

The strategies for scientific literacy in Indonesia

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Abstract The historical aspects, policies, institutions, awards and measurement results of scientific literacy and scientific culture development in Indonesia have currently attracted further exploration. This paper utilizes secondary data research, further analyzed by employing the Supplementary Analysis technique. The results revealed that the tradition of writing and publishing scientific journals in Indonesia has existed ever since the Dutch East Indies with the journal's publication entitled '*Natuurkundig tijdschrift voor Nederlandsch Indië*' in 1850. To date, Indonesia has owned 5,990 nationally accredited journals. Policy support has been provided at the national and regional levels, despite limitations in cultivating literacy and reading habit. From the institutional perspective, Indonesia provides a wide array of public support, including the effort of the Ministry of Education and Culture for advocating the national literacy movement and the availability of a reference database and scientific access established by the National Library; the Indonesian Institute of Sciences, and the Ministry of Research and Technology. Similarly, in the award-related perspective, the Indonesia government has granted awards to individuals or groups and local governments engaging in the cultivation of scientific literacy and scientific culture. However, among the global measurements for literacy development in Indonesia (in 2020) recorded that three indicators scored less than those in 2019.

Keywords Information literacy; scientific literacy; scientific culture; Policy; STI development; national literacy movement

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I. Introduction

This study aims to analyze the efforts made by the Indonesian government to develop a culture of scientific literacy in Indonesia and the impact based on global index measurements. This article focuses on the fourth aspect, efforts to cultivate scientific literacy and scientific culture in Indonesia, including history, policies, institutions, and awards, as well as to determine the impact of measurement results from scientific literacy and scientific culture development in Indonesia.

Literacy refers to a set of skills and practices of reading, writing, and arithmetic (English, 2013). Literacy provides a means of identification, understanding, interpretation, creation and communication engaging the text with the increasing use of digital modes enriching the information rhetoric (Wagner, 2011). Therefore, several ideas to cultivate literacy are widely voiced. An example includes the state's obligation (policy) to provide and ensure access to primary education for all children or young learners (Regmi, 2019). This attempt implements the 2030 Agenda for Sustainable Development (Sustainable Development Goals - SDGs), which aims to advance literacy through one of the strategies by developing a literacy environment, requiring a regulatory basis, further acknowledged in this study as literacy policy. Practically, in several countries, institutional and regulatory barriers have presented hindrances to scientific literacy and scientific culture development (Pickard, 2019).

On the other hand, literacy includes the dimensions of publishing literacy referring to the ability to format and publish ideas in textual and multimedia forms. Hence, publishing literacy provides a place for internal information literacy including the component of knowledge, human thought, and human communication (Koltay, 2011). Publishing literacy refers to a manifestation of reproduced scientific theory, reflected from the objective world through scientific activities, further advocated in the cultural system (Shang, 2019).

Scientific literacy has three different approaches, including: 1) the content of science (scientific knowledge), 2) the importance of the scientific process (scientific method), and 3) the conception of social structures or scientific institutions, further acknowledged as scientific culture (Durant, 1994), which particularly underlies this research. This understanding is in line with the concept presented by Han (2019), emphasizing that scientific culture becomes an integral part of a country's economic and social system because scientific culture has different characteristics depending on the economic and social development of the country (Han, 2019). Scientific culture also develops in accordance with the product and progress of science and technology. Hence, a positive attitude and acceptance of new technology development lead to understanding towards the latest technology.

Based on the description above, the formulation of this research is as follows:

RQ₁ = What is the effort/strategy the Indonesian government has made to cultivate the people's scientific literacy?

RQ₂ = What is the impact of the efforts made to cultivate people's scientific literacy (based on the measurement of the global index)?

II. Methodology

2.1 Literature Review and Framework

The application of science serves as a significant aspect of the scientific culture in society (Supramaniam et al., 2021), proven by numerous prior studies highlighting the actual existence of scientific culture in a country, which included the reading tradition of scientific writings, book or scientific journal publications (Kaestle, 1985). Previously, literacy had a long history as the first written communication was ever recorded in 3500 BC, portraying the first book in Rome around 23 BC, further developed in the Middle East and several Asian countries. The printing tradition later became more advanced and developed with the invention of the printing press in the 15th century (University of Texas, 2015). In its development, numerous scientists devoted themselves to studying the development of literacy, chronologically and methodologically generating the breakthrough in understanding the history of a nation under specific themes (Graff, 1993). Regarding the historical aspects, scientific literacy and scientific culture have been strongly influenced by national policies and leadership. Miller (1983) reported that in a democratic society, scientific literacy in the population was pivotal for science policy decisions (Miller, 1983).

