Infrastructure for Inclusive Economic Development Volume 1: Lessons Learnt from Indonesia

Edited by

Sri Mulyani Indrawati
Titik Anas
Candra Fajri Ananda
Fauziah Zen

ERIA
Economic Research Institute for ASEAN and East Asia

MINISTRY OF FINANCE
REPUBLIC OF INDONESIA

Infrastructure for Inclusive Economic Development Volume 1:
Lessons Learnt from Indonesia

Economic Research Institute for ASEAN and East Asia (ERIA)
Sentral Senayan II 6th Floor
Jalan Asia Afrika No. 8, Gelora Bung Karno
Senayan, Jakarta Pusat 10270
Indonesia

Ministry of Finance, Indonesia
Gedung Djuanda I, Jl. Dr. Wahidin Raya No. 1, Jakarta Pusat, DKI Jakarta 10710

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Ministry of Public Works and Public Housing

Komodo Airport, East Nusa Tenggara
Indonesia Infrastructure Guarantee Fund

THE PRESIDENT
OF THE REPUBLIC OF INDONESIA

Foreword

The President of the Republic of Indonesia

Achieving Inclusive Development in Indonesia

Indonesia is a unique archipelagic country comprising of 17,024 islands based on the Indonesia's Geospatial Information Agency (BIG) release. Currently, 58 percent of Indonesia's GDP is concentrated on the island of Java, one of the largest islands in Indonesia, home for 56 percent of Indonesia's population, or about 149 million people. I aspire that the development in Indonesia must be Indonesia-centric, rather than Java-centric. With its vast archipelago of over 17 thousand islands, it is necessary to have equality and an even distribution of development to achieve economic justice for Indonesians. As a large country, Indonesia must take bold steps and have ambitious agendas to realize the noble objective of Indonesia's constitution, prosperous Indonesians, not only prosperity of certain Indonesians but all Indonesians. Without bold transformation, it will be challenging for the country to become an advanced and prosperous country.

Infrastructure development, including basic facilities such as water treatment and dams and connectivity infrastructures such as seaports, airports and highways, as well as energy facilities such as power plants and infrastructure to support industrial development such as industrial and special economic zones, stands as a pivotal agenda in Indonesia's pursuit of progress, fostering equity, and boosting national competitiveness. The Indonesian government has identified 210 strategic infrastructure projects and 12 programs as of 2022 of value IDR 5,746.4 trillion to accelerate the provision of essential services, improved connectivity, and mobility infrastructure, upgraded irrigation channels through dam construction and primary, secondary, and tertiary irrigation channels, more affordable and sustainable energy and better food infrastructure, equal access to Information and Communication Technology (ICT).

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Although we were hit hard by the Asian Financial Crisis back in 1997 which was resulted in development setbacks, Indonesia began catching up on development. Between 2016 and 2023, substantial progress was made in infrastructure and connectivity development, reaching even the most remote areas, outer regions, and villages as aspired in the Nawacita, the nine development priority agenda that I set when I began my term as President of the Republic of Indonesia. In addition, the massive infrastructure development that we carry out since 2016 has created significant jobs for Indonesians and provided business for Indonesia's entrepreneurs. Improved connectivity, as the result of better transportation infrastructure, also allows farmers, fishermen, and other enterprises to sell their products and get raw materials and other inputs more quickly. Students in rural places can now access the most up-to-date information and knowledge thanks to digital connectivity. Households in rural areas can purchase goods and services online and get delivered faster than before. Businesses in remote places can communicate with their customers without leaving their hometowns. This concerted effort propelled Indonesia's competitiveness from a previous ranking of 59 in 2018 to to 51 in 2023 in terms of infrastructure development based on the Institute for Management Development (IMD) Competitiveness Ranking. This growth momentum represents Indonesia's marathon to the Golden Indonesia.

The pathway to providing infrastructure for Indonesia was not always easy. There were bottlenecks and impediments. At some point in the past, we could not build the road because the land could not be successfully acquired. However, with determination, just like the old saying "where there is a will there is a way", we could alleviate the bottlenecks and impediments. We successfully completed 153 infrastructure projects of value IDR 1,040 trillion during the period 2016-2022 and there will be some more projects to finish by the end of 2024.

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Sharing Experience with the World

The challenges faced by the world today are substantial. Global economic growth has slowed to 2.6 percent in 2022, and the achievement of Sustainable Development Goals (SDGs) has been significantly delayed. Immediate action is required to prevent a lost decade of development. Indonesia consistently supports strengthening infrastructure development in developing countries. The multidimensional crises the world is experiencing pose unique challenges to infrastructure development in these nations, including the limited fiscal space. This necessitates innovative financing approaches for countries worldwide. The increasing SDGs financing gap, rising from USD 2.5 trillion annually before the pandemic to USD 4.2 trillion post-pandemic, must be addressed promptly.

Infrastructure development also highlights the need to empower local communities and economies to foster a strong sense of ownership. Additionally, supporting developing countries to build their capacities and self-reliance is essential. Existing initiatives must synergize and reinforce one another, considering the voices of developing countries and prioritizing dialogues. This will enable developing nations to better confront global challenges in the future. Collaboration is paramount, emphasizing stakeholder engagement, including the private sector, to yield tangible benefits, such as through green development and energy transition. Developing countries are most vulnerable to sustainable development and climate change challenges. International cooperation, including ASEAN, APEC, and G20, can utilize their positions to drive inclusive digital transformation, the development of green industries and infrastructure, and enhanced access to the global supply chain.

Expectations for the National Strategic Project Book

This book is a collaboration of efforts between the Ministry of Finance,
the Coordinating Ministry of Economic Affairs, the Ministry of Public Works and Housing,
and the Economic Research Institute of ASEAN

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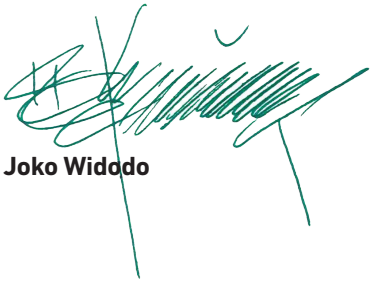
and East Asia (ERIA) in capturing Indonesia's experience in infrastructure development. Such collaboration can lead to valuable insight and knowledge sharing, benefiting not only Indonesia but also countries interested in infrastructure development and economic growth in the region.

Indonesia's experience in infrastructure development with all its limitations offers valuable insights to developing countries striving to bridge infrastructure gaps. By documenting Indonesia's development history, progress, impacts, and experiences, it is hoped that this knowledge can assist nations facing similar circumstances to Indonesia's in their development efforts. Readers are expected to draw wisdom from the challenges and breakthroughs achieved by Indonesia.

The President of the Republic of Indonesia



Joko Widodo

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COORDINATING MINISTER FOR ECONOMIC AFFAIRS
REPUBLIC OF INDONESIA

Foreword

Coordinating Minister for Economic Affairs

Since 2014, infrastructure development has been the focus of the Indonesian government to boost its economic growth and promote inclusivity. It is deemed necessary to accelerate the provision of infrastructure that has strategic value in the regional and national economy, social welfare, and national defence and resilience. Given Indonesia's geographic and demographic complexities, there's no denying the magnitude of the challenge.

Acknowledging the immense challenges in delivering infrastructure to society, the Coordinating Ministry for Economic Affairs is striving to address obstacles in infrastructure development through its leading role within the Committee for Acceleration of Priority Infrastructure Delivery (*Komite Percepatan Penyediaan Infrastruktur Prioritas* – KPPIP), a cross-institutional committee tasked with streamlining the delivery of infrastructure projects that hold significant importance for both society and the nation's socio-economic development. The transformative infrastructure initiatives are recognised as National Strategic Projects (*Proyek Strategis Nasional* – PSN). Collaborating with other ministries in the committee, we relentlessly work within our designated jurisdiction to ensure the successful execution of the National Strategic Projects and address any challenges that emerge along the way.

