europe (Juana-Espinosa, 2019; Gallego, 2021), the United States (McNutt, 2016; Young, 2020), and Singapore (Lim, 2021; Xu & Chen, 2023) demonstrate that the adoption of digital government has contributed to improvements in public service delivery.

These studies provide space for the implementation of open government data in Indonesia to improve, especially in business ecosystem innovation and technocratic approaches to encourage technology adoption in government. These improvements are largely driven by innovations within open government data systems, which constitute a key component of broader digital transformation efforts. Against this backdrop, an important question arises: what is the current state of open government data in Indonesia, and how has its implementation process evolved?

However, the Satu Data Indonesia policy faces significant challenges that hinder its implementation. These challenges include inter-agency coordination, digital literacy, technological limitations, and human resources issues. Effective data integration is hindered by inter-agency coordination issues and political barriers, which is clarified as institutional challenges (Ardani & Cahyani, 2022). Additionally, technical challenges related to data interoperability and human resources remain problematic. Implementing the technical frameworks for data interoperability continues to be a challenge due to decentralized data collection (Raja & Adlan, 2022). On the user and public level, varying levels of digital literacy

and technology proficiency present additional challenges. Differences in digital literacy among stakeholders complicate the adoption of standardized data practices as the big picture of human resources challenge (Gozali, 2023). The One Data Indonesia Policy is also highly substantive at the educational level, particularly in the management of large-scale learning data, which has significant implications for national policymaking.

Within the Ministry of Education, Culture, Research, and Technology, it is especially important to elaborate on the implementation of the Indonesia One Data Policy. The Ministry has issued Regulation No. 31 of 2022, which ensures data governance aligned with the One Data Indonesia policy. However, despite the One Data Policy having legal backing since 2019, its implementation has faced several challenges, including institutional egoism, incomplete derivative legal regulations, insufficient infrastructure, and the need for improved human resources. This constitutes a significant challenge in the implementation of the policy related to the management of educational data within the Ministry. These issues are evident at both the Ministry of Home Affairs (Azis et.al, 2024) and the provincial government of South Sumatra (Prabujaya, 2024). This study aims to fill the gap of literature that mention before and to analyze the implementation of the One Data Policy within the Ministry of Education, Culture, Research, and Technology while provide the policy recommendation for improvement in the future.

This article based on these academic research questions: (1) how is the One Data Indonesia policy being implemented within the Ministry of Education, Culture, Research, and Technology? (2) what challenges impede the implementation of the One Data Indonesia policy within the Ministry of Education, Culture, Research, and Technology? (3) how can policy recommendations be formulated to develop a better strategy for the One Data Policy in Indonesia's education sector? This research question aims to contribute to the academic discourse on the implementation of open government data, particularly the One Data Policy, within institutions that manage large-scale educational data.

Method

Research Design

This study employs a qualitative method to examine the ongoing processes of digitalizing public services and managing government data in Indonesia, as well as their impact on bureaucracy. The qualitative method used here serves as a guide for in-depth exploration through interview techniques and relevant observations (Starke, 2013). More specifically, it also examines the methodological approaches employed in research related to public policy and public administration (Hendren, 2023). The research involves interviews with high-level and mid-level decision-makers from the Ministry of Education, Culture and Technology and provides secondary data from other ministries that relate with this research. It also analyzes media reports, press releases, and public information from policymakers related to government digitalization and Indonesia's National One Data Policy. Additionally, the study aims to access

data from relevant ministries and agencies to assess the impact of integrated digital applications aligned with the National One Data Policy on public services. Therefore, the research combines qualitative data from interviews and media documentation with statistical data extracted from ministry sources that are central to this study.

Research Sample

The participants in this research include several decision-makers and technical operators from the Ministry of Education, Culture, Research, and Technology of Indonesia. Additionally, the researcher analyzed public statements from the One Data Indonesia (SDI) Secretariat, which operates under Bappenas. Then, the selection of participants in this study considered their roles in policy and the ease of access for interviews. Furthermore, the researcher focused on data operations within educational units, particularly from the Center for Data and Information Technology, Ministry of Education, which handles data from the education sector. Additionally, to assess coordination and the implementation of cross-sector regulations, the researcher also brings some public reports and policy leaders statements which connect with the sector for the general policy regulation of the One Data initiative.

The researcher collected data through interviews and documentation, including podcasts, media releases, press statements on websites, and other related media sources. Interviews were conducted with key officials and leaders from the Ministry of Education, Culture, Research, and Technology of Indonesia from the Center of Data, Technology and Information and included the involvement of other relevant directorates. The researcher conducted interviews during 29 November 2024 – 6 June 205, with 25 government officers, from leaders and staff members from the Ministry of Education, Culture, Research, and Technology, and also data users from local government.