Therefore, the issue of scientific literacy and scientific culture serves as an inevitable part for the study of science and technology and science policy (Laugksch, 2000). Even on June 3, 2021, the Chinese government published The National Action Plan for Scientific Literacy 2021-2035, aiming to popularize science and cultivate scientific quality in China. This policy follows the two previous regulations, including China's policy of advancing science and technology and the popularization of science. Meanwhile, the targets as stipulated by the government through this policy include: 1) Target in 2025, aiming that the proportion of Chinese citizens with scientific literacy to exceed 15%, and the uneven development of scientific literacy in various regions would significantly increase the population, and 2) Long-term goals by 2035, expecting that 25% of Chinese citizens are scientifically literate (The State Council - China's Cabinet, 2021). Interestingly, the stipulated policy targets the five priority groups to obtain scientific improvement, which includes: youth, farmers, industrial workers, the elderly, as well as civil servants, and government officials (Zhihao, 2021).

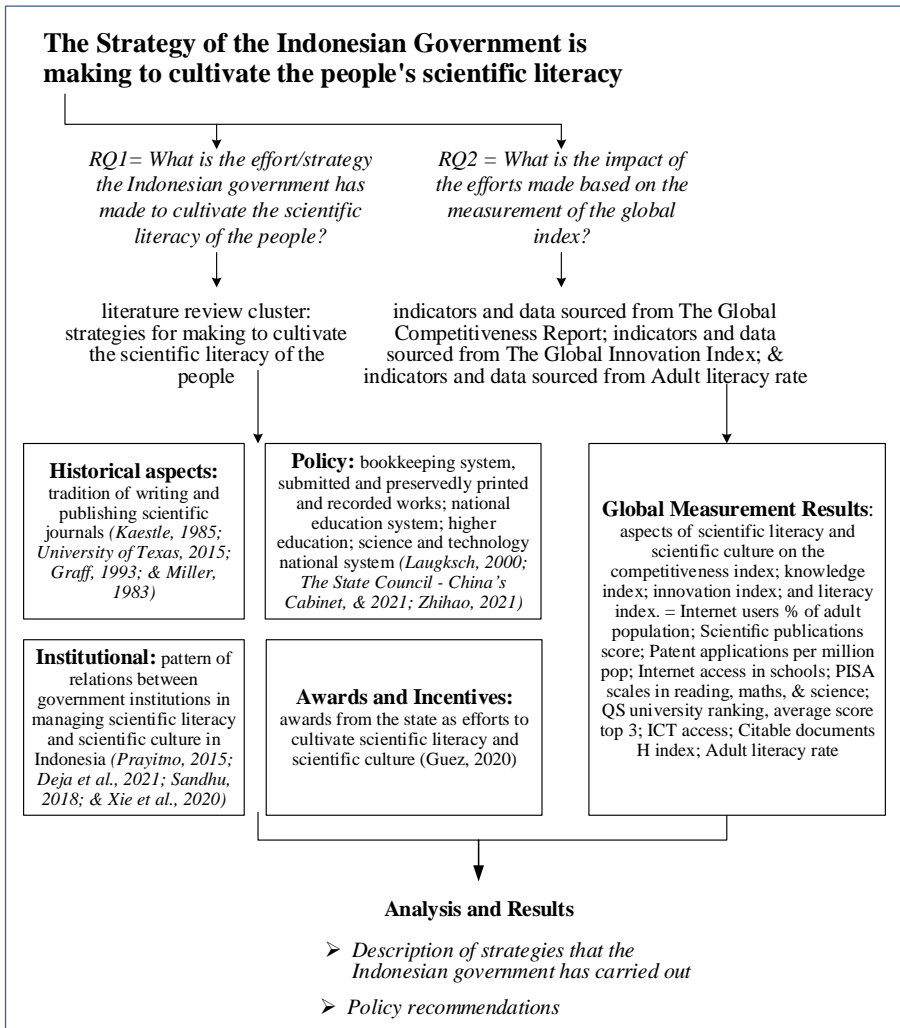


Figure 1 Study Framework

The strategy for increasing scientific literacy in China is distinctively conducted. For teenagers, the strategic plan is adjusted to the program's objectives to: navigate the approaches, harness the curiosity and imagination of teenagers, encourage the interest in science, and nurture the potential of teenagers to become future scientists. In order to achieve this goal, scientific education and science outreach are managed to be improved from elementary school to university level, especially in rural areas. Meanwhile, for farmer groups, scientific literacy campaigns are intended for knowledge enhancement

regarding environmental protection, energy and resource conservation, green production, disaster prevention, public health and changing old habits (Zhihao, 2021).

