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INDICATORS 2023

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Daerah Khusus Ibukota Jakarta 10340
Whatsapp: 0811-8612-369
e-mail: penerbit@brin.go.id
website: penerbit.brin.go.id
Penerbit BRIN
@penerbit_brin
@penerbit.brin

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OPENING SPEECH
CHAIRMAN OF THE NATIONAL RESEARCH AND INNOVATION AGENCY

As-salamu 'alaikum wa rahmatullahi wa barakatuh,

Praise be to Allah Swt., for His mercy and grace, the *Indonesia Science, Technology, Research, and Innovation Indicator 2023* book can be published. This book is one of the flagship reports issued by BRIN. In the future, this book will be published periodically to provide a comprehensive overview of the achievements and developments of national science and technology, research, and innovation.

This book provides basic data on various science, technology, research, and innovation indicators, including data on research expenditure, science and technology human resources, research performance, and total factor productivity. National research expenditure, which is an aggregate of research expenditure from the government, business, and higher education sectors, is currently around 0,1 percent of GDP in 2022. However, the business sector's research expenditure shows an increasing value and share.

The strength of national science and technology human resources is quite large in terms of numbers, reaching more than 340.000 researchers (in 2022). On the other hand, this number of researchers is still relatively small compared to our large population. Furthermore, research performance can be measured by data on publications, patents, and technology-based trade. In addition, this book presents indicators of science and technology, research, and innovation performance in the form of total factor productivity (TFP).

I hope that the *Indonesia Science and Technology, Research, and Innovation Indicators 2023* book can be utilized as widely as possible by all stakeholders, such as ministries/institutions, local governments, business people, academics, international institutions, and others as a reference in policy formulation, planning, and research as needed.

Finally, I would like to thank all those who have contributed to the preparation of the *Indonesia Science, Technology, Research, and Innovation Indicators 2023* book.

Wassalamu'alaikum warahmatullahi wabarakatuh.

Jakarta, September 2023
Chairman of the National Research and Innovation Agency

Laksana Tri Handoko

FOREWORD

Science, technology, and innovation play a central role in advancing a country. Therefore, the Deputy for Research and Innovation Policy, National Research and Innovation Agency (BRIN), published *Indonesia's Science, Technology, Research, and Innovation Indicators 2023* book. This book reveals Indonesia's science, technology, research, innovation data for 2022.

With gratitude to God, we are able to complete the publication of the *Indonesia's Science, Technology, Research, and Innovation Indicators 2023* book. The preparation of science, technology, research, and innovation indicators refers to the Frascati Manual (2015). The challenge in preparing this book lays in the process of continuous data collection, especially in business sector research data. Starting in 2023, BRIN developed the SeBaRis application, a registration system for research institutions. With SeBaRis, the sustainability of business sector research data can be established, and registered research institutions can access BRIN's research and innovation facilitation.

Furthermore, we will continue to improve the quality of science, technology, research, and innovation data. Contribution from various parties is needed. We thank all those who have provided support.

Jakarta, September 2023
Deputy for Research and Innovation Policy, BRIN

Boediastoeti Ontowirjo

ABBREVIATION LIST

APBN	: State Budget
BI	: Bank Indonesia
BKN	: State Civil Service Agency
BKPM	: Investment Coordinating Board
BPS	: Central Bureau of Statistics
BRICS	: Brazil, Russia, India, China, South Africa
BRIN	: National Research and Innovation Agency
Ditlitabmas	: Directorate of Research and Community Service
DJKI	: Directorate General of Intellectual Property
GERD	: Gross Expenditure on R&D
HKI	: Intellectual Property Rights
IPTEK	: Science and Technology
ISIC	: International Standard Industrial Classification
Kemdikbudristek	: Ministry of Education, Culture, Research, and Technology
Kemendagri	: Ministry of Home Affairs
LPDP	: Education Fund Management Institution
PDB	: Gross Domestic Product
PDSP	: Education Data and Statistics Center
PMA	: Foreign Investment
PMDN	: Domestic Investment
PTN	: State University
R&D	: Research and Development
UNIDO	: United Nations Industrial Development Organization
WDI	: World Development Indicators

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CHAPTER 1 RESEARCH EXPENDITURE

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A. GROSS DOMESTIC EXPENDITURE ON R&D

Gross Domestic Expenditure on R&D (GERD) is an aggregate of research expenditure from the government, higher education, and business sectors, amounting to IDR 17,7 trillion. Table 1.1 shows the distribution and percentage of GERD in these three sectors. The government sector still dominates the research expenditure, accounting for 66 percent of GERD.

Table 1.1 Distribution and Percentage of GERD by Sector in 2022

No	Sector	Research Expenditure (IDR)	Percent (%)
1	Government (BRIN, local Government, and LPDP) [1)]	11.743.096.134.752	66
2	Higher Education[2)]	3.029.724.677.000	17
3	Business [3)]	2.963.369.254.279	17
	Total	**17.736.190.066.031**	100

Sources:
1) BRIN (2022), Ministry of Home Affairs (2022), and LPDP Report (2022)
2) Ministry of Education, Culture, Research, and Technology (2022)
3) Processed from BRIN's Research Institution Registration System (SeBaRis) (2022), and Survey of Medium and Medium Industries, BPS (2022)

In terms of GDP, the total GERD is around 0,1 percent in 2022. Table 1.2 shows that the largest proportion of GERD to GDP ratio in 2022 comes from the government sector at 0,06 percent, followed by the university and business sectors, at 0,02 percent each.

Table 1.2 Ratio of GERD to GDP in 2022

Percentage of Research Expenditure	Percent (%)
Nasional	0,1
Government	0,06
Higher Education	0,02
Business	0,02

Source: processed data

B. GOVERNMENT EXPENDITURE ON R&D

Government expenditure on R&D includes personnel, capital, goods, and services expenditure incurred by central government, local governments, and the endowment fund management institution (LPDP). Since central government research expenditure has been consolidated by BRIN, central government research expenditure is BRIN's expenditure. Government expenditure on R&D and its percentage of GDP are shown in Table 1.3.