The infrastructure developments that are categorised as National Strategic Projects for the first time were stipulated in Presidential Regulation (*Perpres*) No. 3 of 2016 concerning the Acceleration of the Implementation of National Strategic Projects. That list was by no means static and is continuously amended through successive regulations to reflect the changing priorities and dynamic nature of development. The decisions to modify the list were made through assessments conducted by KPPIP, which evaluated specific infrastructure projects against predetermined criteria essential for their classification as National Strategic Projects.

COORDINATING MINISTER FOR ECONOMIC AFFAIRS
REPUBLIC OF INDONESIA

Since its establishment in 2014 up until December 2022, KPPIP has overseen the completion of 153 National Strategic Projects with a total investment value of Rp1,040 trillion[1]. One notable example is the successful operation of Jakarta's first mass rapid transit system, which has significantly alleviated traffic congestion in the capital city. The introduction of the first light rapid transit is expected to further reduce traffic congestion. Furthermore, the development of more than 1,000 km of rail tracks all over the country shows that infrastructure growth is not limited to the capital but extends to other regions as well. In addition, the completion of 36 dams has added 2.73 billion cubic metres of clean water supply, reduced the risk of flooding, and irrigated 288 thousand hectares of rice fields. Those are only a few examples of the projects, but the message is resoundingly clear: infrastructure development must benefit all segments of society, even those residing in remote areas.

Effective collaboration between the central government, regional governments, and the private sector is essential to support infrastructure development. Over the last 8 years since the inception of KPPIP, this collaborative effort, led by KPPIP's coordination, has proven to be a key success factor in delivering infrastructure to society, especially when non- budgetary funding was required to complete infrastructure developments.

While infrastructure development offers both tangible and intangible benefits, there is a shortage of literature focusing on infrastructure development for inclusive economic growth in Indonesia, particularly concerning projects falling under National Strategic Projects category. Hence, we are confident that this book is a valuable addition to contemporary literature on future infrastructure development.

[1] As of August 2023, 161 National Strategic Projects have been completed and are fully operational, with a total investment value of Rp1,134.7 trillion. Moreover, 31 projects have been partially operated, and 68 projects already started construction, amassing an estimated investment of around Rp1,946.5 trillion.

COORDINATING MINISTER FOR ECONOMIC AFFAIRS
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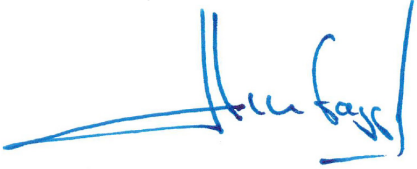
Recognising the importance of raising public awareness about the government's efforts to accelerate infrastructure development across Indonesia, we extend our deep appreciation to collaborating ministries and organisations, namely the Coordinating Ministry for Economic Affairs, the Ministry of Finance, the Ministry of Public Works and Housing, and the Economic Research Institute of ASEAN and East Asia (ERIA), for their efforts in publishing this book. Our profound wish is that this book serves its intended purpose, which is to inform the general public about infrastructure development across the country. While the publication of this book, along with its companion volume showcasing selected infrastructure projects under the National Strategic Projects banner, marks the beginning of a two-part series on infrastructure development in Indonesia, we believe that there will be many more valuable lessons to be learned from current and future infrastructure developments as we strive to realise our 100-year independence by 2045.

Coordinating Minister for Economic Affairs



Dr. Ir. Airlangga Hartarto, M.B.A., M.M.T., IPU.,

MINISTER OF PUBLIC WORKS AND PUBLIC HOUSING
REPUBLIC OF INDONESIA

Foreword

Minister of Public Works and Public Housing

Indonesia, an archipelagic country with the world's fourth-largest population, faces a unique challenge due to its geography when it comes to achieving equitable development and infrastructure development. When President Joko Widodo began his term, Indonesia's infrastructure lagged behind its neighbouring countries such as Singapore, Malaysia, and Thailand. Inadequate infrastructure, amongst other factors, contributed to high logistics costs that hindered Indonesia's competitiveness on the global stage. Recognising this critical issue, President Joko Widodo significantly increased investment in infrastructure, a pivotal factor in improving Indonesia's competitiveness and reducing logistic and transportation costs. The investment in sustainable and resilient infrastructure is essential to facilitate mobility and strengthen the economy.

Infrastructure development not only reduces logistics costs and boosts national competitiveness, but it also fosters inclusive development and social equity. This aligns with the President's Nawacita, the nine development priorities, which places a strong emphasis on infrastructure improvement, particularly in peripheral areas. Typically, these periphery areas are the least developed regions, characterised by weak connectivity and insufficient basic infrastructure. By accelerating and expanding infrastructure development to reach all regions, the government aims to enhance connectivity, improve energy efficiency, and ensure water and food security, ultimately bolstering Indonesia's competitiveness.

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Since 2016, the government has been fast-tracking various infrastructure projects throughout the country, encompassing roads, toll roads, ports, airports, dams, irrigation systems, and water supply systems. To further regional development, the government established National Strategic Projects (*Proyek Strategis Nasional* – PSN), comprising selected strategic infrastructure projects and programmes. These projects receive special attention from the government and come with dedicated facilities to expedite their systems, and water supply systems. The combination of effective governance and special facilities attached to PSN projects has increased the certainty of infrastructure development, leading to quicker project completion. These projects are anticipated to have multiplier effects, ultimately boosting economic growth.

The implementation of PSN began with the issuance of Presidential Regulation Number 3 of 2016 No. 3 of 2016 on Accelerating the Implementation of National Strategic Projects (PSN). Since its enactment, the Ministry of Public Works and Housing has successfully completed 87 PSNs. The list of PSNs continues to evolve, and currently, it is governed by Coordinating Minister for Economic Affairs Regulation Number 7 of 2023, covering a total of 210 PSNs. According to this regulation, the Ministry of Public Works and Housing has been tasked with 125 projects, 33 of which have been completed. Currently, the Ministry is diligently working to finish 18 projects by 2023, with 21 more expected to be completed by 2024.

PSN has significantly expedited the development of sustainable infrastructure and disaster-resilient structures, ultimately driving economic growth. Infrastructure such as dams, toll roads, irrigation, drinking water supply systems, and the one million houses programme now stand as tangible evidence of the Ministry of Public Works and Housing's substantial contribution to the nation's infrastructure development.

In the pursuit of raising public awareness about infrastructure development and PSN, I wholeheartedly welcome the publication titled 'Infrastructure for Inclusive Economic Development: Lessons Learnt from Indonesia.' This book, a collaborative effort co-published by the Ministry of Finance of Indonesia (MOF) and Economic Research Institute for ASEAN and East Asia (ERIA), represents an important initiative to document Indonesia's knowledge and experience in infrastructure development. It brings together lessons learned from various dimensions of

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Indonesia's infrastructure development, critically evaluating both the challenges and opportunities that come with advancing infrastructure. The book captures the multi-faceted nature of Indonesia's infrastructure development and offers insights that can be invaluable in addressing infrastructure deficits in nations facing similar challenges to Indonesia's.

I extend my heartfelt congratulations to the Ministry of Finance and ERIA for bringing this book to fruition. I would like to express my sincere appreciation to all the contributors and editors who generously shared their insights in crafting this remarkable volume. May the contents of this book serve as valuable source of information, inspiration, and meaningful discussions, ultimately contributing to the creation of an environmentally friendly, green, inclusive, resilient, and sustainable future.

Minister of Public Works and Public Housing,
Republic of Indonesia

M. Basuki Hadimuljono

Foreword

Prof. Tetsuya Watanabe,
President of Economic Research Institute for ASEAN and East Asia (ERIA)

I am delighted to introduce a remarkable book that explores the profound significance of infrastructure for the growth and development of Indonesia. As the President of ERIA, I take great pleasure in highlighting the pivotal role that infrastructure plays in the progress of any nation, particularly within East Asian economies.

Infrastructure serves as the backbone of any economy, and Indonesia is no exception. The country's unique geography, expansive archipelago, and ever-increasing population pose distinctive challenges in the realm of infrastructure development. However, investing in infrastructure is imperative for Indonesia to sustain its economic growth and enhance the quality of life for its citizens.