The third aspect is related to institutions that involve the two interrelated platforms of literacy and building a scientific culture such as digital libraries and institutional repositories (Prayitno, 2015). The new patterns influence both platforms in obtaining scientific information and digital access to knowledge sources such as libraries. The immense change from libraries along with the proliferation of digital libraries has been due to the fact that libraries are no longer considered service providers but have now become partners in information literacy for academics, accessible from anywhere (Deja et al., 2021). As a result, digital libraries play an essential role as an advantageous platform for digital transformation in Learning Common mode, digital education centers, digital scholarship centers, and Information Commons revolutionizing teaching and learning (Sandhu, 2018). However, digital libraries are faced with significant challenges in sustaining the quality of digital objects and metadata (Xie et al., 2020). The results of previous studies become the basis for preparing the framework of the research (Figure 1).

Other attempts such as awards and incentives play significant roles in accommodating science and technology, related to scientific literacy and scientific culture. UNESCO, since 1967 has routinely granted awards internationally to individuals or government organizations worldwide, devoting to support effective literacy practices (Guez, 2020). The two award types include: 1) UNESCO King Sejong Literacy Prize, a prize intended for government activities or government institutions and non-governmental organizations achieving effective results in sustaining literacy, especially for the development and dissemination of mother-tongue languages in developing countries, and 2) UNESCO Confucius Prize for Literacy, an award granted to recognize the efforts dedicated by outstanding institutions, organizations or individuals in order to support effective literacy practices and to promote literacy and numeracy societies.

In the end, the government efforts and steps in building scientific culture and literacy have been seen in the achievements of global measurements conducted by several international indexing institutions, such as: World Economic Forum with the Global Competitiveness Index, Cornell University, INSEAD and World Intellectual Property Organization with Global Innovation Index.

Referring to the aforementioned explanation, this study employs the four aspects to navigate the realm of scientific literacy and scientific culture in Indonesia, including: history, national policies, institutions, and rewards - incentives, as well as global measurement results (Figure 1). This concept is in line with the view that the key to developing a scientific culture is to build a network of actors as scientific culture is related to the scientific community and

political, economic, social, and educational communication, as well as other actors and stakeholders (Tang, 2019). Therefore, apart from looking at the tradition of scientific writing, it is also important to understand political support in the policy field through regulations related to improving scientific culture and the provision of incentives and institutional support.

2.2 Data Collection Strategy

This study utilizes secondary data research (Heaton, 2012; Tight, 2019), containing a collection of data from previously published sources. Furthermore, the data were analyzed by applying the Supplementary Analysis technique through reusing secondary data in order to generate a novel analysis and understanding towards the existing data (Heaton, 2012).

III. Result

The result of data collection was further analyzed and described based on four aspects, including: 1) tradition of writing and publishing scientific journals from the Dutch East Indies to the Beginning of Independence in Indonesia, 2) national policy of scientific literacy and scientific culture, 3) concerned institution or bodies managing scientific literacy and scientific culture, and 4) state recognition of efforts to promote scientific literacy and scientific culture.

The tradition of writing and publishing scientific journals from the Dutch East Indies to the Beginning of Independence in Indonesia

The emergence of culture and scientific literacy in Indonesia has been inseparable from the longstanding history of research and education, recorded since the colonial era of the Dutch East Indies, although scientific literacy and cultural activities were pioneered by European scientists arriving and researching in the Dutch East Indies region. A number of Dutch-language scientific journals had been published in Batavia at that time (Table 1), one of which was the *Treubia* scientific journal published in 1919, consistently published under the Center for Biological Research, Indonesian Institute of Sciences. This journal was initiated from a special issue of the *Museum Zoologicum Bogoriense* in 1915 entitled '*Contribution a la faune des Indes neerlandais*', containing articles from land and water fauna. It was not until 1919 that the journal '*Treubia*' was published, named after the director of the Lands Plantentuin, Dr. M Treub, advocating a strong vision of building scientific traditions in the fields of botany, agriculture, and other natural sciences in Dutch East Indies at that time. During the Japanese colonial period, this journal altered its name to *Dobutu Gakuiho* (*Treubia*). Since Indonesia's independence, this journal has returned to using the name *Treubia* to the present.