Table 1.3 Government Expenditure on R&D and its Percentage of GDP in 2022

Sector	Research Expenditure (Rp)
BRIN[1)]	10.513.489.517.466
Local Government[2)]	982.365.233.377
LPDP[3)]	247.241.383.909
Total	11.743.096.134.752
GDP[4)]	19.588.400.000.000.000
Percentage of government expenditure on R&D to GDP	**0,06%**

Source:
1. "Mengupas Anggaran Riset dan Inovasi 2022", February 24, 2023 in BRIN's Media Lounge Discussion
2. Ministry of Home Affairs (2022)
3. LPDP Financial Statements as of December 31, 2022
4. BPS (2022)

Total government expenditure on R&D is around IDR 11,74 trillion, or 0,06 percent of GDP. Since the issuance of Presidential Regulation No. 78 of 2021 on the National Research and Innovation Agency, which integrates all R&D activities into BRIN, BRIN's expenditure accounts for 90 percent of total government expenditure on R&D (Figure 1.1).

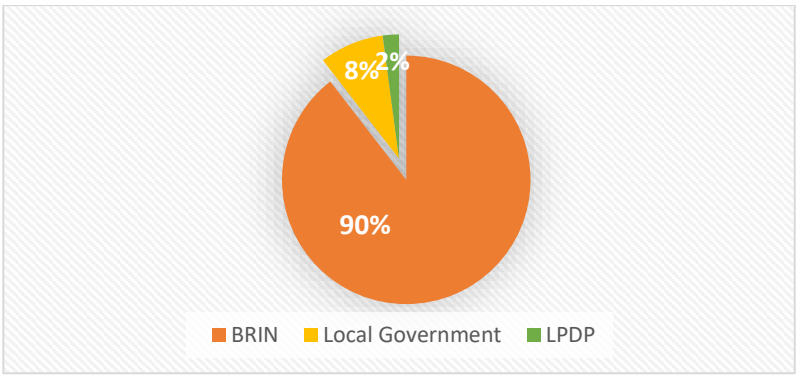
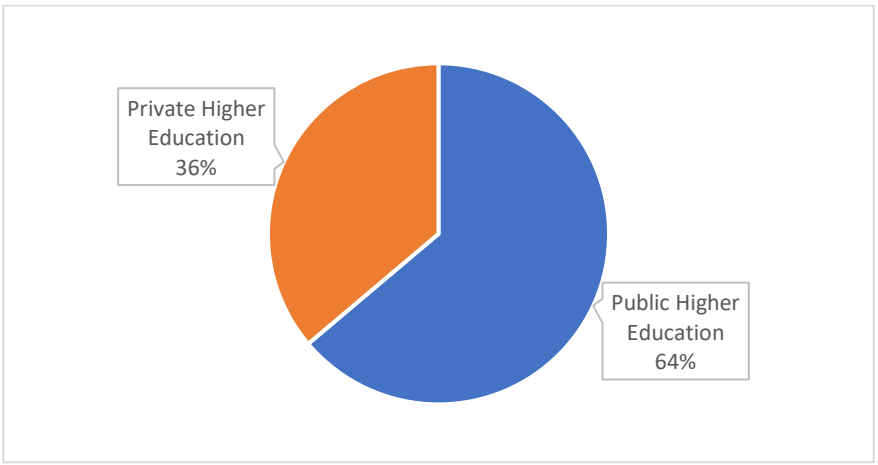


Figure 1.1 Distribution of Government Sector Research Expenditure by 2022

C. Higher Education Expenditure on R&D

Research expenditure in the higher education sector includes personnel expenditure and research activities. In 2022, total higher education research expenditure will be around IDR 3,03 trillion, or 0,02 percent of GDP. The expenditure is spread across public universities at 65 percent and private universities at 35 percent (Figure 1.2).



Source: Ministry of Education, Culture, Research, and Technology (2022)

Figure 1.2 Distribution of Higher Education Sector Expenditure on R&D by Type of Higher Education in 2022

D. BUSINESS EXPENDITURE ON R&D

Business sector research expenditure is the budget spent on research activities in the business sector. Data on business expenditure on R&D is obtained from three sources, namely BRIN's Research Institution Registration System (SeBaRis) in 2023, which contains data on business sector research expenditure in 2022; financial statements of listed companies in 2022; and the Large and Medium Industry Survey.

Business sector research expenditure and its percentage of GDP can be seen in Table 1.4. Total business sector research expenditure in 2022 reached IDR 2,96 trillion, or 0.02 percent of GDP.

Table 1.4 Business Expenditure on R&D ant its Percentage of GDP in 2022

Description	2022
Business Expenditure on R&D (IDR)[1)]	2.963.369.254.279
GDP (IDR) [2)]	19.588.500.000.000.000
Percentage of business expenditure on R&D	**0,02%**

Source:
1) Processed from the Database of Research Institution Registration System (SeBaRis), 2023; Indonesia Stock Exchange (BEI), 2023; and the Large and Medium Industry Survey, BPS, 2022
2) BPS (2022)

CHAPTER 2
SCIENCE AND TECHNOLOGY HUMAN RESOURCES

(RESEARCHER)

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A. NATIONAL RESEARCHER

Researchers consist of researchers, engineers, lecturers, and other science and technology human resources. Researchers conduct research activities, such as conceptualizing or creating new knowledge, planning the management of scientific and technical aspects of research activities, and making scientific publications of the results of research activities. National researchers consist of government researchers (BRIN), universities, and manufacturing industries. The data is from BRIN, Kemdikbudristek, and BPS (Table 2.1).

Table 2.1 National Researchers (Head Count) in 2022

Sector	Jumlah
Government sector researcher (BRIN) [1)]	9.734
Higher education sector researchers [2)]	326.554
Manufacturing industry sector researcher[3)]	6.251
National Researcher [4)]	342.539
Total Population of Labor Force [5)]	143.722.644
Total Population [5)]	275.773.800
Ratio of researchers per 1 million labor force	2.383,33
Ratio of researchers per 1 million population	1.242,10