Table 1. Overview of interviewees

ID	Interviewee role	Position	Date of interview
I01	Director of Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Policy maker	3 December 2024, 4 January 2025
I02	Deputy Director of Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Policy maker	29 November 2024
I03	Data Manager of Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	4 December 2024
I04	Digital Regulation Expert (Center of Data, Technology and Information, the Ministry of Education, Culture and Research)	Operator & managem ent	6 December 2024
I05	Data Operator, Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	28 November 2024

I06	Data Operator, Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	15 December 2024
I07	Program Manager Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	17 December 2024
I08	Data Operator, Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	5 January 2025
I09	Data Operator, Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	9 January 2025
I10	Program Manager Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	9 January 2025
I11	Data Operator, Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	11 January 2025
I12	Data Operator, Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	11 January 2025
I13	Program Manager Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	10 January 2025
I14	Data Operator, Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	13 January 2025
I15	Data Operator, Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	15 February 2025
I16	Program Manager Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	17 February 2025
I17	Data Operator, Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	19 February 2025
I18	Data Operator, Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	16 February 2025
I19	Program Manager Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	22 Mach 2025
I20	Data Operator, Center of Data, Technology and Information, the Ministry of Education, Culture and Research	Operator & managem ent	23 March 2025
I21	Media and public officer, the Ministry of Education, Culture and Research	User	23 March 2025
I22	Media and public officer, the Ministry of Education, Culture and Research	User	24 March 2025
I23	Regional Officer, Data Education, Semarang Central Java	User	25 March 2025
I24	Regional Officer, Data Education, Pati Central Java	User	3 June 2025
I25	Regional Officer, Data Education, Kudus Central Java	User	6 June 2025

Research Procedure

The researcher employed structured interviews, followed by semi-open-ended questions to explore specific issues in greater depth. The interview guide was developed based on the Innovative Resistance Theory (IRT) framework, which was adapted from the open government data context. Also, to enrich the analysis and provide a broader perspective, the researcher also reviewed relevant documents related to the One Data Indonesia policy, both at the national level and within its implementation in the Ministry of Education, Culture, Research, and Technology. Additional sources included news releases, activity reports, and publications from the Ministry's official website and the One Data Indonesia Secretariat website.

Data analysis

The researcher analyzed the implementation of the One Data Indonesia policy within the Ministry of Education, Culture, Research, and Technology, drawing insights from in-depth interviews. This analysis was supported by utilizing data from existing databases. The interviews conducted were analyzed alongside other relevant data concerning the Indonesia One Data Policy. Additionally, media documentation, regulatory records, focus group discussions, and podcasts, as well as interviews with decision-makers from various ministries involved in the policy, were included in the analysis.

The researcher scheduled interviews with several leaders from the Ministry of Education, Culture, Research and Technology to access data. From these interviews, the data was processed using qualitative methods to map the implementation process of the policy and identify the challenges faced, particularly in the education data sector. After collecting primary data from interviews, the researcher transcribed and interpreted the data following the approach outlined by Erikson, Gokhan & Stenius (2021). Using MS Word and Excel, the data was repeatedly organized and structured. In the first stage, the interview transcripts were treated as key data for analysis and then entered into Excel to identify easily interpretable keywords. These keywords were then analyzed for their relevance to the ‘barriers’ framework used as the basis for the interview instrument. This analysis was supplemented by additional sources such as news releases, official organizational reports, and other documents related to the research theme found in online and relevant digital media.

Results and Discussion

Results

A. Data Governance in the Education Sector

A.1 Regulatory Framework for Satu Data Indonesia in the Education Sector

This research reviews the One Data Indonesia (SDI) policy in education by reconstructing the implementation of Presidential Regulation No. 39 of 2019 and its subsequent policy derivatives in the education sector, executed by the Ministry of Education, Culture, Research, Technology, and Higher Education from 2020 to 2024.

In the education sector, a key regulation on data governance is Ministerial Regulation No. 31 of 2022 concerning One Data for Education, Culture, Research, and Technology. Additionally, Ministerial Decree No. 133/M/2023 provides technical guidelines for managing education data, research data, and community service data in higher education. Ministerial Decree No. 133/M/2023 serves as a follow-up to Ministerial Regulation No. 8 of 2022 on Electronic-Based Government Systems within Ministry of Education, Culture, Research, and Technology and Ministerial Regulation No. 31 of 2022 on One Data for Education, Culture, Research, and Technology. This decree was enacted to ensure that the data managed under this system is highly accurate, up-to-date, accountable, and easily accessible.

In this context, the Indonesian government introduced the One Data Indonesia policy through Presidential Regulation No. 39 of 2019. The One Data Policy serves as the foundation for collecting, processing, analyzing, and distributing comprehensive and reliable data. It aims to provide an accurate basis for strategic government policymaking. Prior to this, the government implemented the Electronic-Based Government System (Sistem Pemerintahan Berbasis Elektronik/SPBE) policy under Presidential Regulation No. 95 of 2018. While the SPBE focuses on digital governance and infrastructure for managing government policies, the One Data Policy forms the basis for integrated data management.

Table 2. Evolution of policies implementation of One Data Indonesia

YEAR	POLICY
1998	Reform Movement The economic crises of the 1990s promoted government transparency and bureaucratic reform. Freedom of Public Information Bill The bill lays the foundation for openness in public information.
2000	Second Amendment of the 1945 Constitution The amendment emphasize the citizens right to data and information
2004	Law No 5 of 2004 Article 31 Accurate and Accountable Data The Law Mandates the production of accurate and accountable government data
2005	Central Information Commission and Right to Information Act 2005 The commission and act develop draft regulation for OGD
2008	Law No 14 of 2008 of Public Information Disclosure Data open made openly accessible by default
2011	Open Government Partnership