This book presents an in-depth examination of Indonesia's infrastructure, not only chronicling its achievements but also shedding light on the obstacles it has encountered along the way. It underscores the necessity of investing in transportation, energy, and communications, all of which have the potential to deliver a wide array of benefits to the nation.

I would like to express my sincere gratitude to Her Excellency Sri Mulyani Indrawati, the Minister of Finance of the Republic of Indonesia, for her unwavering support of ERIA's mission to facilitate the economic development of ASEAN Member States, including our assistance in producing this book. Her steadfast commitment to Indonesia's development is truly inspiring, and it is an honour for ERIA to collaborate with such a dedicated group of individuals. Her insightful input and guidance have undoubtedly enriched the content of this book, and I am confident that it will serve as a valuable resource for those interested in gaining a deeper understanding of the intricacies of Indonesia's economic landscape, especially within the infrastructure sector.

I extend my appreciation to the authors for their profound insights and their ability to present this complex subject in an accessible and informative manner. Their passion for this topic shines through on every page, and their dedication to this work is truly inspiring.

I wholeheartedly recommend reading this book with enthusiasm and reflecting on the messages it conveys. Southeast Asian economies can glean valuable lessons from Indonesia's experience in leveraging infrastructure to promote inclusive growth and connectivity. As a strong advocate for ASEAN development, ERIA remains committed to advancing the region and is honoured to be part of the endeavour to achieve a prosperous ASEAN.

President of ERIA

Professor Tetsuya Watanabe

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Infrastructure for Inclusive Economic Development Volume 1 Lessons Learnt from Indonesia documents and disseminates knowledge on the *Proyek Strategis Nasional* (PSN), a part of Indonesia's strategy to achieve inclusive development. It explains the importance of infrastructure in Indonesia; Indonesia's ability to overcome challenges to significantly improve infrastructure across the country; and infrastructure's impact on the economic, social, and long-term vision to achieve high-income, inclusive, and sustainable economic growth in the country by 2045. Additionally, this book covers obstacles to the massive push for infrastructure development in the country, in terms of land acquisition, alignment and coordination between amongst levels of government, as well as utilisation of alternative sources of financing. This book is written by policymakers in collaboration with non-governmental experts. The highest appreciation is extended to the contributors.

The book also benefits from extensive reviews provided by a distinguished panel of experts: Hal Hill, professor emeritus, Southeast Asian Economies, Crawford School of Public Policy, Australian National University; Jon D. Lindborg, advisor, Indonesia–Australia Partnership for Infrastructure, Korea Institute for Advancement of Technology (KIAT); Andin Hadiyanto, head, Financial Education and Training Agency, Ministry of Finance, Indonesia; and Halim Alamsyah, senior advisor to Minister of Finance for Finance and Islamic Finance, Ministry of Finance, Indonesia.

The book obtained direct oversight from Sri Mulyani Indrawati, Minister of Finance, Government of Indonesia; and feedback from Suahasil Nazara, Vice Minister of Finance, Government of Indonesia, and the Financial Education and Training Agency, Ministry of Finance, Indonesia.

Gratitude is also extended to the Economic Research Institute for ASEAN and East Asia (ERIA), as well as to the support team, comprising Heru Wibowo, Stefan Wesiak, Azizatullatifah, Agusta Rizar Binadja, Putu Niti Pradnya Dika, Nur Istiqomah, Tika Aulia Dewi, Eunike Septiana, Fadriani Trianingsih, and Josua.

Abbreviations

ADB	Asian Development Bank
AFC	Asian financial crisis
AMS	ASEAN Member State
APBD	*anggaran pendapatan dan belanja daerah* (local government budget)
APBN	*Anggaran Pendapatan dan Belanja Negara* (State Budget)
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
BAU	business as usual
BJPSDA	*biaya jasa pengelolaan sumber daya air* (water resources management service fee)
BKF	*Badan Kebijakan Fiskal* (Fiscal Policy Agency)
BPKH	*Badan Pengelola Keuangan Haji* (Hajj Management Fund Agency)
BRI	Belt and Road Initiative
BRIN	*Badan Riset dan Inovasi Nasional* (National Research and Innovation Agency)
DAK	*dana alokasi khusus* (special allocation funds)
ERIA	Economic Research Institute for ASEAN and East Asia
FCR	full cost recovery
FDI	foreign direct investment
GCA	government contracting agency
GCF	Green Climate Fund
GDP	gross domestic product
GHG	greenhouse gas
GRDP	gross regional domestic product
ICCTF	Indonesia Climate Change Trust Fund
ICOR	incremental capital–output ratio

INA	Indonesia Investment Authority
IO	input–output
IPF	Infrastructure Financing Prioritisation Framework
IRR	internal rate of return
JAKSTRA PB	*Kebijakan dan Strategi Penanggulangan Bencana* (Policy and Strategy for Disaster Management)
KPPIP	*Komite Percepatan Penyediaan Infrastruktur Prioritas* (Infrastructure Development Acceleration Committee)
LKPP	*Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah* (National Public Procurement Agency)
LMAN	*Lembaga Manajemen Aset Negara* (State Asset Management Agency)
LPI	Logistic Performance Index
LUCF	land-use change and forestry
LVC	land value capture
MOF	Ministry of Finance
MOHA	Ministry of Home Affairs
NAIRU	non-accelerating inflation rate of unemployment
NDC	nationally determined contribution
OECD	Organisation for Economic Co-operation and Development
OJK	*Otoritas Jasa Keuangan* (Financial Services Authority)
PDAM	*Perusahaan Daerah Air Minum* (local water utility)
PDF	Project Development Facility
PMN	*penyertaan modal negara* (state equity participation)
PP	Peraturan Pemerintah (government regulation)
PPP	public–private partnership
PSN	Proyek Strategis Nasional (National Strategic Projects)
PT PII	PT Penjaminan Infrastruktur Indonesia
PT SMI	PT Sarana Multi Infrastruktur

RAN-API	*Rencana Aksi Nasional Adaptasi Perubahan Iklim* (National Action Plan for Climate Change Adaption)
RAN-GRK	*Rencana Aksi Nasional untuk Penurunan Emisi Gas Rumah Kaca* (National Action Plan for Greenhouse Gas Emission Reduction)
RAN-MAPI	*Rencana Aksi Nasional Mitigasi dan Adaptasi Perubahan Iklim* (National Action Plan for Climate Change Mitigation and Adaption)
RAS	Balancing Input-Output Tables Method
REDD+	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
RENAS PB	*Rencana Nasional Penanggulangan Bencana* (National Action Plan for Disaster Management)
RPJMN	*Rencana Pembangunan Jangka Menengah Nasional* (National Mid-Term Development Plan)
SDG	Sustainable Development Goal
SEZ	special economic zone
SOE	state-owned enterprise
SPAM	*sistem penyediaan air minum* (drinking water supply system)
TEU	20-foot equivalent unit
TFP	total factor productivity
VGF	viability gap funding

Contributors

Editors

Sri Mulyani Indrawati, Minister of Finance of the Republic of Indonesia. Prior to this role, she held the position of Managing Director at the World Bank Group. In 2014, Forbes magazine recognised her as the 38th most powerful woman in the world. She received the Finance Minister of the Year for East Asia Pacific award from Global Markets magazine in recognition of her exceptional efforts in managing the COVID-19 pandemic in Indonesia. She holds a bachelor's degree from the University of Indonesia and earned both her master's and doctoral degrees from the University of Illinois at Urbana-Champaign, United States.

Titik Anas, special advisor to Minister of Finance for sectoral fiscal policy, Ministry of Finance, Government of Indonesia, and lecturer, Economics and Business, University of Padjadjaran, Indonesia. She holds bachelor's and master's degrees from the University of Indonesia and a doctorate from Australian National University, where she also received the Australian Leadership Award for her doctorate.