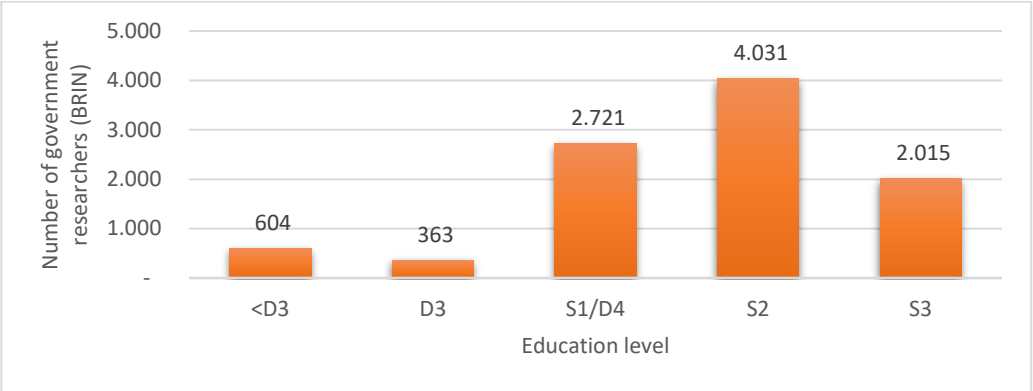
Source:
1) Processed by the team from BIRN's BOSDM data as of December 2022
2) Higher Education Statistics 2022 by the Ministry of Education, Culture, Research, and Technology
3) Large and Medium Industry Survey in 2022 by BPS and BRIN's Research Institution Registration System (SeBaRis) in 2023
4) Sum of points 1,2, and 3
5) Statistics Indonesia 2022, BPS

The total number of national researchers is 342.539. University researchers occupy the largest portion, which is 95,33 percent of the total national researchers. The proportion of government researchers and manufacturing industry researchers are 2,84 percent and 1,82 percent of the total national researchers, respectively.

B. GOVERNMENT SECTOR RESEARCHERS

Since the issuance of Presidential Regulation No.78 of 2021 concerning the National Research and Innovation Agency, all research activities and researchers spread across various ministries and institutions have been integrated into BRIN. In 2022, the number of BRIN researchers is 9.734 people. Based on education

level, the majority of researchers have a master's degree (S2), totaling 4.031 people, followed by bachelor degree (S1/D4), doctoral degree (S3), diploma degree (D3), and under diploma degree (<D3) (Figure 2.1).

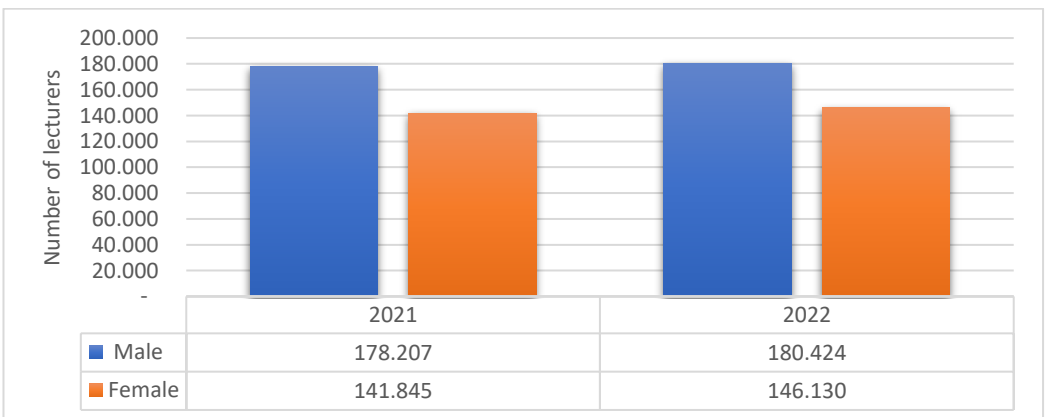


Source: BOSDM BRIN, December 2022

Figure 2.1 Government Researcher (BRIN) 2022

C. HIGHER EDUCATION SECTOR RESEARCHERS

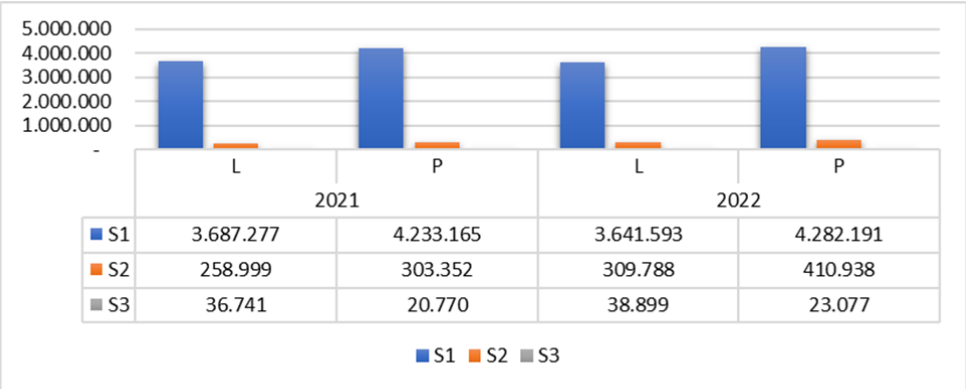
The number of lecturers in all national regions continues to increase every year. In 2018, there were 308.545 lecturers; in 2019, it increased to 308.607 lecturers; then in 2020, it reached 312.890 lecturers; in 2021, it reached 320.052 lecturers; and in 2022, it reached 326.554 lecturers. In this context, male lecturers still dominate the number of lecturers nationally when compared to the number of female lecturers (Figure 2.2).



Source: Statistic from Ministry of Education, Culture, Research, and Technology, 2021–2022

Figure 2.2 Higher Education Researcher in 2021–2022

The total number of students enrolled at the undergraduate (S1), postgraduate (S2), and doctoral levels (S3) in 2021 was 8.540.304 people. Meanwhile, in 2022, the number increased to 8.706.486 people, an increase of 1,95 percent (Figure 2.3).