In the early days of independence, since the formation of the Indonesian Scientific Council (MIPI) in 1956, Indonesia's scientific literacy activities had been coordinated as marked by the two indicators of success in that era. The first indicator is marked by the existence of an institution that serves as a forum for managing scientific collections, which is the establishment of a Scientific Documentation Center. The Scientific Documentation Center serves as a 'clearing center,' particularly assigned with: a) providing information on scientific progress at home and abroad, and b) serving as a library, preparing bibliographies, translating scientific papers, and providing reproductions of scientific works. The second indicator is marked by the emergence of active scientific publishing in the form of scientific magazines, journals and books. The publications of scientific magazines and journals are grouped into two: a) official publications from MIPI and b) publications of research results from MIPI (Committee for Drafting the Book of 20 Years of Independent Indonesia, 1966).

Official publications of MIPI at that time were in the form of scientific magazines and journals such as 'Berita MIPI,' published quarterly to provide information on scientific activities at home and abroad and to present 'current scientific trends' in the field of science. In addition, MIPI publishes 'Medan Ilmu' containing articles in the fields of natural, social and cultural sciences. Furthermore, another publication entitled 'Indonesian Abstracts on Current Scientific Literature' contains abstracts of articles published in scientific magazines and journals in Indonesia. If the three scientific magazines are regularly published, MIPI has another publication for exchanging information, which contains monographs of research results in certain fields (Committee for Drafting the Book of 20 Years of Independent Indonesia, 1966). From its development to the present, Indonesia has had 5,990 accredited scholarly journals, dominated by the field of education (Putera et al., 2021).

Table 1 Networked readiness index, 2016, Emerging Asia

Year	Organization Name	Journal Title	Language
1850	Koninklijke Natuurkundige Vereeniging in Nederlandsch Indië; Natuurkundige Vereeniging in Nederlandsch Indië.	Natuurkundig tijdschrift voor Nederlandsch Indië (stop publishing in 1922)	Dutch
1852	Vereeniging tot Bevordering der Genees-Kundige Wetenschappen in Ned.-Indië	Geneeskundig tijdschrift voor Nederlandsch-Indië (stop publishing in 1942)	Dutch
1876	's Lands Plantentuin te Buitenzorg	Annales du Jardin botanique de Buitenzorg (stop publishing in 1923)	Dutch
1884	's Lands Plantentuin te Buitenzorg	Mededeelingen uit 's Lands Plantentuin (stop publishing in 1904)	Dutch
1897	's Lands Plantentuin te Buitenzorg	Icones Bogorienses, part of 'Jardin botanique de Buitenzorg' (stop publishing in 1914)	Dutch
1898	's Lands Plantentuin te Buitenzorg	Bulletin de l'Institut botanique de Buitenzorg (stop publishing in 1908)	Dutch
1905	Dutch East Indies. Departement van Landbouw	Mededeelingen uitgaande van het Departement van Landbouw (stop publishing in 1914)	Dutch
1906	Imprimerie du Departement	Bulletin du département de l'agriculture aux indes néerlandaises (stop publishing in 1911)	Dutch
1911	Imprimerie de L'Institut	Bulletin du Jardin botanique de Buitenzorg (stop publishing in 1923)	Dutch
1919	's Lands Plantentuin te Buitenzorg; Koninklijke Plantentuin Van Indonesia; Kebun Raya Indonesia.	Treubia	Dutch; English
1949	Organisatie voor Natuurwetenschappelijk	Bulletin Organisatie voor Natuurwetenschappelijk Onderzoek	Dutch
1950	Organization for Scientific Research in Indonesia	O.S.R. News	English
1950	Herbarium Bogoriense, Kebun Raya Indonesia	Reinwardtia	English
1952	Organisation for Scientific Research in Indonesia	Journal for Scientific Research	English
1955	Laboratorium Treub, Kebun Raya Indonesia	Annales Bogorienses	English
1956	Majelis Ilmu Pengetahuan Indonesia (MIPI)	Berita MIPI	Indonesia & English
1958	Majelis Ilmu Pengetahuan Indonesia (MIPI)	Indonesian Abstracts on Current Scientific Literature	English
1959	Majelis Ilmu Pengetahuan Indonesia (MIPI)	Medan Ilmu Pengetahuan (stop publishing in 1963)	Indonesia

Source: processed by the author (Committee for Drafting the Book of 20 Years of Independent Indonesia, 1966; Messer, 1994; Plantentuin. et al., 1919)

Policies of Scientific Literacy and Scientific Culture in Indonesia

The Indonesia government has stipulated a number of policy instruments to foster scientific literacy and scientific culture from laws to local government regulations (Table 2).