Candra Fajri Ananda, special advisor to Minister of Finance for regional fiscal policy, Ministry of Finance, Government of Indonesia, and professor at Faculty of economics and business University of Brawijaya, Indonesia. He holds a bachelor's degree in economics from University of Brawijaya and a master's degree and doctorate from the University of Göttingen, Germany.

Fauziah Zen, senior economist, Economic Research Institute for ASEAN and East Asia (ERIA), and faculty member, Economics and Business, University of Indonesia. She is also a visiting professor at Hitotsubashi University and a guest lecturer at the University of Tokyo, both in Japan. She obtained her bachelor's and master's degrees from Bandung Institute of Technology, Indonesia; a master's and doctorate from Hitotsubashi University, Japan; and a post-graduate degree from the University of Oxford, United Kingdom.

Authors

Kiki Verico, tenure-track professor, International Economics, Faculty of Economics and Business, University of Indonesia and senior researcher, Institute for Economic and Social Research, University of Indonesia (LPEM FEB UI). He has been appointed as senior advisor to Minister of Finance for Industry and International Trade, Ministry of Finance, Government of Indonesia. He holds a bachelor's degree from the University of Indonesia; master's degrees from Universiti Malay, Malaysia and Universidad Autónoma de Madrid, Spain; and a doctorate from Waseda University, Japan.

Riatu Mariatul Qibthiyyah, faculty member, Economics Department, University of Indonesia, and senior researcher, LPEM FEB UI. She is a public finance expert in the areas of decentralisation, intergovernmental transfers, and taxation. She has also been involved in technical assistance and consultations on infrastructure and connectivity. She received her bachelor's degree from the University of Indonesia and her master's and doctorate degrees from Georgia State University, United States.

Darwin Trisna Djajawinata, director, Operation and Finance, PT Sarana Multi Infrastruktur (PT SMI). He holds degrees from Parahyangan Catholic University and Bandung Institute of Technology, Indonesia, and Leeds University, United Kingdom.

Andre Permana, executive director, Indonesia Infrastructure Guarantee Fund. He has held various strategic positions, including head, Risk and Compliance Division; head, Business Development Division; and executive vice president, Project Appraisal, Indonesia Infrastructure Guarantee Fund. He earned his bachelor's and master's degrees from the University of Indonesia and his doctorate from Nanyang Technological University, Singapore.

Muhammad Halley Yudhistira, director, Economic Planning and Development Policy, LPEM FEB UI, and assistant professor, LPEM FEB UI. He earned his bachelor's degree from the University of Indonesia and master's and doctorate from the National Graduate Institute for Policy Studies (GRIPS), Japan.

Eri Hariyanto, lecturer, Financial Education and Training Agency, Ministry of Finance, Government of Indonesia. His previous position at the Directorate-General of Financing and Risk Management provided experience in Islamic financial management, especially government *sukuk*. He lectures on Islamic finance, macroeconomics, the Indonesian economy, public policy, public finance, and scientific writing.

Teuku Riefky, macroeconomic and financial sector researcher, Institute of Economic and Social Research, LPEM FEB UI. He has worked for various institutions as an independent consultant, including the Asian Development Bank, Danareksa Research Institute, Fiscal Policy Agency, Korean Institute for International Economic Policy, Mandiri Institute, United Nations Development Programme, and World Bank. He is also involved in Think20 Indonesia, an engagement group of the G20, as coordinator, International Finance and Economic Recovery Task Force.

Venkatachalam Anbumozhi, director, Research and Strategy and Innovations, Economic Research Institute for ASEAN and East Asia (ERIA), Indonesia. His previous positions include senior capacity building specialist, Asian Development Bank Institute, Japan; assistant professor, University of Tokyo, Japan; senior policy researcher, Institute for Global Environmental Strategies, United States; and assistant manager, Pacific Consultants International, Japan. He was a member of the G20 Task Force on Green Financing, APEC Expert Panel on Green Growth, US–ASEAN Advisory Group on Smart Low-Carbon Cities, and ASEAN Panel for Promoting Climate-Resilient Growth. He obtained his doctorate from the University of Tokyo.

Khoirunurrofik, associate professor, Urban and Regional Economics, University of Indonesia. He received his master's from Carnegie Mellon University, United States, and doctorate from GRIPS, Japan. His research focusses on public finance and fiscal decentralisation as well as urban and regional economics.

Rullan Rinaldi, senior economist (budget team lead), Prospera. He earned his doctorate from Texas Tech University in the United States and had earned his bachelor's from Padjadjaran University, Indonesia. His publications focus on public expenditure review, national and sub-national public financial management, economic governance, and regional economics.

Della Y.A. Temenggung, deputy, Advisory and Policy Group, Prospera. She previously served as lead advisor, Economics and Inclusion Team, Australia–Indonesia Partnership for Economic Governance; in the Trade and Competitiveness Global Practice, World Bank; and as senior economist, Secretariat of Timnas PEPI. She holds a doctorate from Australian National University and has been a faculty member, Department of Industrial Engineering, Bandung Institute of Technology. Her expertise is focussed on economic policy, private sector development, and international economics.

I Kadek Dian Sutrisna Artha, chief economist and head, SMI Institute, PT SMI. Before joining PT SMI, he was head, Institute for Economic and Social Research, and lecturer, Department of Economics, University of Indonesia. He earned his bachelor's from the University of Indonesia and his master's from Vrije Universiteit Amsterdam, the Netherlands. He received his doctorate from the University of Groningen, the Netherlands.

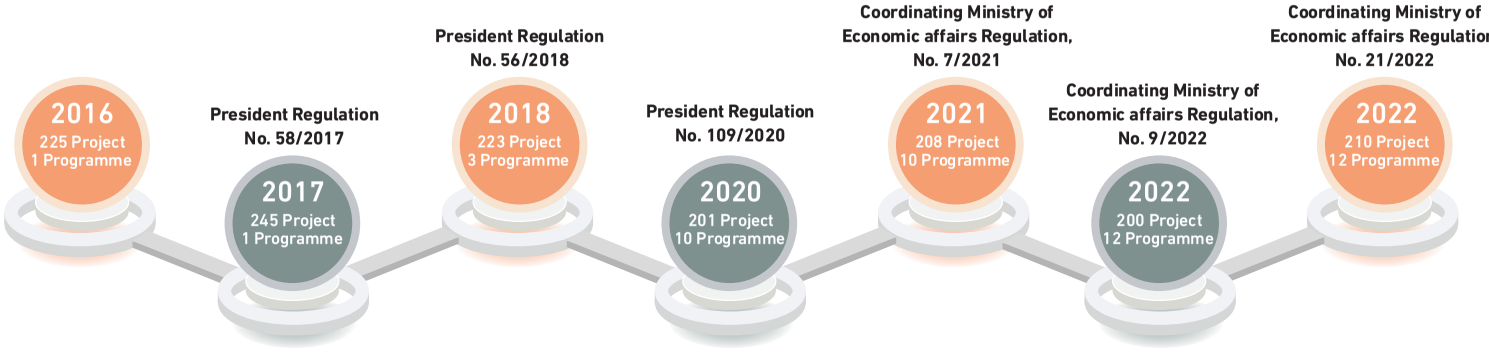
Wilmar Salim, associate professor, School of Architecture, Planning and Policy Development, and head, Center for Infrastructure and Regional Research, Bandung Institute of Technology. He earned a bachelor's from Bandung Institute of Technology; master's from the University of Queensland, Australia; and doctorate from the University of Hawai'i at Mānoa, United States.

Wempi Saputra, is the executive director, Office of Executive Director for South-East Asia, World Bank, which represents Brunei Darussalam, Fiji, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, Nepal, Singapore, Thailand, Tonga, and Viet Nam. He has a degree from the Indonesian State College of Accountancy; bachelor's from the University of Indonesia; master's from the National Graduate Institute for Policy Studies, Japan; and a doctorate from Nagoya University.

Gema Satria Mayang Sedyadi, research analyst, Budget Team, Prospera. He holds a bachelor's degree from Bandung Institute of Technology and a master's degree from Australian National University.