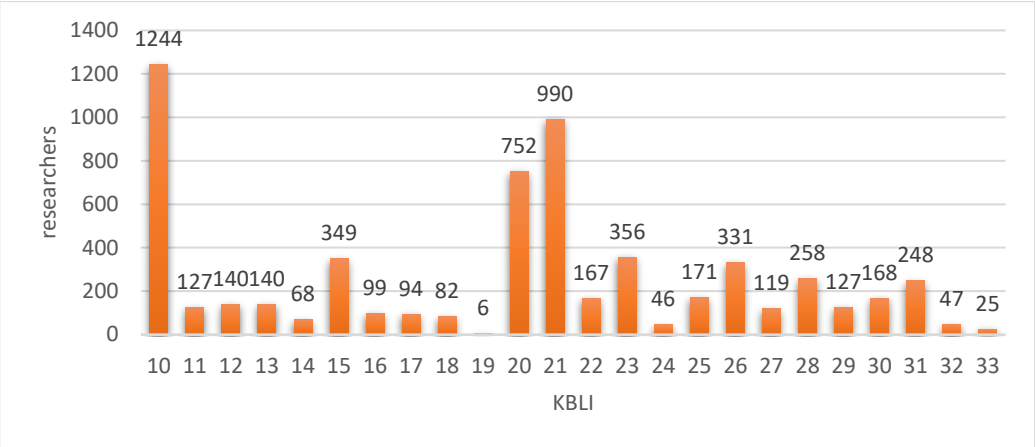
Source: Ministry of Education, Culture, Research, and Technology, 2021–2022

Figure 2.3 Registered Student of S1–S3 Level in 2021–2022

D. BUSINESS SECTOR RESEARCHER

Business sector researchers are represented by manufacturing industry researchers. The data below is based on data from the Directorate of Industrial Statistics, Large and Medium Industry Survey, BPS (2021), and BRIN's Research Institution Registration System (SeBaRis) (2023).

Figure 2.4 shows the distribution of the number of researchers in the manufacturing industry in 2022. Of the 6.251 researchers in the manufacturing industry sector, almost half (46,3%) are concentrated in the food industry sector (KBLI 10), pharmaceutical industry, chemical medicinal products, and traditional medicine (KBLI 21), and chemicals and goods from the chemicals industry (KBLI 20).



Source: Large and Medium Industry Survey (2022), BPS; Research Institution Registration System (SeBaRis) BRIN (2023)

Figure 2.4 Manufacturing Industry Researchers in 2022

CHAPTER 3 RESEARCH PERFORMANCE

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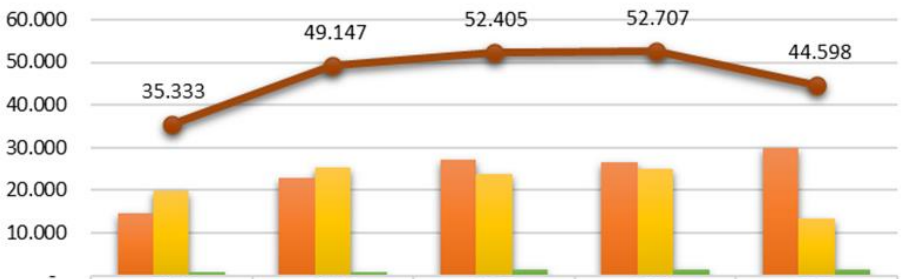
A. PUBLICATION

One of the research performance indicators is measured through the number of international scientific publications, both in the form of journals, proceedings, and other international publications. Data on international scientific publications was sourced from Scopus data (2023) for the last five years, as shown in Figure 3.1. In 2022, the number of Indonesia's international scientific publications decreased, compared to the previous year, but experienced a significant increase in the number of international journal publications.



	2018	2019	2020	2021	2022
JOURNAL	14.757	22.831	27.303	26.456	29.868
PROSIDING	19.854	25.394	23.665	24.918	13.275
OTHER	722	922	1.437	1.333	1.455
AMOUNT	35.333	49.147	52.405	52.707	44.598

Source: Scopus (2023)

Figure 3.1 Number of International Publication in Indonesia 2018–2022

The top five international scientific publication-producing institutions are four state universities and the National Research and Innovation Agency (BRIN). By research field, the international scientific publications mostly are in the fields of environmental science, computer science, and engineering, as shown in Table 3.1.

Table 3.1 Institutions and Fields of Study in Indonesia in International Publication in 2022

5 Institutions with the Largest Number of International Publications by 2022

No.	Institution/Affiliation	Number of Publication
1	University of Indonesia	3.243
2	Gadjah Mada University	3.036
3	Airlangga University	2.753
4	BRIN	2.535
5	Bandung Institute of Technology	2.147

5 Fields of Study in Indonesia's International Publications in 2022

No.	Field	Number of Publication
1	Environmental Science	8.625
2	Computer Science	8.123
3	Engineering	7.950
4	Social Science	7.168
5	Medicine	6.887

Source: Scopus (2023)

The number of international publications per 100 science and technology human resources in Indonesia is 13,02. This number shows that every 100 researchers in Indonesia will produce around 13 international publications throughout 2022. This figure has a difference of 8,67 with South Korea and 21,29 with China.

Table 3.2 Number of International Publications per 100 Science and Technology Human Resources in 2022

Description	Number
Science and Technology Human Resources	342.539
International Scientific Publications	44.598
International Publication per 100 Human Resources Science and Technology	13,02

Source: Processed based on data from Scopus, 2023

Indonesia is the highest in ASEAN in terms of the number of international publications that have been cited in the 2018–2022 period. However, when viewed from the average citations per international publication during the same period, which is 2,73 citations per publication, Indonesia still needs serious efforts to catch up with other ASEAN countries (Table 3.3).

Table 3.3 Comparison of Indonesia's Average Citation per International Publication in 2018–2022 Period to South Korea, China, and other ASEAN Countries

Country	Number of Publications	Number of Publication Citations	Average Citations per Publication	Cited Document
Indonesia	234.190	640.212	2,73	34.485
China	4.005.672	32.244.132	8,05	594.292
South Korea	483.206	4.029.250	8,34	83.826
Malaysia	201.863	1.346.571	6,67	33.032
Singapore	129.508	1.821.633	14,07	21.131
Thailand	116.112	678.633	5,84	18.185
Vietnam	77.376	664.046	8,58	8.372
Philippines	31.152	192.397	6,18	3.651
Brunei Darussalam	4.247	46.204	10,88	536
Myanmar	3.985	31.449	7,89	553
Cambodia	3.091	21.782	7,05	460
Laos	1.722	14.071	8,17	288