Table 2 Policies of Scientific Literacy and Scientific Culture in Indonesia

Policy	Level	Issue
Law of the Republic of Indonesia number 43 of 2007 concerning the libraries	Constitution	Development and utilization of the library as a source of information in the form of written works, printed works, and/or recorded works, and cultivating a love of reading
Law of the Republic of Indonesia number 3 of 2017 concerning the book system	Constitution	Books containing science, information, and entertainment (article 7), people with disabilities have the right to get the convenience of reading books according to their needs (article 9), and people in frontier, outermost, underdeveloped areas, remote indigenous communities, and those experiencing disasters have the right to receive book access service (article 10)
Law of the Republic of Indonesia number 13 of 2018 concerning the submission of printed and recorded works	Constitution	Submission of printed works: each publisher is required to submit 2 (two) copies of each title of printed work to the national library and 1 (one) copy to the provincial library where the publisher is domiciled. Submission of recorded works: each producer of recorded works who are recorded must submit 1 recording of each title of the national library of work and 1 (one) provincial library where the record is domiciled
Law of the Republic of Indonesia number 11 of 2019 concerning the national system of science and technology	Constitution	Submission and keeping of primary data and outputs of research, development, assessment, and application results
Government Regulation of the Republic of Indonesia number 51 of 2021 concerning the implementation of law number 13 of 2018 concerning the submission for printed and recorded works	Government regulations	Submission of printed and recorded works, management of the results of the handover of printed and recorded works, community participation, awarding, and procedures for imposing administrative sanctions.

Government Regulation number 24 of 2014 concerning the implementation of law number 43 of 2007 concerning libraries	Government regulations	Efforts to cultivate reading culture, conducted by the government, local governments, and the community. Communities who successfully carry out the movement to cultivate a love of reading are given awards by the government and local governments
Regulation of the Head of the Indonesian Institute of Sciences number 12 of 2016 concerning the repository and depository of the Indonesian Institute of Sciences	Head of Institution Regulation	Storage and access to scientific papers and primary data from research and/or development, surveys, or systematic thinking within the Indonesian Institute of Sciences
Regulation of the Minister of Education and Culture number 23 of 2015 concerning the growth of character	Ministerial regulation	Habituation of positive attitudes and behavior in schools starting from the first day of school, orientation for new students for junior high school, high school and vocational high school, until school graduation
Regulation of the Head of the National Library of the Republic of Indonesia number 15 of 2014 concerning the award for the cultivating passion for reading movement	Head of Institution Regulation	Award name, form, and conditions; and procedures for awarding,
Gorontalo Governor Regulation number 22 of 2018 concerning determination of regional literacy month	Governor Regulation	Literacy movement is conducted through families, education units and the community, which includes the movement to cultivate a love of reading in the community, and awards for people who have succeeded in carrying out the movement to cultivate a love of reading.
Magetan District Regulation number 62 of 2020 concerning the Magetan regency literacy movement	District Regulation	Efforts to cultivate the literacy movement, facilities and infrastructure, literacy movement institutions, implementation strategies, and financing
Tulang Bawang District Regulation number 43 of 2020 concerning the regional literacy movement of Tulang Bawang regency kabupaten	District Regulation	Regional literacy movement consisting of school literacy, family literacy, and community literacy
Pohuwato District Regulation number 3 of 2020 concerning implementation of literacy culture	District Regulation	Literacy culture is conducted in accordance with the literacy dimensions, such as <i>al-quran</i> literacy, literacy literacy, scientific literacy, counting literacy, information and communication technology literacy, financial literacy,