Facts of National Strategic Projects

The PSN was created in 2016 and underwent six changes before being enacted under Coordinating Ministry of Economic Affairs Regulation No. 21 of 2022



Projects include in The PSN

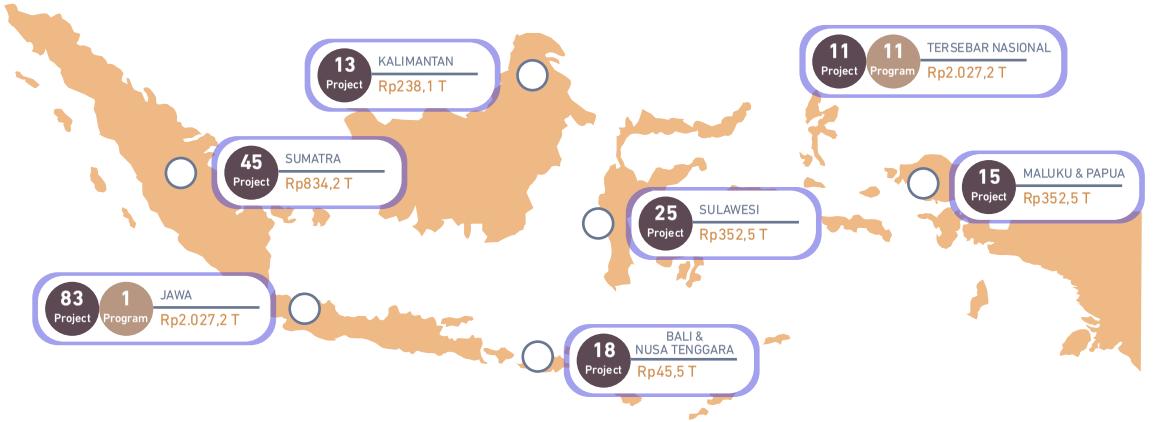
- Proposed project are evaluated by KPPIP and approved in a closed meeting
- Project from the previous list which are in process are driven by the government

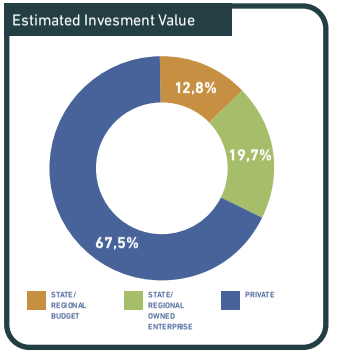
Projects removed from The PSN

- Completed projects and there are no pending issues
- The project no longer requires The PSN support

The PSN Distributon

According to Coordinating Ministry of Economic Affairs Regulation No. 21/2022 there are 210 Projects and 12 Programmes classified as the PSN with an estimated total investment value of Rp5.746,4 trillion*





*Includes estimated investment from private sectors in the projects after the projects completed

PROJECT

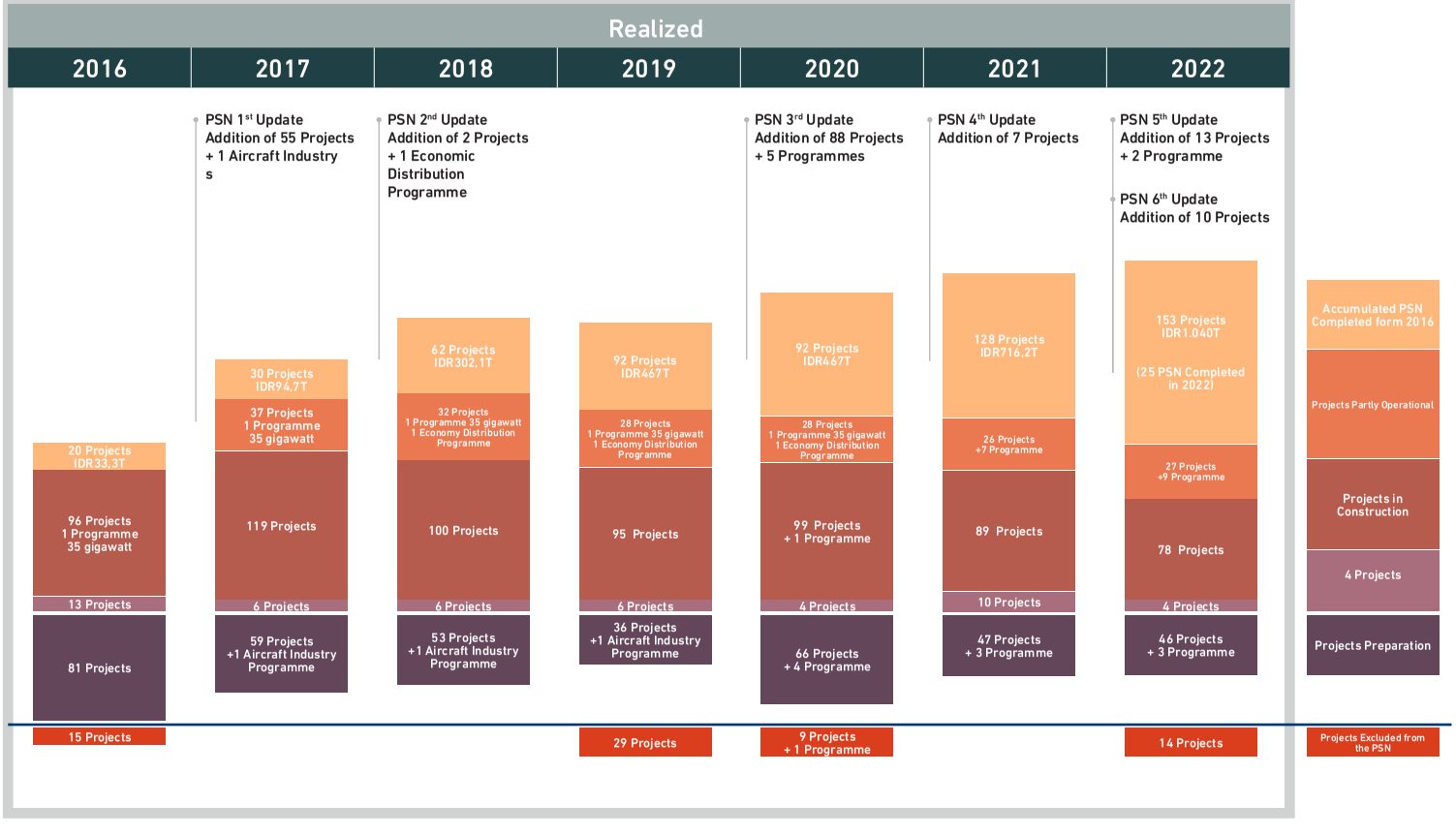
ROAD	DAM & IRRIGATION	AREA	TRAIN	PLANTATION	ENERGY	SEAPORT	WATER & SANITATION	HOUSING	AIRPORT	TOURISM	EDUCATION	SEAWALL	TECHNOLOGY
53 PROJECTS	56 PROJECTS	24 PROJECTS	14 PROJECTS	1 PROJECTS	16 PROJECTS	16 PROJECTS	13 PROJECTS	2 PROJECTS	6 PROJECTS	1 PROJECTS	1 PROJECTS	1 PROJECTS	6 PROJECTS

PROGRAMME

EXIT TOLL ACCESS	SMELTER	ELECTRICITY	FOOD STATE	ECONOMIC DISTRIBUTION	WASTE MANAGEMENT	STRATEGIC TOURISM	BORDER AREA	SUPERHUB	AREA DEVELOPMENT ACCELERATION	SPECIAL ECONOMIC ZONE	SUGAR AND PALM OIL