	Indonesia becomes one of the eight founding members of the partnership
2012	Open Government Indonesia Indonesia initiates its first OGD initiative and launches pilot projects.
2013	Major Impediment to Open Government Data
2014	Satu Data Indonesia First OFG Policy launched as part of the Open Government Indonesia Programme Indonesia Open Data Portal First portal launched to enhance public data and information agency
2015	National Secretariat A national secretariat is formed to implement OGD
2016	Presidential Regulation No. 09 of 2016 of Kebijakan Satu Peta One map policy, launches the baseline for geospatial data
2017	Developing draft of a presidential regulation of Satu Data Indonesia Indonesia's Executive Office of the president and BAPPENAS hold public consultations for SDI.
2018	Presidential Regulation No. 95 of 2018 of Sistem Pemerintahan Berbasis Elektronik (SPBE) SPBE digitizes government information systems
2019	Presidential Regulation on Satu Data Indonesia Indonesia's government establishes obligations for SDI
2022	Launching Portal Satu Data Indonesia The SDI portal provides access for first government datasets Initial SDI's evaluation Evaluations are completed through participation data and self-assessment.
2023	Developing National Data Catalogue BAPPENAS and PT Telecom develop data catalogue Grand Launching portal Satu Data Indonesia BAPPENAS and ministry of PAN/RB launches portal satu data Indonesia
2024	Indonesia's Government Launches Govtech & INA Digital President Jokowi launches Govtech and INA Digital to strengthening digital and data ecosystem in Indonesia

Source: Bernot (2024), Bappenas (2024), research resume

The Secretary General of the Ministry of Education, Culture, Research, and Technology has published two important regulations: (1) Ministerial Regulation No. 303/M/2022 on technical guidelines for education data covering early childhood education, basic education, secondary education, as well as courses and training. And, Ministerial Regulation No. 133/M/2023 on technical guidelines for managing education data, research data, and community service data in higher education.

In principle, following the Ministerial Regulation of Education, Culture, Research, and Technology Number 31 of 2022 on One Data for Education, Culture, Research, and Technology, as well as the Ministerial Decree Number 133/M/2023 on Technical Guidelines for Education Data, Research Data, and Community Service Data in Higher Education, the education data management system in the Ministry of Education, Culture, Research, and Technology environment consists of three clusters: (1) language data, (2) basic education data, and (3) cultural data.

Furthermore, data is also needed for internal purposes, such as policy design, policy evaluation, implementation, research, and strategic communications. On the external side, data is used in the education sector by central and regional executive bodies, legislative and

judicial institutions, educational units, research institutions, and non-governmental stakeholders.

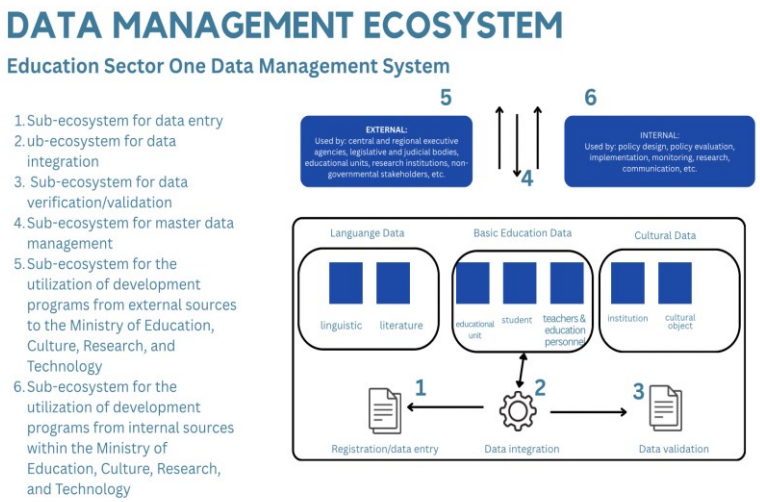

Figure 1: digital ecosystem on Indonesia One Data policy, source: Center of Data, Technology and Information, the Ministry of Education, Culture, Research & Technology (2024)

In terms of data governance, the scope of data within the Ministry of Education, Culture, Research and Technology includes the following areas, especially data on education sectors: (1) data on educational units (schools, universities, etc.), (2) data on students (learners), (3) data on educators and education staff, (4) data on educational resources, (4) data on human resources in education, (5) data on the learning process, (6) data on learning outcomes.

To enhance the quality of data management in the education sector, the Ministry of Education, Culture, Research, and Technology is also promoting the improvement of human resources in the field of education data management. This is achieved by strengthening the existing regulatory structure and encouraging education personnel to fulfil their duties as operators of the Core Education Data. In practice, education data management requires education personnel to handle administrative tasks through the core of the data education system. These education personnel are referred to as core of education data on data operators. According to existing regulations, Government Regulation No. 17 of 2010 on the Management and Implementation of Education.

A.2 Data Management Process

The Minister of Education, Culture, Research, and Technology Decree No. 133/M/2023 provides guidelines for Education Data, Research Data, and Community Service Data in Higher Education. This decree No. 133/2023 is a follow-up to Ministerial Decree No. 8 of 2022 on the Electronic-Based Government System and Ministerial Decree No. 31 of 2022 on One Data for Education, Culture, Research, and Technology. In this context, the data management process

within the Ministry of Education, Culture, Research, and Technology is clarified, which is managed by the Center of Data and Information Technology of the Ministry of Education, Culture, Research, and Technology.