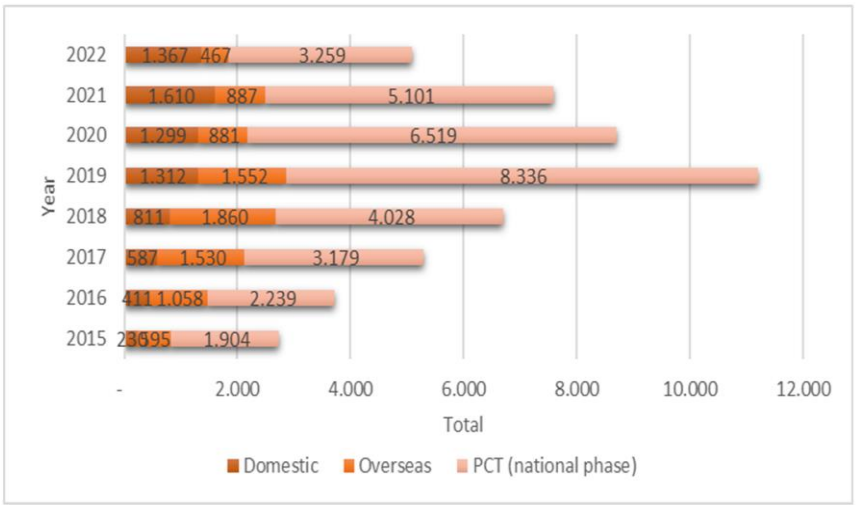
Source: Scimagojr (2023)

B. PATENT

A patent is an inventor's exclusive right to an invention in the field of technology that demonstrates the novelty of the invention. Some references use data on the number of patents as an indicator of a country's research and innovation capabilities (WIPO, 2004).

Domestic applicant patents are patents registered from applicants domiciled in Indonesia. Meanwhile, applicants domiciled abroad can apply directly to the DJKI (classified as "foreign applicants") or through the Patent Cooperation Treaty (PCT) scheme. The PCT scheme is a patent application to one of the patent offices in a PCT member country so that it is automatically registered in member countries, one of which is Indonesia.

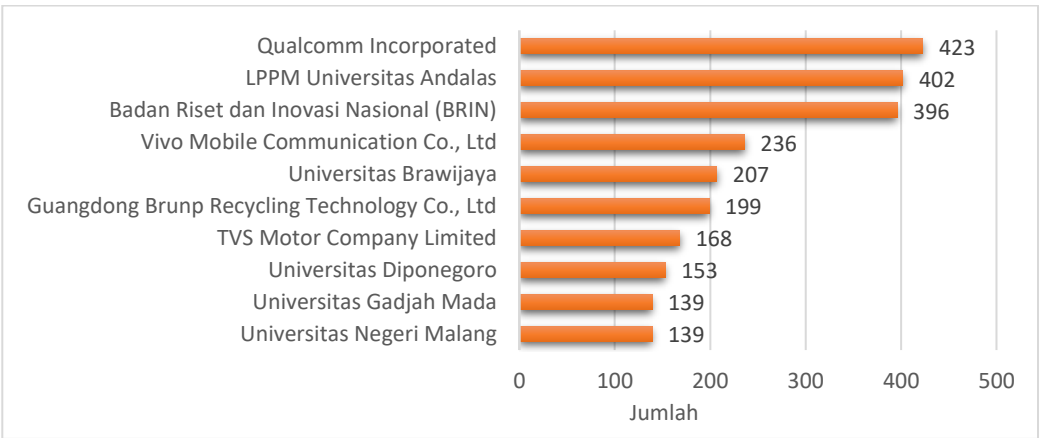
In 2015–2022, the number of domestic applicant patents (granted) increased. Compared to 2020 as the initial year of implementation of the National Medium-Term Development Plan 2020–2024, the number granted in 2022 increased by 5,2% (Figure 3.2).



Source: DJKI (2023)

Figure 3.2 Number of Patents Granted in Indonesia, 2015–2022

The top three patent applicant institutions in 2022 are Qualcomm Inc. (a technology company, particularly in the semiconductor, telecommunications, and software industries), LPPM Andalas University, and the National Research and Innovation Agency (BRIN) (Figure 3.3).



Source: DJKI (2023)

Figure 3.3 Top Ten Patent Applicant Institutions in Indonesia in 2022

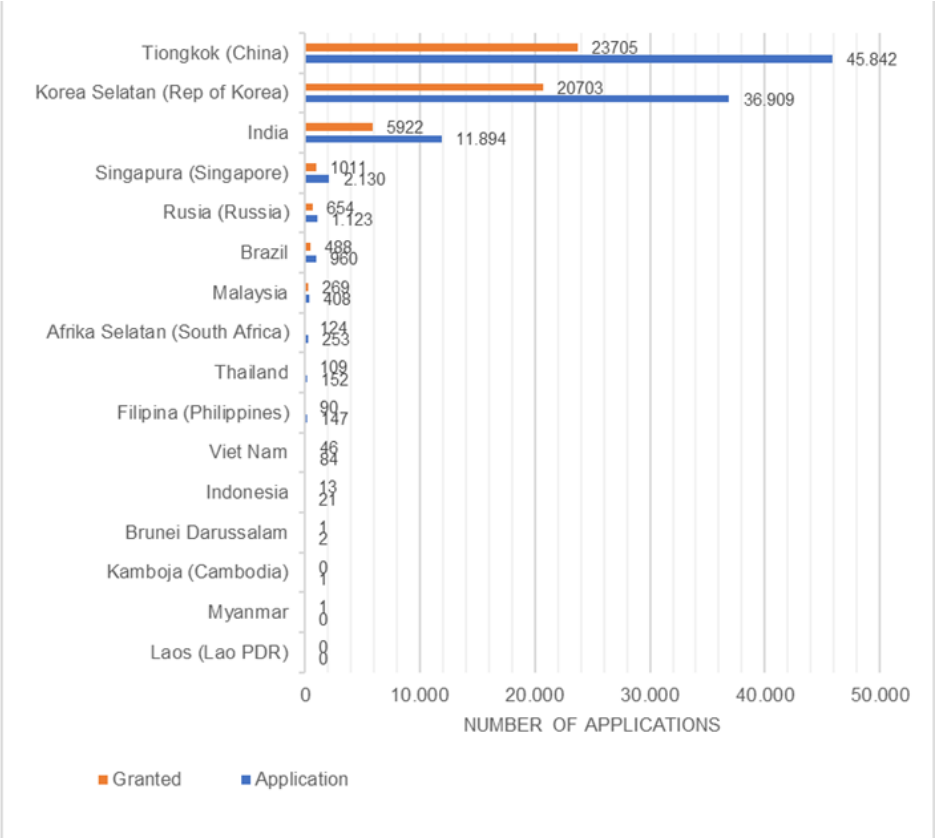
The ratio of the number of domestic patents per 100 human resources science and technology is 0,4. This number indicates that every 1000 researchers was able to produce 4 patents in 2022 (Table 3.4).