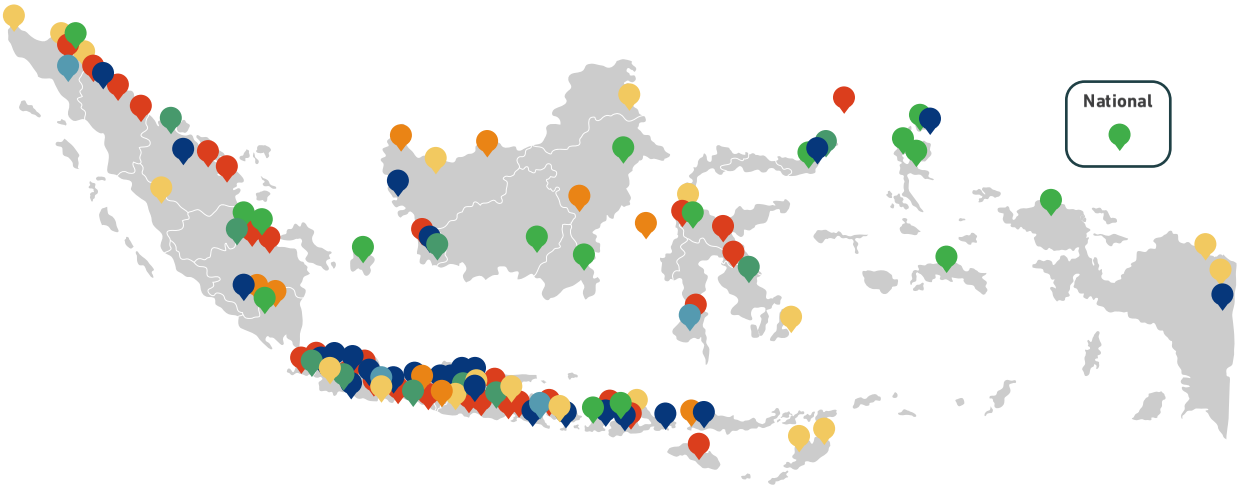
Accumulated PSN Completion Status

From 2016 to December 2022, the accumulated completion of the PSN status are as follows



Completed PSN Projects

From 2016 to 2022, 153 PSN projects were completed, with a total value of IDR1.040 trillion.



18 Projects completed in Semester II of 2022

Completed in 2016

20 Projects (IDR33,3 T)

- 7 Airports
- 1 Toll
- 6 Dams
- 1 Seaport
- 1 Gas Pipeline
- 4 Border Posts

Completed in 2017

10 Projects (IDR61,4 T)

- 2 Toll
- 1 Access Road
- 1 Airport
- 1 Gas Facility
- 3 Border Posts
- 1 Dam
- 1 Irrigation Line

Completed in 2018

32 Projects (IDR207,4 T)

- 2 Train Routes
- 4 Dams
- 1 Irrigation Line
- 10 Tolls
- 5 Special Economic Zones
- 1 Airport
- 4 Smelters
- 4 Industrial Parks
- 1 Marine Fishery

Completed in 2019

30 Projects (IDR165,3 T)

- 4 Airports
- 9 Roads
- 6 Areas
- 2 Smelters
- 4 Dam
- 1 Seaport
- 2 Technologies
- 2 Train Routes

Completed in 2020

12 Projects (IDR123,1 T)

- 1 Airport
- 1 Train Routes
- 2 Tolls
- 1 Drinking Water Supply
- 3 Industrial Park
- 3 Dams
- 1 Seaport

Completed in 2021

12 Projects (IDR123,1 T)

- 6 Tolls
- 1 Train Routes
- 1 Area
- 1 Housing Area
- 2 Drinking Water Supplies
- 11 Dams
- 1 Seaport
- 1 Technology

Completed in 2022

25 Projects (IDR320 T)

- 3 Areas
- 3 Seaports
- 1 Electrical Transmission
- 1 Waste to Electric
- 1 Border Post
- 4 Power Plants
- 6 Dams
- 1 Smelter
- 1 Train Route
- 2 Airports
- 1 Housing Area
- 1 Gas Facility


INDORAMA

Chapter 1

Mobilizing All Forces to Accelerate Infrastructure Development in Indonesia

Sri Mulyani Indrawati

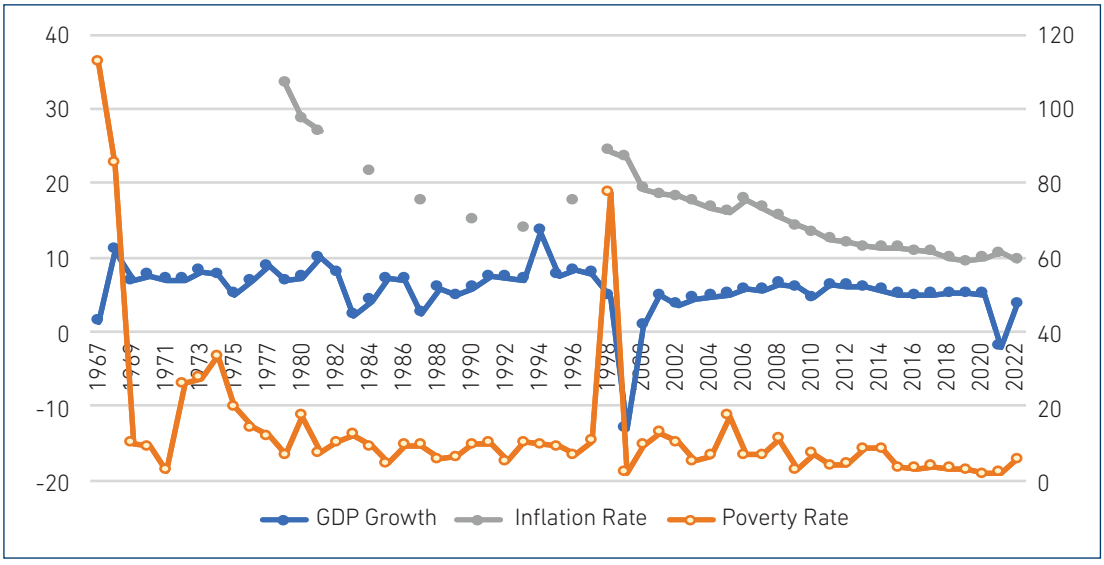
1. Indonesia after 78 years of independence

In the Declaration of Independence in 1945, Indonesia's leaders at the time promised, amongst others, prosperity and social justice. Each of the ruling governments post-independence has been mandated to deliver the promise as written in the Constitution. This implies financing consequences. However, the road to prosperity is challenging. Not only has domestic saving been very limited but Indonesia has also faced several crises: the 1965 coup d'état, the 1984 oil crisis, the 1997 Asian financial crisis (AFC), the 2008 global financial crisis, and the 2020 COVID-19 pandemic.

By way of background, in the post-independence era, the old order (Orde Lama) government, governing from 1945 to 1967, struggled to maintain political stability. The economy was characterised by high inflation, stagnant output, poverty, and hunger (Booth, 1998). During the transition between the old order government and the new order government in 1967, several economic reforms were undertaken. The period from 1968 to the mid-1980s was characterised by high and stable economic growth, with an average growth of 7%, partly due to the high oil price. However, the oil price tumbled at the end of the 1970s, and oil revenue was no longer sufficient to support development. The government shifted to an export promotion strategy, which made Indonesia one of the 'Asian miracle' countries (Birdsall et al.,1993).

However, the picture reversed completely when the economy was severely hit by the AFC in 1997, which even led to a political crisis that toppled President Suharto after 32 years in power. The economy contracted by 13.1 % in 1998 and has never returned to its 7% growth trajectory since (Figure 1.1). The financial sector, which was paralysed by the AFC, went through bailout and reform. The economy was not yet fully recovered when the global financial crisis took place 10 years later. With limited exposure to global financial markets and China's strong growth and commodity boom, the economy continued to grow at 6% during the period 2008–2009. The taper tantrum of 2013 and the United States–China trade tension beginning in 2017, however, negatively affected Indonesia. The average growth for the period 2010–2019 was 5.4% (Figure 1.1).