The Center of Data and Information Technology of Ministry of Education, Culture, Research, and Technology was previously known as Center of Communication Technology (Pusat Teknologi Komunikasi/Pustekkom), whose authority has been expanded and strengthened to manage data and technological innovation within Ministry of Education, Culture, Research, and Technology,

The scope of Ministry of Education, Culture, Research, and Technology on data management is as illustrated in the following diagram:

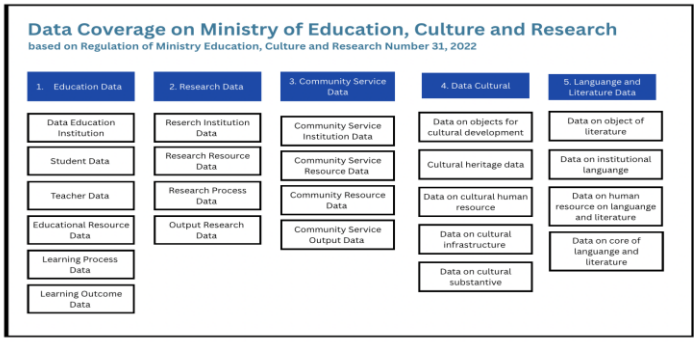

Figure 2: data structure at the Ministry of Education, Culture, Research and Technology, source: Center of Data, Technology and Information, at the Ministry of Education, Culture, Research and Technology (2024), created by researcher.

The government, through the Ministry of Education, Culture, Research, and Technology has developed a roadmap to enhance the quality and digital transformation of education in Indonesia. This roadmap focuses on three key strategies: maximizing digital infrastructure, establishing a global vision for digital transformation, and developing a national digital learning system.

Challenges in the education sector are numerous, including access, quality of the education system, competitiveness, and institutional governance. "*However, our strategic goal is to strengthen education governance*," W. Mukti (29 November 2024). Meanwhile, Head of Education Data Management at the Center of Data the Ministry of Education, Culture, Research and Technology, explained that the ministry has implemented governance arrangements based on One Data Indonesia and Electronic-Based Government System regulations. This is reflected in Ministry Decree No. 8 of 2022 on the Electronic-Based Government System and Ministrial Decree No. 31 of 2022 on One Data for Education, Culture, Research, and Technology.

One of the pillars in providing quality education access is a digital education ecosystem. Therefore, the Ministry of Education, Culture, Research, and Technology is fully committed to

optimizing the use of educational technology platforms, including akun belajar.id, the Independent Learning Platform (PMM), Education Report, SIPLah and ARKAS for school resource management, and the Independent Campus Platform for higher education.

B. Challenges in Data Management at the Ministry of Education

B.1 Sectoral Egos Between Agencies/Working Units

One significant challenge in educational data management at the Ministry of Education, Culture, Research and Technology is related to coordination and consolidation, both within the Ministry's internal units and with external stakeholders. Although efforts have been made to improve coordination and consolidation through legal frameworks, such as Ministerial regulations and technical guidelines derived from those regulations, sectoral egos remain a major barrier.

"*Sectoral ego is a characteristic issue in internal coordination at the Ministry of Education, Culture, Research and Technology, especially regarding the responsibilities of the Center of Data as the data manager. Educational data is vast, so we need to coordinate with various units within the Ministry across different directorates-general, as well as with the education offices at the provincial and district levels, and other related agencies that oversee schools and vocational universities. For instance, at the provincial and district/city levels, the challenges are very diverse, ranging from internal systems to the availability of human resources. In addition, the mindset and paradigm of the data managers and leadership in each agency also need to be aligned, so that everyone understands the importance of educational data and the context of the One National Data policy*," (I02). Furthermore, sectoral egos are part of the bureaucratic culture within the Ministry, representing both a usage barrier (UB) and a tradition barrier (TB) in the analysis based on Innovative Resistance Theory. On the other hand, the "*bureaucratic traditions that shape the work culture*" (I03, I17) also pose challenges to program implementation and reflect a psychological barrier faced by the government in implementing open government data (Meijer, 2015; Moon, 2019).

B.2 The Need for Human Resources and Data Management Talent

Human resources are critical for formulating strategic policies for data management at the government level, especially across ministries and agencies. The same issue applies to the Ministry of Education, which requires talented professionals in data management, digital technologies, and data protection to support the implementation of One Data Indonesia in the education sector.

The need for digital talent is particularly crucial to accelerate program execution, which in turn drives efforts to improve the implementation of strategic programs. Based on the data management projections set by the One Data Indonesia Secretariat, additional human resources and talent are needed to support this process. "*The need for human resources or*

digital talent is becoming increasingly crucial. At Pusdatin Kemendikbudristek, we require additional resources to prepare programs that align with the central government's directions. Moreover,with the Minister's strategic programs aimed at digital transformation in education, as well as the data management programs under One Data Indonesia, digital talent has become an urgent priority," (I01, I19), "*It is also about responsibility and the need to continuously improve human resources.*" (I07, I21)"*...at the provincial and district/city levels, the challenges faced are highly varied, ranging from internal systems to the quality of available human resources*" (I02, I13).

The need for digital talent has become a critical concern, particularly because the process for hiring employees in Indonesia's bureaucracy, especially for civil servants, can be quite lengthy. Additionally, the process for entering through the Government Employee with Work Agreement route also requires approval from the Ministry of Administrative and Bureaucratic Reform and must adhere to timelines set by the government. On the other hand, the urgent demand for digital talent is crucial to strengthen the existing team at Center of Data, Information and Technology at the Ministry of Education, Culture, Research and Technology, in order to execute the strategic programs of Minister and to implement the government's decisions regarding data management under the One Data Indonesia Secretariat. Human resources and digital talent are key aspects that contribute to both functional barriers and psychological barriers, from the perspective of Innovative Resistance Theory, in the implementation of open government data policies (Prasetyo, 2019; Yashina, 2025).