Table 3.4 Patent Ratio per 100 S&T Human Resources in 2022

Number of patents granted domestically	1.367
Number of Human Resources Science and Technology (people)	342.539
Ratio of patents granted per 100 S&T Human Resources	0,4

Sources: DJKI (2023)

Furthermore, Indonesia's research performance on an international scale can be seen in patents registered at the United States Patent and Trademark Office (USPTO). The USPTO is the largest patent office that is often used as a reference for the level of patent applications of countries in the world. (Schwab, 2018). In Figure 3.4 below, we can see Indonesia's position compared to the BRICS (Brazil, Russia, India, China, and South Africa), South Korea, and ASEAN countries. In 2021, Indonesian inventors submitted 21 patent applications to the USPTO. Of these proposals, 13 patents were granted (Figure 3.4).



Source: WIPO (2023)

Figure 3.4 Number of Patent Applications at the USPTO in 2021

C. INTERNATIONAL TRADE IN TECHNOLOGY INDUSTRIES

Medium-to-high-tech exports are often used as an indicator to measure the extent to which knowledge and technology diffuse in a country's production system (Global Innovation Index, WIPO, 2022). On the other hand, high-tech imports reflect a country's capacity to absorb knowledge and technology.

Indonesia's high and medium-high-tech exports in 2022 saw a significant increase, growing by more than 10% compared to 2021. Indonesia's import values show that medium-high tech industries dominate the flow of goods into Indonesia with positive growth (see Table 3.5).

Table 3.5 Export and Import Value of Manufacturing Industry by Technology Intensity

Classification	Exports (US $ million)		Imports (US $ million)	
	2021	2022	2021	2022
High Tech	8.771,15	9.892,57	25.450,19	25.729,72
Low Tech	85.036,45	93.539,78	29.081,22	33.766,49
Medium-high-technology	39.503,43	46.870,02	66.990,69	80.391,10
Medium-low-technology	43.692,64	55.839,96	33.760,58	64.070,18
TOTAL	**177.003,66**	**206.142,33**	**155.282,68**	**203.957,49**

Source: BPS (2023)

Trade balance data indicates that the value of the trade balance of industries with low technology intensity tends to increase. Meanwhile, the trade balance of industries with high and medium-high technology intensity has actually decreased and tends to experience a deficit (see Table 3.6).

Table 3.6 Manufacturing Industry Trade Balance by Technology Intensity

Classification	Trade Ballance (US$)	
	2021	2022
High Tech	-16.679.044.532	-15.837.155.422
Low Tech	55.955.228.389	59.773.289.394
Medium-high-technology	-27.487.260.566	-33.521.080.431
Medium-low-technology	9.932.061.618	-8.230.217.245

Source BPS (2023)

CHAPTER 4
TOTAL FACTOR PRODUCTIVITY

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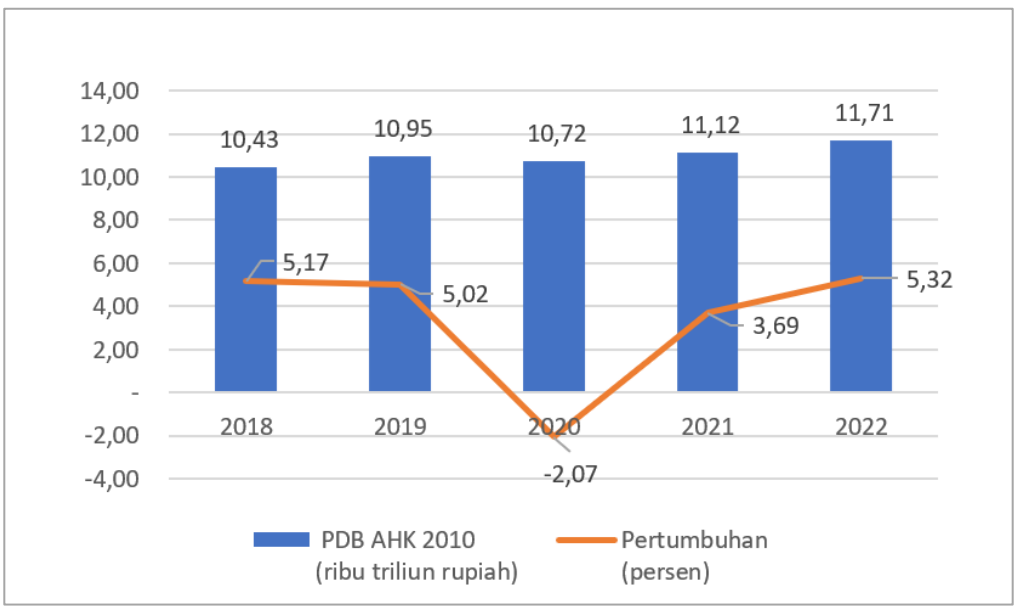
A. INDONESIA'S ECONOMY

The Indonesian economy in 2022 reflects a state of recovery from the crisis caused by the Covid-19 pandemic. Figure 4.1 shows that economic growth in 2022 has equaled–even slightly exceeded–the economic growth in 2018 and 2019 (pre-pandemic). In 2020, economic growth was negative but started to be positive again in 2021.