Figure 1.1. Indonesia's GDP Growth, Inflation, and Poverty Rates, 1967–2022 (%)

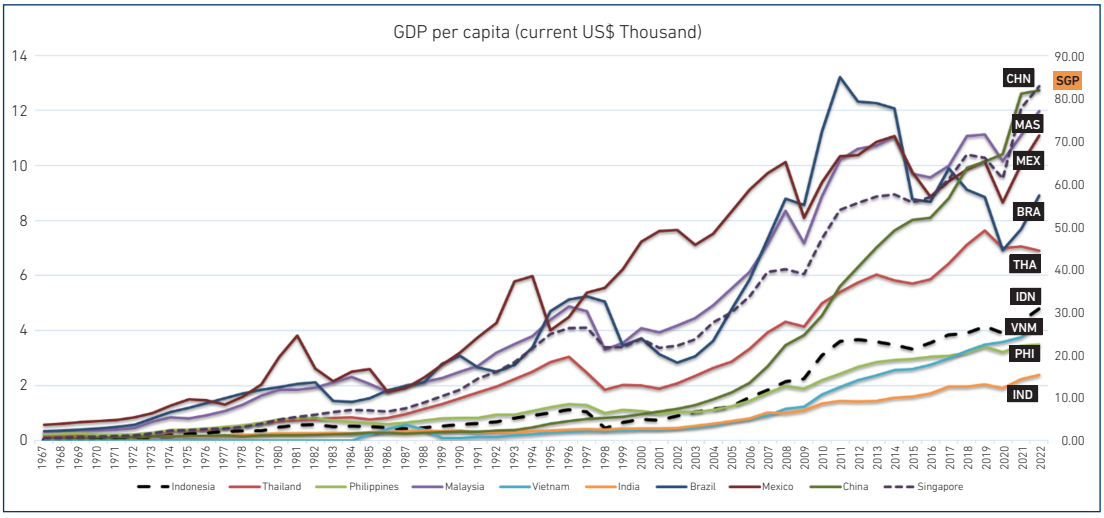


GDP = gross domestic product, RHS = right-hand scale.

Source: Indonesia Central Bureau of Statistics (BPS).

Navigating through several crises, Indonesia became an upper middle-income country in 2019, with a gross national income (GNI) per capita of US$4.070, 74 years after its independence. Social indicators also improved, with the poverty rate significantly reduced from 60% in 1970 to 9.4% in 2019 (Figure 1.1). Nevertheless, when compared to peer countries, such as Malaysia and Singapore, which also achieved independence around the same time as Indonesia, or China, which got its accession to the World Trade Organization in 2001, Indonesia relatively lags (Figure 1.2).

Figure 1.2. GDP per Capita in Indonesia and Peer Countries, 1967–2022



Source: databank.worldbank.org (accessed 17 October 2023).

Indonesia basically needs a lot to catch up to deliver the mandate of its constitution, particularly with the aspiration of becoming an inclusive and high-income country within 100 years of its independence. For this, infrastructure provision is imperative. However, Indonesia has been struggling to provide sufficient infrastructure due to limited fiscal capacity and domestic savings.

In the early 1970s, Indonesia managed to allocate a significant amount of budget for infrastructure due to the favourable oil price and revenue. In the 1990s, however, Indonesia was only able to allocate around 9% of gross domestic product (GDP) for infrastructure (OECD, 2015). After the Asian financial crisis, infrastructure investment collapsed to 2% of GDP in 2001 and continued to be relatively low for several years compared to the average infrastructure investment share of other Asian high-growth economies of 6%–7%, due to the constrained fiscal space and paralysed financial sector post-AFC. To fill the huge infrastructure gap, Indonesia must mobilise resources outside of public funding, optimise the constrained domestic financial market, and seek external resources. This chapter discusses the challenges and how Indonesia addresses the challenges from the perspective of the Ministry of Finance.

2. Challenges to Filling the Infrastructure Gap

The root cause of the infrastructure gap in developing countries like Indonesia is the inherent characteristics of infrastructure development that require **substantial investment**, yet often gives **low financial return** and/or **a very long payback period**. Relying on public funding will result in substantial gaps as the government needs to finance many other programmes. Consequently, private sector participation, including foreign investors, is needed to fill the gap. For the private sector to participate, there should be **attractive returns** on investment from the project. The challenge is how to make non-financially viable infrastructure projects attractive to investors.

The long payback period of infrastructure should ideally be financed by long-term financing. Unfortunately, Indonesia's financial sector is relatively shallow, with the financial sector dominated by the banking sector. The relatively shallow financial sector was badly hit by the AFC in 1997/98. The fixed exchange rate with an overvalued rupiah and weak banking supervision made the financial sector vulnerable to currency attacks. Rupiah devaluation, high inflation, and the interest rate increased nonperforming loans. The banking sector, the largest segment of Indonesia's financial sector, basically collapsed, leaving a substantial fiscal burden for the government. The cost of the banking sector bailout was about 60% of GDP. It took a long time for the banking sector to fully recover from the crisis. The banking sector bailout limited the government's fiscal space in the first few years after the AFC.

In the first few years after AFC, the focus of the government was to rescue the banking sector and restore macroeconomic stability. Several reforms were undertaken to restore the banking sector, comprising measures to strengthen prudential regulation: central bank independence, deposit insurance, and government bonds, amongst others. The Financial Sector Authority and Deposit Insurance Corporation were established. Reforms on fiscal management were also introduced with the enactment of Law Number 17 of 2003 concerning State Finance, Law Number 1 of 2004 concerning State Treasury, Law Number 15 of 2004 concerning State Finance Accountability, and Law Number 24 of 2022 concerning Government Debt Securities.

By the time President Yudhoyono came to power in 2004, macroeconomic stability was restored, the financial sector had begun to recover, and the state budget was consolidated (Indrawati et al., 2020). During the period 2004–2014, average economic growth was 5.7% and average annual inflation was at 7% (year-on-year). The government prepared an infrastructure development plan for 2005–2009.

With the state budget consolidated, public funding available for infrastructure increased. The Ministry of Finance started to tag expenditure for infrastructure development. In 2005, the government spent Rp26.11 trillion on infrastructure. In the beginning, capital spending was allocated directly through the spending of the respective ministries. Later, the government adopted public-private partnerships (PPP). In executing infrastructure projects, regulatory and institutional impediments often existed. Several sectoral reforms were also undertaken to make the sectors more attractive to investors, including new electricity, oil and gas, and telecommunication laws.

At the early stage of PPP adoption, the success stories were limited. The infrastructure summits that the government held in 2005 and 2006 did not produce a significant number of deals. Salim and Negara (2018) documented that the limited success stories of PPP in the past were due to several factors: **regulatory impediments, weak project preparation, and incomplete project documentation**. Nevertheless, Salim and Nagara (2018) suggested that during the Yudhoyono presidency, there were significant improvements in infrastructure provision, mainly funded by the government budget.

With the heavy reliance on the government budget and limited private participation, the infrastructure gap remained huge by the end of Yudhoyono's term. The Ministry of National Development Planning (Bappenas) estimated the needed funding for filling the infrastructure gap for the period 2015–2019 at around US$4796 trillion (approximately Rp959.2 trillion a year) and another Rp6,556 trillion for the 2020–2024 period (approximately Rp1,311 trillion a year). The allocated state budget for infrastructure remained relatively low compared to the projected needed capital. During the period 2015–2019, the government allocated Rp1694.6 trillion for infrastructure, about 35% of the projected needed funding for the same period. For the period 2020–2024, the government allocated Rp1,900.1 trillion, about 20% of the Bappenas projected needed funding for the same period.

3. Mobilising Available Resource for Infrastructure Development

During President Yudhoyono's term, learning from the limited uptake of PPP in the past and global best practices, the government established three financial institutions to facilitate PPP in infrastructure, PT Sarana Multi Infrastruktur (SMI), PT Penjaminan Infrastruktur Indonesia (PII), and PT Infrastructure Investment Finance (IIF), with the expectation that the established institutions would facilitate the PPP better.