B.3 Concerns about Data Protection / Data Security

The cyberattack on the National Data Center in July 2024 also affected the management of educational data. This cyberattack disrupted services at 239 government agencies in Indonesia. The hack particularly impacted critical sectors, including immigration and education data. In the immigration sector, the attack caused the paralysis of immigration services across all international airports in Indonesia. In the education sector, 47 services under the Ministry of Education, Culture, Research, and Technology which were hosted by the National Data Center, were rendered inaccessible. Among these were key services such as scholarship applications, the Indonesia Smart Card for higher education, several platforms, and film licensing services (Kompas, 2/7/2024). The issue of data protection has become crucial for maintaining consolidated and integrated data management.

Data security has become a critical issue, particularly as part of the usage barrier (UB) and image barrier (IB) in data management. "*The situation was very complex at the time because much of the data from the ministry of Education, Culture, Research and Technology and services were inaccessible. We had to continuously coordinate with the National Data Center team and the Ministry of Communication and Information; it was an emergency. At that point, 47 services within our Ministry were unavailable. These services involved critical data related to the Basic Education Data system and scholarships, which were accessed by millions of users. Our team was on standby around the clock, trying to recover data from our internal*

servers that had backups " (I02). In addition to security concerns, infrastructure limitations also posted significant barriers to program implementation, along with the need to improve the quality of human resources. "*There are infrastructure and system limitations in managing interoperability across data sources. And this isn't just an IT issue—it's about the organization's overall readiness*." (I03)."*Digital infrastructure is still uneven. At the central level, things might be okay, but many of our colleagues in the regions still face serious challenges—whether it's with internet networks, devices, or even basic digital literacy*." (I04, I07).

With limited resources, cyberattacks have become a deeply concerning barrier. The attack on the National Data Center forced the Center of Data, Technology and Information team at the Ministry of Education, Culture, and Technology to work tirelessly to ensure that essential data could be recovered or replicated. They also had to coordinate with educational institutions at the regional level (districts and provinces), universities, and scholarship recipients to update and restore necessary data. In this context, data protection has become essential for shaping future policies and evaluations. Data protection, therefore, emerges as a crucial part of the infrastructure barrier or functional barrier, within the framework of Innovative Resistance Theory, and remains a key obstacle to improving the quality of open government data (Bertot, 2014).

B.4 Understanding Regulations and Challenges in Strengthening Resources at the Regional Level

Managing data in the education sector, which is a key part of the One Data Indonesia policy, faces challenges related to the data input process and the understanding of regulations at the regional level. The main issue is the lack of comprehensive understanding of existing regulations and their technical implications at the local level. "*Data in the education sector, including those processed through the Basic Education Data system at the regional level, is crucial. However, the data from the regions, particularly from the education offices at the district level, still face challenges due to a lack of comprehensive understanding of the regulations. This results in inconsistent data input efforts. Additionally, the quality of human resources in data management varies, which has been a persistent challenge*," (I04). On the other hand, there is also a lack of human resources to manage this, especially at the regional level. In addition, there is a lack of data literacy among stakeholders, particularly among local government officials (I01).

These challenges contribute to the incompleteness of data aggregation in Indonesia's education sector. The barriers faced at the regional level, such as limited access to infrastructure and the need to improve local human resource capacity, are key components of the functional barriers that significantly impact the implementation of open government data (Ivani, 2024).

Discussion

Innovation Resistance Theory as an Analytical Tool

Using Open Government Data to explore the implementation of the One Data Indonesia policy, the researcher employs Innovation Resistance Theory as the analytical framework (Wirtz, 2016; Ruijer, 2019; Nikiforova et al., 2024). As an analytical tool, Innovation Resistance Theory remains highly relevant today, especially for analyzing data openness in the public sphere. This relevance is further underscored as governments worldwide develop digital government initiatives, with open government data serving as a foundational element. Indonesia began building its system several years ago by launching regulations in 2019 concerning the One Data Indonesia policy, where education data forms a crucial part of the ecosystem.

In its discourse framework, Innovation Resistance Theory identifies two main factors: functional barriers and psychological barriers. Within the functional barriers, there are three sub-factors of resistance: (1) usage barrier, (2) value barrier, and (3) risk barrier. Psychological barriers include (1) tradition barrier and (2) image barrier (Nikiforova & Zuiderwijk, 2022).