		cultural literacy and citizenship, and other literacy.
Boalemo Disctrict Regulation number 75 of 2020 concerning the literacy movement of Boalemo regency	District Regulation	Implementation of the literacy movement in developing social inclusion-based libraries and cultivating a love of reading. The literacy dimension consists of early literacy, basic literacy, library literacy, media literacy, technological literacy and visual literacy
West Lampung Disctrict Regulation number 24 of 2019 concerning road petans for literacy district	District Regulation	Movement to synergize all potentials and expand public involvement in growing, developing, and civilizing literacy in the regions
Bima Disctrict Regulation number 35 of 2019 concerning Amendments to Bima Regent's Regulation number 11 of 2019 concerning the Bima regency literacy movement	District Regulation	Early literacy, basic literacy, numeracy literacy, library literacy, cultural literacy and citizenship, financial literacy, and media literacy
Demak Disctrict Regulation number 17 of 2018 concerning the regional action plan for the Demak regency literacy movement 2018-2019.	District Regulation	Indicators for the regional action plan for the literacy movement are measured by reading culture innovations, promotions and publications, training, competitions, reading ambassadors and public involvement.
Probolinggo Disctrict Regulation number 62 of 2018 concerning the Probolinggo regency literacy movement	District Regulation	Implementation of literacy through the development and cultivation of early literacy, basic literacy, library literacy, media literacy, technology literacy, and visual literacy. Outputs for improving reading and writing skills, at least understanding vocabulary and punctuation, understanding reading content, summarizing reading content and retelling, creating written works with reading inspiration that have been read with development according to the experience, knowledge or imagination of students
Cirebon Disctrict Regulation number 53 of 2018 concerning the integrated regional literacy movement	District Regulation	Literacy dimension consisting of literacy, numeracy, science, information and communication technology, finance, and culture and citizenship
Jombang Disctrict Regulation number 16 of 2017 concerning the Jombang regency literacy movement	District Regulation	Literacy components consisting of early literacy, basic literacy, library literacy, technological literacy, media literacy, and visual literacy

Institutional Culture of Literacy and Scientific

Indonesia has libraries both at the national and provincial levels, serving as a vehicle for education, research, preservation, information and recreation to accommodate the intelligence and empowerment of the nation. On the other hand, the library aims to provide services to its users, increase the love of reading, as well as broaden the horizons and knowledge to educate the nation's life (Law of the Republic of Indonesia Number 43 of 2007). Therefore, the national library is a non-ministerial government institution that conducts the government duties as a building library, reference library, deposit library, research library, preservation library, and library network center, and is domiciled in the national capital.

Awards and Incentives

Awards are granted by the National Library and Provincial Library to appreciate efforts for scientific literacy and scientific culture development in Indonesia to: a) Printed Publishers and Recorded Producers who conduct their obligations in accordance with the provisions of laws and regulations, b) Communities who participate in supporting the obligation to submission, and c) Citizens of foreign countries that conduct the obligations in accordance with the provisions of laws and regulations.

IV. Discussion: Effort to encourage literacy and international measures

Strategies for scientific literacy in Indonesia have indeed been started since the era before Indonesia's independence. It is characterized by a culture of scientific writing and publishing scientific journals (see table 1). Even based on data in 2013, Indonesia had 5,900 scientific journals, and in 2019 it increased to 14,000 (Putera et al., 2021). Even so, in the pre-independence period, the culture of writing and publishing scientific journals was still limited, and they became the educated people of the colonial government. After independence, the tradition of writing and publishing scientific journals has grown, and since 2005 things have increased, not only publishing in domestic journals. However, the tradition of writing in international journals is increasing. This condition can be seen from the trend of international publications from Indonesia, which is increasing significantly with an average of 10-40% every year. Even in 2020, Indonesia recorded 50,868 international publications (Putera et al., 2022). This significant increase is also inseparable from policy support in Indonesia's higher education and research sector, namely the regulation of the Ministry of Research,

Technology and Higher Education Number 44 of 2015, and further updated through the Regulation of the Ministry of Education and Culture Number 3 of 2020. In addition, there is also an obligation to publish research results for researchers in Indonesia based on the Ministry of State Apparatus Empowerment and Bureaucratic Reform Regulation Number 34 of 2018.

Based on table 2, there are 20 regulations governing scientific literacy and scientific culture development in Indonesia. Most of these regulations are in the form of District Regulations (50%) and Constitution (20%) (Figure 2). This condition indicates that local governments in Indonesia support programs at the central government level. On the other hand, efforts to cultivate the people's scientific literacy have been supported by four regulations in the form of the Constitution. Policy support in the form of a constitution indicates that the Indonesian government pays great attention to efforts to grow scientific literacy.