Source: processed from BPS data (2023)

Figure 4.1 Indonesia's GDP and Growth 2018–2022

B. DISTRIBUTION AND GROWTH OF PDB

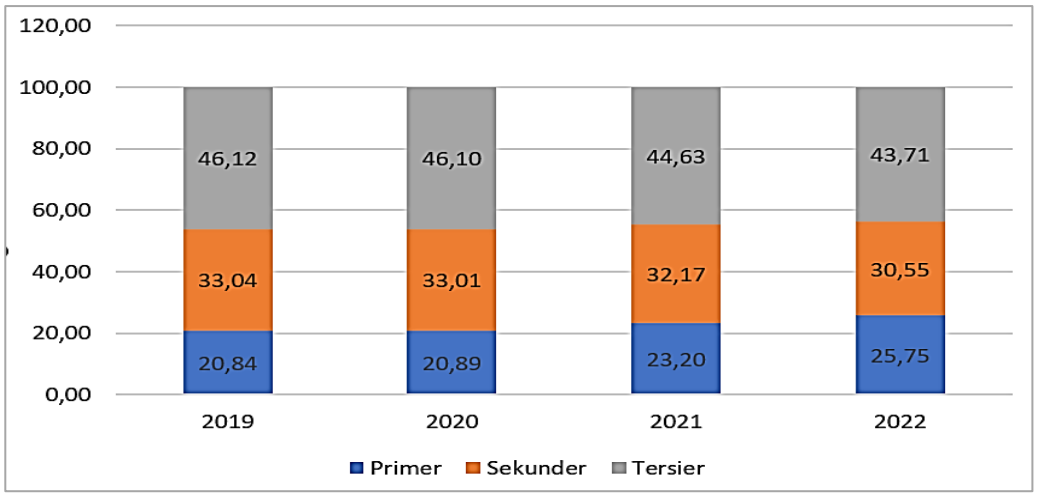
The distribution of GDP provides insight into the structure of the economy. The Covid-19 pandemic has slightly changed Indonesia's economic structure. The portrait of 2022 shows that several sectors that are closely related to science and technology have decreased in contribution. The first is the education service sector which is a science development activity. Second and third are the manufacturing industry sector and the construction sector as a vehicle for technology application. The only technology-intensive sector whose contribution has increased compared to the pre-pandemic period is the information and communication sector (Table 4.1)

Table 4.1 Distribution of GDP by Business Field 2019–2022 (Percent)

Business Field	2019	2020	2021	2022
A. Agriculture, Forestry, and Fisheries	12,7	13,7	13,3	12,4
B. Mining and Quarrying	7,26	6,43	8,97	12,2
C. Manufacturing	19,7	19,9	19,2	18,3
D. Electricity and Gas Procurement	1,17	1,16	1,12	1,04
E. Water Procurement, Waste Management, and Recycling	0,07	0,07	0,07	0,06
F. Construction	10,8	10,7	10,4	9,77
G. Wholesale and Retail Trade; Repair of Cars and Motorcycles	13	12,9	13	12,9
H. Transportation and Warehousing	5,57	4,47	4,24	5,02
I. Provision of Accommodation and Meals	2,78	2,55	2,43	2,41
J. Information and Communication	3,96	4,51	4,41	4,15
K. Financial Services and Insurance	4,24	4,51	4,34	4,13
L. Property (Real Estate)	2,77	2,94	2,76	2,49
M., N. Corporate Services	1,92	1,91	1,77	1,74
O. Government Administration, Defense, and Compulsory Social Security	3,62	3,79	3,46	3,09
P. Education Services	3,3	3,57	3,28	2,89
Q. Health Services and Social Activities	1,1	1,3	1,34	1,21
R., S., T., U. Other services	1,95	1,96	1,84	1,81
GROSS VALUE ADDED AT BASIC PRICES	95,9	96,4	96	95,6
TAX LESS SUBSIDIES ON PRODUCTS	4,11	3,65	4,05	4,38
GROSS DOMESTIC PRODUCT	100	100	100	100

Source: BPS (2023)

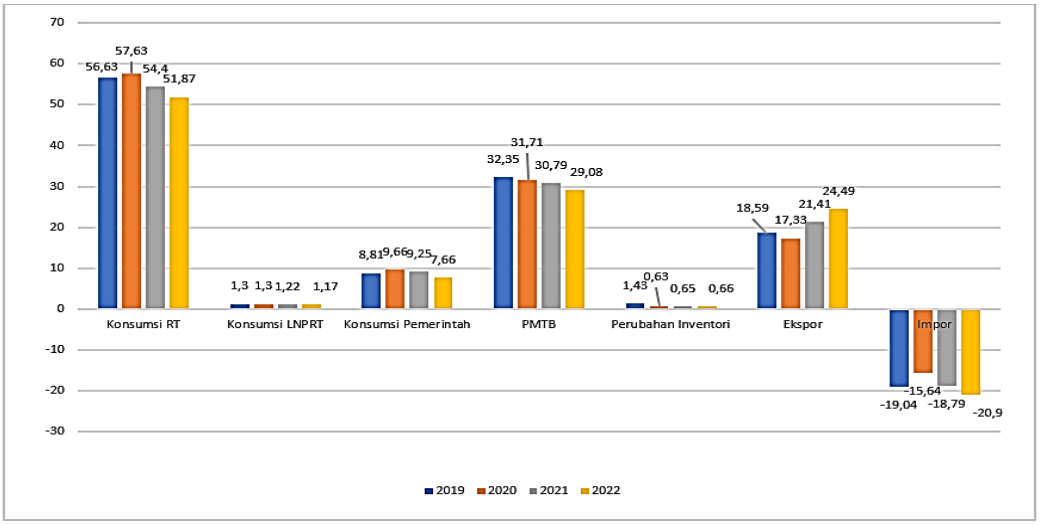
Business fields in GDP can be categorized into three main sectors: primary, secondary, and tertiary. After the Covid-19 pandemic, the structure of the Indonesian economy has shifted, where the role of the secondary and tertiary sectors in gross value added has decreased. On the contrary, the role of the primary sector has increased (Figure 4.2).



Source: processed from BPS data (2023)

Figure 4.2 Distribution of Gross Value Added by Primary, Secondary, and Tertiary Sectors in 2019–2022 (Percent)

In terms of usage, the distribution of GDP has also changed from 2019–2022. The public, the government, and the business world are still economizing. Figure 4.3 shows that household consumption, government consumption, and gross fixed capital formation (PMTB), which reflects the amount of investment in the business sector, have decreased their contribution to GDP. Meanwhile, the contribution of foreign trade (exports and imports) has increased, which based on Table 3.6 is sourced from trade in low-tech products.