Table 3. IRT Analysis Instrument for Open Government Data, One Data Indonesia Policy in the Education Sector

IRT Category	Barrier Indicator	Evaluation Aspect	Status	Improvement Strategies
Usage barrier Value	Complex access, difficult interface	Accessibility of the *One Data Indonesia* education portal	Succesful	Develop the *One Data Indonesia* education portal with public UI/UX standards; provide APIs, open formats, and complete metadata.
	No open format available	Availability of APIs & open data	Not yet optimal	Encourage data sharing across Ministries, research groups, and the public.
	Lack of documentation/metadata	Metadata and documentation	Successful	Maintain metadata standards by keeping up with data developments and technological innovations.
	Data not relevant to user needs	Suitability to user needs	Insufficients	Engage in co-creation of data with users (researchers, NGOs, media) and develop dashboards that support regional decision-making.
	Minimal Real Benefits	Utilization by local governments & the public	Limited	Encourage cross-regional policy forums at the local level to make use of data, and coordinate with Regional Planning Agencies and other relevant institutions.
Risk	Minimal tangible benefits	Utilization by local governments	Insufficient	Promote cross-local government policy forums to encourage data use and coordinate with Regional Planning Agencies and related institutions.

		and the public		
Tradition	Closed bureaucratic culture	Data sharing culture	Lacking	Conduct internal education on the added value of Open Government and incorporate OGD indicators into institutional performance metrics..
Image	Perception that data is only a technical task	Perception of public data	Fairly good	Involve leadership in campaigns like "Open Data = Quality Service," showcasing successful examples of regions utilizing OGD.
	Fear of public scrutiny	Fear of transparency	High	Promote data-driven policies emphasizing that data is a tool to improve public welfare.

Source: (Nikiforova & Zuiderwijk, 2022) & research resume (2025).

C.1 Usage Barrier

From the usage barrier perspective in the Innovation Resistance Theory analysis, several indicators are examined: complexity of access, availability of open formats, and documentation/metadata. Complex access to data for the public, the availability of data in open formats like CSV or Excel that support interoperability principles, and how metadata helps users understand and utilize the data are critical aspects. Resistance arises partly because data is viewed as internal property rather than public information. As one informant stated, "*Initially, there was resistance due to the perception that data was an asset owned by certain units, not as public assets*" (I01, I15).

Regarding the process of data presentation, which affects data usage, resistance also stems from changes in work patterns. Previously, data was for internal consumption only, and "*data openness is not merely a technical matter of uploading files to a portal; it goes deeper—it touches how daily work patterns change*" (I03, I09). Usage barriers also relate to how the workforce must continually upgrade their technical skills to comply with existing regulations and adapt to technological innovations. "*In the past, we mainly used Excel, but now we need to learn CSV, JSON formats, and more*" (I05).

Indonesia's educational data is vast, considering there are over 50 million students and hundreds of thousands of educational institutions from elementary schools to universities. This abundance allows for curation into tools that help policymakers process and analyze data, contributing to strategic policy formulation, especially at the regional level. Furthermore, data accessibility should be improved for researchers, media, and the public, as this directly supports efforts to improve education quality, mentioned before as usage barriers (Safarov, 2017; Viera, 2018). Proper platform use will minimize usage barriers, enabling innovations in digital bureaucracy and data openness to deliver real benefits.

C.2 Value Barrier

From the value barrier perspective, the focus is on how useful the data is to the public accessing it. This barrier is analyzed in terms of the relevance of data to user needs and the practical benefits it provides. Internally, data managers face a tension between the regulatory

values and procedures they uphold versus the realities on the ground, especially regarding transparency and entrenched secrecy cultures. “Conceptually, everyone agrees open data is good. But in practice, there is a gap between the values we believe in and what actually happens. For example, transparency is widely accepted as important, yet secrecy culture remains deeply rooted” (I02, I19).

This tension also manifests in concerns that opening government data might expose institutional weaknesses, which contradicts the principles of open government data. However, if the data provided is accurate, it becomes a vital part of public transparency and decision-making. As noted, “Sometimes there’s still the perception that opening data will expose weaknesses” (I03, I17). There is also apprehension that opening data could lead to misinterpretation, especially given the widespread influence of social media and the presence of ‘buzzers’ who spread hoaxes that can damage public perception. “There’s a fear that if data is opened carelessly, it could be misused. So, there is a tension between transparency and the caution we’ve traditionally maintained” (I05).

Technically, the value barrier also includes dilemmas about data integrity. Open government data should foster greater data openness that strengthens institutional integrity. “The value barrier emerges as a dilemma between data integrity and accessibility. As someone involved in data structure and validation, I know that accurate data requires strict validation processes” (I06).

When tested against the educational data transparency from the Ministry’s Data, Technology, and Information Center, key questions within the value barrier framework arise: Is the data available relevant to researchers, NGOs, and the public? And is the data used in local policy or public analysis? The reality shows that educational basic data is very rich, reflecting core societal activities, both in educating families and institutional development (Attard, 2016; Jetzek, 2019). Given this abundance, the data needs to be curated to meet broader public needs which is important as a value. Effective and proper implementation of open government data initiatives will minimize value barriers and help innovation find its relevance in public interest.

C.3 Risk Barrier

In the context of Innovation Resistance Theory, the analysis of the risk barrier is crucial as a component of the functional barriers. Within the Ministry, a significant concern centers around data security and the need to strengthen digital infrastructure. According to the One Data Indonesia policy, data storage is mandated to be centralized through the National Data Center. However, this centralized system introduces substantial risks—particularly regarding data security. This was evident when the National Data Center suffered a cyberattack in mid-2024, raising serious concerns about the ability to recover data quickly and effectively. “*We follow regulations on using the National Data Center, but when it was breached due to an attack, the recovery process was extremely difficult.*” (I01) “*What’s most concerning is data security and privacy. When we open data to the public, our attack surface becomes much larger*.” (I06)

There are also fears that data may be misused—especially if errors occur during input

or if the validation process is incomplete. "*Sometimes, when we open data, there's concern it might be misused—especially around anonymization or potential errors in the dataset*." (I03) Such risks create hesitation in publishing data widely. When mistakes or risks occur, there's uncertainty over who is held accountable—even if a staged validation process has been followed. "*Risk is the biggest issue that makes us cautious. A single mistake in releasing detailed data can cause major problems*." (I04)

This risk barrier is also rooted in concerns over the accuracy and validation of published data (Martin, 2013). Inaccuracies or outdated information raise sustainability issues and resistance to publishing data. Therefore, phased validation and clear regulatory guidelines are essential to ensure data processes remain structured and reliable. Minimizing these risks barrier is key to making open government data a vital tool for effective public service delivery and data-driven governance.