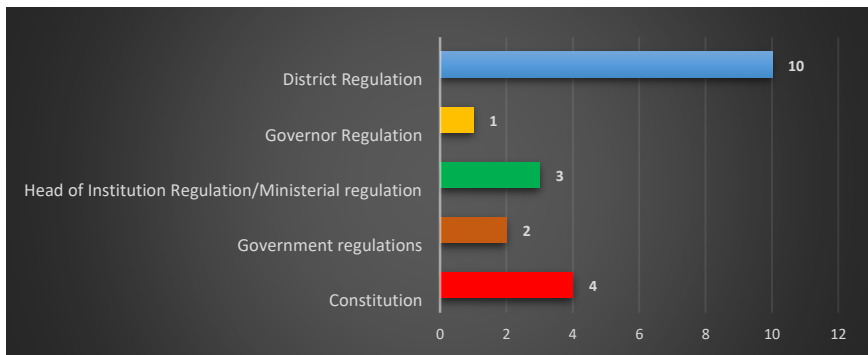


Figure 2 Distribution of regulations for scientific literacy in Indonesia

On the other hand, public institutions such as National libraries with all their facilities are essential in cultivating people's scientific literacy. The national library additionally develops a number of services such as: 1) online digital library (e-Resources), serving as a vehicle for accessing journals, e-books and other online reference works (National Library of the Republic of Indonesia, 2020); 2) iPusnas, which is a digital library application (e-Pustaka) equipped with an e-Reader to read e-books and social media features, collecting thousands of e-books, borrowed and read online and offline through various operating systems and computer devices such as smartphones, tablets, and desktops/laptops (National Library of the Republic of Indonesia, 2016); and 3) Indonesia OneSearch (IOS), as a one-stop search service for all public collections from libraries, museums, archives, and electronic sources in Indonesia. There are currently 9,711,236 unique entries and 13,903,815 duplicate entries in Indonesia OneSearch, collected by automatic harvesting

method from partner organizations' repositories from various sectors (Library of the Republic of Indonesia, 2021).

In addition, Indonesia also has a National Scientific Repository (RIN) under the management of the Scientific Documentation and Data Center of the Indonesian Institute of Sciences. RIN is functioned to store, preserve, cite, analyze and share research data. In addition, RIN acts as an online media for managing, storing and sharing research data. Through RIN, researchers, data writers, publishers, data distributors and affiliated institutions receive academic credit and web visibility. Researchers, Agencies, and Funders thus have a full authority right to control over research data, as RIN currently has 4,017 datasets, 14,525 files, and 95,042 downloads since 2020 (National Scientific Repository - Indonesian Institute of Sciences, 2021).

Additionally, Indonesia through the Ministry of Research and Technology or National Research and Innovation Agency also has a Sinta (Science and Technology Index), providing a database for access to quotes and expertise in Indonesia, established in 2016. Another platform such as Garuda also provides a digital referral system containing 1,411,258 Articles, from 2,298 Publishers, with 12,275 Journals and 160 Conferences (Ministry of Research and Technology/National Agency for Research and Innovation, 2018).

Giving awards is also one aspect that supports the civilizing of scientific literacy in the community. There are two basic indicators for the award consideration, which are: the level of compliance in fulfilling obligations and the quality of producing Printed and Recorded Works (Government Regulation of the Republic of Indonesia Number 51 of 2021). In addition, as an implementation of the provisions of Article 74, Article 75, and Article 76 of Government Regulation Number 24 of 2014 concerning the Implementation of Law Number 43 of 2007 regarding Libraries, a Regulation of the Head of the National Library of the Republic of Indonesia was stipulated concerning the Award of the Cultivating Passion for Reading Movement as an appreciation or gift to the community, whether individuals, groups, and/or institutions that have succeeded in encouraging the reading interest and reading habits in the community through library utilization (Regulation of the Head of the National Library of the Republic of Indonesia Number 15 of 2014), commemorated at the national level as *Nugra Jasa Dharma Pustaloka* in the category of reading fondness culture.