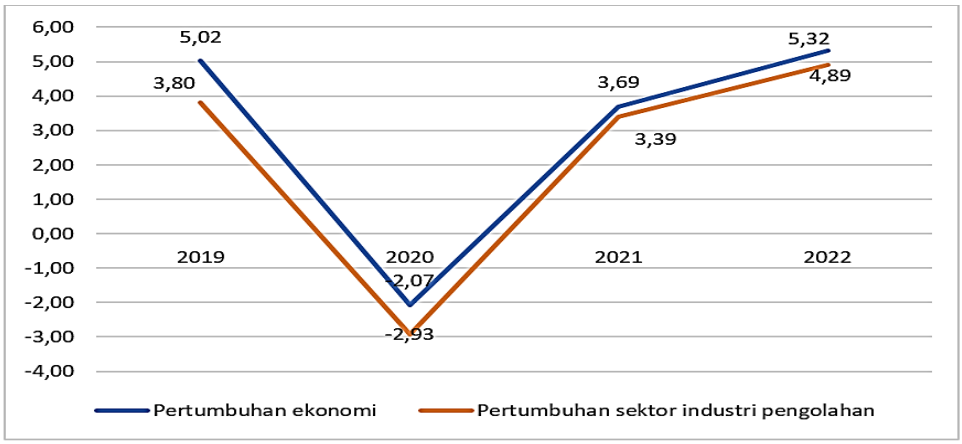


Source: processed from BPS data (2023)

Figure 4.3 Distribution of Gross Value Added by Use 2019–2022 (Percent)

C. INDONESIA'S INDUSTRIAL AND ECONOMIC GROWTH

Until 2022, the manufacturing sector has not been able to drive economic growth. During 2019–2022, the growth of the manufacturing sector was always below national economic growth (Figure 4.4).



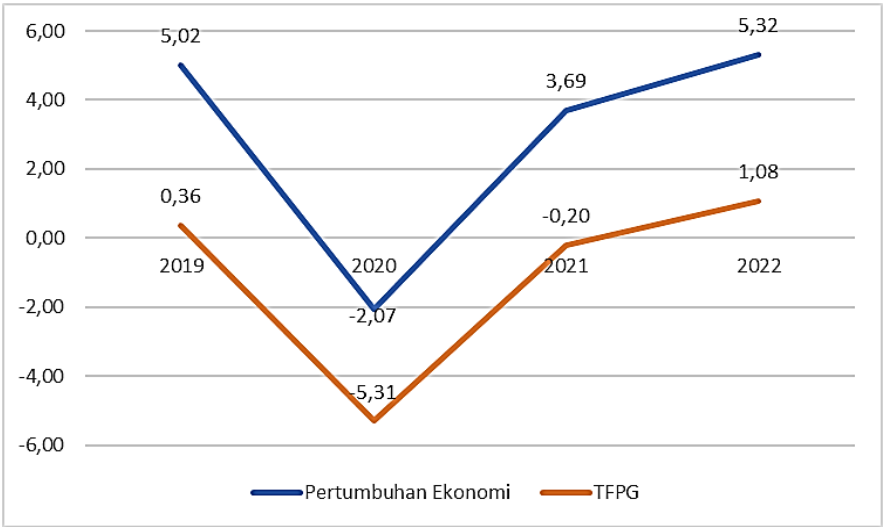
Source: processed from BPS data (2023)

Figure 4.4 Economic and Industry Growth 2019–2022 (Percent)

D. TOTAL FACTOR PRODUCTIVITY

Total Factor Productivity, or some call it Multi-Factor Productivity or Total Factor Productivity Growth, is the part of aggregate output growth that comes from sources other than growth in labor and capital inputs. This part of growth is attributed to the contribution of advances in production technology.

Indonesia's Total Factor Productivity Growth (TFPG) has improved after the end of the pandemic. In 2022, the TFPG value was 1,08%. This value is higher than the pre-pandemic value in 2019, which was 0,36%. The improvement in TFPG value is also followed by an improvement in economic growth (Figure 4.5). In 2022, the national economy grew by 5,32%, of which 20,3% of this growth was supported by technological advancement factors.



Source: processed from BPS data (2023)

Figure 4.5 TFPG and Indonesia's Economic Growth 2019–2022 (Percent)

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APPENDIX

CODE DEFINITION

Based on NACE Rev. 2 3-digit level

High-technology:

- Manufacture of basic pharmaceutical products and pharmaceutical preparations (21);
- Manufacture of computer, electronic and optical products (26);
- Manufacture of air and spacecraft and related machinery (30.3)

Medium-high-technology:

- Manufacture of chemicals and chemical products (20);
- Manufacture of weapons and ammunition (25.4);
- Manufacture of electrical equipment (27);
- Manufacture of machinery and equipment n.e.c. (28);
- Manufacture of motor vehicles, trailers and semi-trailers (29);
- Manufacture of other transport equipment (30), excluding
- Building of ships and boats (30.1) and excluding
- Manufacture of air and spacecraft and related machinery (30.3);
- Manufacture of medical and dental instruments and supplies (32.5)

Medium-low-technology:

- Reproduction of recorded media (18.2);
- Manufacture of coke and refined petroleum products (19);
- Manufacture of rubber and plastic products (22);
- Manufacture of other non-metallic mineral products (23);
- Manufacture of basic metals (24);
- Manufacture of fabricated metal products, except machinery and equipment (25)
- excluding Manufacture of weapons and ammunition (25.4);
- Building of ships and boats (30.1);
- Repair and installation of machinery and equipment (33)

Low-technology

- Manufacture of food products (10);
- Manufacture of beverages (11);
- Manufacture of tobacco products (12);
- Manufacture of textiles (13);
- Manufacture of wearing apparel (14);
- Manufacture of leather and related products (15);
- Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials (16);

- Manufacture of paper and paper products (17);
- Printing and reproduction of recorded media (18) excluding Reproduction of recorded media (18.2);
- Manufacture of furniture (31);
- Other manufacturing (32) excluding
- Manufacture of medical and dental instruments and supplies (32.5)

This book is one of the flagship reports published periodically by BRIN. This book reveals the strength of science, technology, research, and innovation in Indonesia by presenting data and achievements of science, technology, research, and innovation in 2022. Various indicators of national science, technology, research, and innovation are presented systematically in this book, including data on research expenditure, human resources in science and technology, research performance, and total factor productivity. This book can be utilized by all stakeholders of development, such as ministries/agencies, local governments, business actors, academics, and international institutions, both as a reference in policy formulation and planning, and as a material for analysis in research and study.

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Kota Jakarta Pusat 10340
E-mail: penerbit@brin.go.id
Website: penerbit.brin.go.id

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