C.4 Tradition Barrier

The tradition barrier falls under psychological barriers in Innovation Resistance Theory, representing the cultural and mindset-based resistance that hinders the transition to effective open government data. In Indonesia's context, where organizational culture and work mentality are deeply rooted, these traditional elements must be considered. For example, there is concern that publishing data might reduce regional competitiveness, discouraging openness. "*There are issues of privacy, regional competitiveness, and even local politics that affect data openness*." (I02, I18, I12) Workplace culture is also a critical aspect. Deep-seated habits can become obstacles to transformation, especially when organizations are not yet accustomed to transparency. "*It is not just about systems—it is also a mental issue. The resistance is not from a lack of willingness to work, but because the work culture is not yet used to transparency*." (I04, I09, I22)

Resistance also comes from reluctance to move out of comfort zones or adopt new technologies. "*There was resistance to adopting new technologies. For example, we are used to older systems and are reluctant to migrate to cloud-based solutions or microservices architectures.*" (I06, I23). However, some stakeholders argue that bureaucratic culture is no longer a major obstacle, especially since regulations supporting One Data Indonesia and Ministry-level technical guidelines are already in place. "*This barrier is not as significant anymore because the regulations are clear. In the past, traditional bureaucracies prioritized control over information, but that is starting to change*" (I01,I17, I24).

Discussion around the tradition barrier reflects a shift from the old bureaucratic mindset, where data was seen as a controlled asset, toward a more open, digital-first government. The transformation to digital government demands a culture of openness and data sharing, aligning with today's digital era (Jetzek, 2014; Attard, 2016). Modern technology accelerates data input, processing, and validation, enabling evidence-based policymaking and promoting more data-driven governance, which ultimately helps to eliminate traditional barriers.

C.5 Image Barrier

The analysis of the image barrier centers on the concern that publishing data, especially if it contains errors, could damage the reputation of the institution, in this case, the Ministry. Another concern is that releasing educational data from various regions might expose disparities and inequalities, which could lead to negative perceptions. "*There is some concern that opening up data will end up cornering the organization, in this case the Ministry, especially if it reveals disparities*." (I01, I16,)

There is also apprehension about how data from open platforms might be interpreted or used by external parties, particularly media or advocacy groups, to criticize the Ministry's performance. " *There are some worries that media or other groups will use the data to criticize our performance. We really want to avoid that kind of blunder*." (I02) This leads to the challenge of ensuring that any data released to the public is either perfectly clean or low in sensitivity. *"Data transparency has actually become a challenge. We are afraid of being criticized if the data is not perfect*" (I04, I13). "*Some datasets, if read partially or out of context, can lead to negative perceptions. ... That is what makes us cautious when releasing data*." (I05, I19)

The fear that open data could undermine the institution's image is a key concern in the broader understanding of open government data (OGD). However, instead of being a threat, well-managed data openness should reinforce institutional integrity and improve public perception. "*The fear that our institutional image might be damaged if data is released without proper context significantly influences our openness*" (I07, I11). These concerns illustrate that the data management process must align with regulations, follow proper validation stages, and be supported by adequate infrastructure and human resources.

To mitigate risks to institutional reputation caused by data being misinterpreted or misused, it is essential to strengthen the narrative around the data by presenting it with proper context. "*Presenting data with a strong narrative*" (I01) is a key strategy to ensure that openness, in the framework of open government data, is not hindered by concerns over image. A compelling narrative, supported by clear storytelling and easy-to-understand infographics, can turn open data into an asset that strengthens the institution, empowers the public, and drives long-term improvements in public policy (Purwanto, 2020; de Souza, 2022). It also helps build public trust in open government data initiatives, ensuring that these innovations deliver tangible benefits to citizens and ultimately reduce existing image-related barriers.

Formulation for Policy Improvement

This research presents empirical evidence derived from data analysis grounded in Innovation Resistance Theory (IRT), examining key dimensions of resistance, including usage, risk, value, image, and tradition barriers. The findings inform a set of policy recommendations, namely: (1) the reinforcement of data infrastructure; (2) improved coordination among

institutions; (3) capacity building and resource strengthening; and (4) expanded policy socialization and engagement across multiple stakeholders.

D.1 Strengthening Data Infrastructure and Data Protection

The cyberattack on the National Data Center was a major blow to Indonesia's data policy. This attack had a significant impact on data management across various ministries in Indonesia. The ransomware attack, which occurred in June 2024, was identified as the Lockbit 3.0 Brain Chipper variant. As a result, data and services across 282 public institutions connected to the National Data Center were severely disrupted. Additionally, the attackers demanded a ransom of $8 million (approximately 131.6 billion IDR) (Kompas.com, 02/07/2024).