In addition, the Indonesian government has provided awards (Prajnyaparamita and Prajnyautama) for enhancing scientific culture, especially for citizens who contribute to science development through Presidential Regulation Number 27 of 1960 concerning: a. provision of Scientific Prizes, which included scientific appreciation for new discoveries or improvements from old discoveries, either by personal or by other people's discoveries; b. progress and development of science; c. benefits for the progress and prosperity of the Indonesian nation in

particular, and for mankind in general. Additionally, a number of other scientific awards are granted such as the Habibie Prize, presented to individuals who are active and highly meritorious in the discovery, development and dissemination of various new (innovative) Science and Technology activities that are significantly useful (significantly) for improving prosperity, justice and peace. The Habibie Prize is an award previously acknowledged as the Habibie Award, organized by the Human Resources Foundation in Science and Technology since 1999, and in 2020 it became the Habibie Prize, which was held together with the Ministry of Research and Technology/National Research and Innovation Agency. This award has been presented to 71 scientists, as a form of appreciation to figures who have contributed to the intellectual life and extraordinary work that was donated to the nation. The recipients of this award are the best people from various science and technology disciplines, as well as those who have dedicated their lives to prosperity, justice and peace.

Global Measurement Results

In Table 3, nine indicators are used to measure the impact of the efforts/strategies of the Indonesian government to cultivate the people's scientific literacy, including: Internet users of the adult population, scientific publications score, Patent applications per million pop, Internet access in schools, Programme for International Student Assessment (PISA) scales in reading, maths and science, QS University ranking, average score of top 3, ICT access, City documents H index, and Adult literacy rate. All indicators and measurement results are obtained from The Global Competitiveness Report, The Global Innovation Index and data of worldbank.

Table 3 Achievement of Scientific Literacy and Scientific Culture Development in Indonesia in 2016-2020 Period

Indicator	2016		2017		2018		2019		2020		Trend
	score	rank	score	rank	score	rank	score	rank	score	rank	
Internet users % of adult population ¹	22,0	107	25,4	109	25,5	110	39,8	104	25,5	110	↑ ↑ ↑ ↑ ↓
Scientific publications score ¹	NA	NA	NA	NA	77,2	58	78,2	56	77,2	58	- - ↑ ↑ ↓
Patent applications per million pop ¹	0,1	99	0,1	97	1,5	99	1,3	101	1,5	99	↑ ○ ↑ ↓ ↑
Internet access in schools ¹	4,9	43	4,8	45	NA	NA	NA	NA	NA	NA	↑ ↓ - - -
PISA scales in reading, maths, & science ²	384,4	59	395,5	63	395,5	63	395,5	63	381,9	72	↑ ↑ ○ ○ ↓
QS university ranking, average score top 3 ²	32,3	41	29,8	38	34,9	37	31,3	36	33,4	34	↑ ↓ ↑ ↓ ↑
ICT access ²	46,0	84	47,1	88	48,5	87	51,4	85	53,7	85	↑ ↑ ↑ ↑ ↑
Citable documents H index ²	14,00	56	11,8	55	12,0	56	12,7	55	14,0	56	↑ ↓ ↑ ↑ ↑
Adult literacy rate ³	NA	NA	NA	NA	93,2	NA	94,4	NA	94,4	NA	- - ↑ ↑ ○

Information:

¹= indicators and data sourced from The Global Competitiveness Report 2016, 2017, 2018, 2019, & 2020

²= indicators and data sourced from The Global Innovation Index 2016, 2017, 2018, 2019, & 2020

³= indicators and data sourced from Adult literacy rate

↑ = up ↓ = down ○ = fixed - = no data available (NA)

V. Conclusion

The Indonesian government has carried out four strategies to cultivate the people's scientific literacy, namely 1) The tradition of writing and publishing scientific journals from Dutch East Indies to the Beginning of Independence. In Indonesia, the scientific practice started in the Dutch East Indies (1850); the present evidence is from the existence of 5,990 accredited scholarly journals. This depiction has become the capital of scientific literacy in Indonesia. 2) Indonesia's Government has stipulated several policy instruments to foster scientific literacy. This depiction has become the capital of scientific literacy in Indonesia. To develop a scientific culture, policy support significantly contributes at the national and regional levels. 3) The policy supports include developing and utilizing libraries as a source of information, teaching a love of reading implemented by the government, local governments, and the community, and providing storage and access to scientific works and primary data from research and development. 4) awarding literacy activities.

Meanwhile, the impact of the Indonesian government's efforts/strategy to cultivate the people's scientific literacy can be seen from nine indicators. Several indicators of literacy development in Indonesia have not exhibited significant results, especially in indicators of internet users in the adult population, scientific publication scores, and PISA scale in reading, mathematics, and science.

Policy Recommendations: Indonesian government, through the Ministry of Education, Culture, Research and Technology, the National Research and Innovation Agency, National Libraries, and Regional Libraries throughout Indonesia, is required to develop a national strategy to foster scientific literacy and scientific culture.

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