Given these challenges, the following strategic recommendations are made regarding data infrastructure. First, establish serious and strategic policies to strengthen data infrastructure and security, particularly concerning the National Data Center, which connects data management across ministries. Strengthening data security is crucial to ensure that data management, as part of the operationalization of the One Data Indonesia policy, is fully realized and protected from disruptions. Second, implement a mechanism for data backup within the ministry, specifically through the Data, Technology, and Information Center. While data backup may require additional budget allocation, it is far more cost-effective than the potential costs of responding to a cyberattack or data breach.

D.2 Improving Coordination Among Agencies

Among the critical recommendations for short- and medium-term policy changes in improving data management regulation and mechanisms in the education sector for implementing the One Education Data Policy is enhancing the quality and scope of coordination. At the national level, under the Secretariat of One Data Indonesia managed by Bappenas, the One Data Indonesia Forum already exists. However, within the Ministry of Education, Culture, Research, and Technology, which oversees data in the education sector, further internal coordination is needed. This aims to eliminate siloed approaches and egos among work units, leaders, and operators within various directorates and across agencies in the ministry. Fostering trust among groups, especially leaders and internal work unit teams who collaborate with other units, requires intensive communication. Trust between leaders and working groups, remains one of the greatest challenges in implementing the One Data Indonesia policy nationally.

D.3 Enhancing Human Resources and Recruiting Talent

To enhance the performance of education data management in implementing the One Data Indonesia policy under the Ministry of Education, Culture, and Research, a high quality of human resources is required. In terms of talent, there is indeed a shortage of personnel/s who manage data and possess technical expertise in data, as per information from an interview with Dr. Hasan Chabibie, former Head of the Data and Information Technology Center at Ministry of Education, Culture, Research and Technology (Chabibie, 2024). In addition, specialized training

is needed to encourage employees within the Ministry of Education, Culture, Research and Technology to acquire technical skills to support data management performance.

On the one hand, a strong team and digital talent are needed to drive the acceleration and digital transformation within the Ministry, particularly in managing education-related data for the implementation of the One Data Indonesia policy. However, there are limitations in budget and regulations regarding the recruitment of employees, which require coordination with several cross-ministerial institutions, including National Development Planning Agency and the State Civil Service Agency.

D.4 The Importance of Socialization and Training for Education Stakeholders at the Regional Level

The management of education sector data under the Ministry of Education, Culture, Research, and Technology is not limited to coordination within the Ministry itself. The Ministry, particularly through the Center for Data, Technology, and Information, must also coordinate with education units under provincial and district/city governments. This is due to the fact that the status of education office staff at the provincial and district/city levels falls under the jurisdiction of their respective provincial or district/city governments. Therefore, specialized coordination strategies are needed, tailored to the performance and quality of staff in each province and district/city.

The proposed recommendation framework above outlines improvements from the national level down to the school level, aiming to enhance future policies and strategic programs. The Innovative Resistance Theory (IRT) framework serves as an analytical tool to examine variables in greater detail, providing a foundation for refining future programs and policies.

Conclusion

Research on the Satu Data Indonesia (One Data Indonesia) policy in education sector, particularly within the Ministry of Education, Culture, Research, and Technology provides valuable insights into the national implementation of data policies. This study focuses specifically on the education sector, combined with an analysis of open government data using the Innovative Resistance Theory (IRT) framework. In this level, the research issues align with the broader framework established by Presidential Regulation No. 39 of 2019 on One Data Indonesia and Presidential Regulation No. 95 of 2018 on the Electronic-Based Government System. At the Ministry level, the technical implementation within Ministry of Education, Culture, Research, and Technology adheres to: Ministerial Regulation No. 8 of 2022 on the SPBE in the ministry, Ministerial Regulation No. 31 of 2022 on One Data for Education, Culture, Research, and Technology, and Ministerial Decree No. 133/M/2023 on Technical Guidelines for Data on Education, Research, and Community Service in Higher Education. These regulations

provide a comprehensive legal framework for implementing One Data Indonesia, particularly for data policy execution within the education sector.

Analyzing the implementation of open government data through the lens of Innovative Resistance Theory (IRT) highlights the fact that open data policies still require refinement across several dimensions. By examining both functional barriers and psychological barriers from the IRT perspective, the analysis reveals not only the strengths but also the weaknesses of the current policy implementation. Despite these achievements, several challenges remain: (1) threats to data centers and issues related to data security, (2) Institutional egoism among ministries and agencies, (3) limited talent and human resources to accelerate data management, and (4) coordination issues among education office staff at the provincial and district/city government levels. Although these challenges persist, the implementation of One Data Indonesia in the education sector is on track. However, continuous improvements are necessary to enhance its effectiveness in the future.

This study is limited to the analysis of open government data implementation within the education data sector, as part of the broader framework of Indonesia's One Data Policy. These limitations stem from constraints in time, resources, and research scope. Additionally, the study specifically applies the Innovative Resistance Theory (IRT) framework, which primarily focuses on identifying barriers and challenges, rather than exploring other dimensions such as business processes, sustainability, or innovation. There is significant potential for future research to adopt a cross-sectoral approach, analyzing open government data implementation in Indonesia more comprehensively across multiple domains. This could include studies in the area of government technology (GovTech) or broader policy integration.

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Aziz: *Generating ideas and conceptualization, developing the research design, writing the literature review, data analysis, data presentation, results composition, and final editing.*

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