PT SMI, a state-owned enterprise under the Ministry of Finance, was established in 2009 to offer financing and investment, consulting services, and project development assistance to the responsible parties of the PPP projects, the *Penanggung Jawab Proyek Kerjasama* (PJPK)[1] from the technical ministries, and/or the local government. To make PPP more attractive, PT SMI provides a Project Development Facility (PDF), Viability Gap Fund (VGF) and Availability Funding. PJPK can use the PDF to develop a project's final feasibility studies and tender documents. With the PDF, PJPK can prepare the project better and potentially lower project costs for prospective investors. The VGF, on the other hand, is capital injection to PPP projects that have demonstrated economic viability but need further financial feasibility. VGF reduces the investor's capital expenditure, hence resulting in lower cost recovery.

PT SMI also offers local governments loans for infrastructure development under the local government authority. Apart from government direct equity injections, PT SMI also manages and channels funding from private, philanthropic, donor, bilateral, and multilateral financial institutions and banking and insurance companies. PT SMI also issues bonds to fund its operations. With a total capital injection of Rp30.52 trillion from the government, since its establishment in 2009, PT SMI has managed to leverage Rp947.86 trillion to support infrastructure projects.

PT PII is also a state-owned enterprise under the Ministry of Finance that was established in December 2009 to extend financing guarantees for infrastructure projects. PT PII provides guarantees for risks associated with government conduct or political uncertainties, such as changes in regulation, which can result in increased costs to investors (first loss absorber). PT PII also provides guarantees to SOEs involved in infrastructure development to secure loans. With PT PII's presence, the government is not directly exposed to contingent liabilities. In its operations, PT PII also assists PJPK with project preparation and transaction help through the Project Development Facility (PDF) and Viability Gap Fund (VGF), particularly through its IIGF Institute.

Following its establishment with a capital injection from the government of Rp9.085 trillion, PT PII currently holds assets close to Rp16 trillion and provides guarantees for 39 infrastructure projects from various sectors. The mobilised investment from these projects is around Rp410.6 trillion and has been supported by the Public-Private Partnership (PPP) and the State-Owned Enterprises (SOEs) direct lending guarantee. Consequently, PT PII's leveraging ratio (i.e. the amount of mobilised investment to the amount of received Penyertaan Modal Negara (PMN), stands impressively at 45.2 times.

[1] PJPK serves as the minister/governor/mayor/head of an institution/director of a state-owned enterprise responsible for infrastructure ownership.

PT Indonesia Infrastructure Finance (IIF) is another financial institution that was established by the Ministry of Finance of the Government of the Republic of Indonesia, the Asian Development Bank (ADB), the World Bank, and several other multilateral organisations for the same purpose as PT SMI, to facilitate PPP in infrastructure. PT IIF provides similar services as PT SMI, focusing on infrastructure projects in sectors such as telecommunications, electricity (renewables and non-renewables), and toll roads, which have long-term resiliency and inelasticity to increases in benchmark interest rates. In 2022, IIF closed a deal of 10 new financing commitments totalling Rp1.67 trillion, expanding its total investment assets by 21% to reach Rp14.82 trillion.

In its practices, IIF has made a commitment to integrating environmental, social, and governance (ESG) principles into its business strategy, including financing social infrastructure projects, such as hospitals, to bridge livelihoods and expand prosperity in society. In November 2022, as part of Indonesia's G20 Presidency, hosted by IIF, Indonesia launched the ESG Framework and Manual for government support and facilities in infrastructure financing. The framework and manual are guidelines for implementing ESG factors in infrastructure financing by optimising the Special Mission Vehicle (SMV) function under the Ministry of Finance through a PPP scheme. The adoption of ESG is expected to ensure that infrastructure provision can generate socioeconomic positive impacts whilst minimising the potential risks (negative impacts) to ESG aspects. The IIF acts as the anchor for the implementation of the framework. Indonesia piloted the implementation of ESG on two PPP housing and water projects receiving PDF in 2022. In 2024, the G20 ESG framework will be applied to all PPP projects.

Reforms to disentangle the impediments to infrastructure development were also undertaken in several other aspects, such as institutional bottlenecks (coordination issues) and land acquisition. The coordination issues were addressed with the establishment of the Committee for Acceleration of Priority Infrastructure Delivery (KPPIP) in 2014. KPPIP is central in decision-making, project preparation, implementation, and monitoring of strategic infrastructure projects. President Joko Widodo launched the National Strategic Project (Proyek Strategis Nasional (PSN)) in 2016 to expedite the development of strategic infrastructure. Infrastructure projects listed in the PSN receive special treatment, e.g. expedited licensing approval, facilitated land acquisition, and fiscal incentives, if eligible.

Land acquisition was a substantial contributor to the infrastructure delay. Often, a project would fail to be executed because one or two residents refused to give up their properties for infrastructure. The parliament enacted Law Number 2/2012 to govern land acquisition for public use. Landowners can take the government to court to settle a land dispute, which can take a long time to settle. The KPPIP was established to handle such issues, including representing the government if the case went to court.

Incongruity in the timing of the budgeting cycle between the ministries responsible for the project and the payment period for the landowners also created complications in the land purchase process. To address the issue, the government in 2016 tasked the State Asset Management Agency (Lembaga Manajemen Aset Negara (LMAN), which operates as a public services agency (BLU) under the purview of the Ministry of Finance to manage funds for land acquisition purposes, particularly for projects classified as PSN. LMAN, as a BLU, has greater flexibility in terms of handling finances than ministries, i.e. it can manage multi-year funding, allowing LMAN to pay landowners even if the land purchase process takes more than a year. The money granted to LMAN from the State Budget is considered government investment. The government has committed Rp144.46 trillion to LMAN for PSN land acquisition compensation as of 30 June 2023, with Rp113.458 trillion already distributed to landowners for a variety of critical infrastructure projects. This has facilitated the expeditious execution of PSN initiatives. Later, based on the Job Creation Law, the government established the Indonesia Land Bank Authority to facilitate investment.

Although the establishment of PT SMI, PT PII, PT IIF and LMAN through their financing role has accelerated infrastructure implementation and private participation, infrastructure financing remains inadequate. Twenty-five years after the AFC, Indonesia's financial sector remains shallow. In 2022, the total assets of the financial sector were Rp13,565.8 trillion, with 78% in the banking sector, which is more suitable for short-term financing. Insurance, pension funds, and other long-term financing instruments are not yet well developed. In 2022, the total assets of the insurance and pension fund were about 9.7% and 8.3% of the total financial sector assets, respectively. Financing institutions were also relatively small, at about 3.4% of total financial sector assets in 2022. If we compare it to peer countries, it is more obvious that Indonesia's financial sector is relatively small. Malaysia's banking sector assets were more than three times higher than Indonesia's in 2021. Singapore's banking sector asset was close to 10 times that of Indonesia's in 2021. Indonesia's average saving ratio in 2010–2019 was around 30%. Post-pandemic, the saving rate was slightly higher, at 34% in 2021 and 37% in 2022. Consequently, the source of funding for infrastructure from the domestic market is rather limited.

The situation is not unique to Indonesia. Infrastructure finance shortages also exist in advanced economies. A parallel endeavour to close the gaps is through the mobilisation of foreign financial resources. In 2021, the government established the Indonesian Investment Authority (INA), a sovereign wealth fund to accelerate investment further. INA facilitates foreign investors to find suitable assets that can give attractive returns. It identifies investment schemes and structures that are mutually favourable and beneficial to both asset owners and investors. INA received a capital injection of Rp75 trillion from the GOI. In 2022, the INA invested in two toll road assets of about 100 km in the Trans-Java corridor (the Kanci-Pejagan Toll and Pejagan-Pemalang Toll) belonging to Waskita Karya worth US$400 million. Also in 2020, as part of a global consortium, it invested in Traveloka for US$300 million. Towards the end of 2022, the INA completed the

investment process in PT Kimia Farma Apotek with an investment value of IDR1.9 trillion, with the INA's portion of Rp930 billion. The INA currently manages investment assets of Rp134.6 trillion (equivalent to US$9 billion), including infrastructure projects.

Parliament and the government had agreed to further reform the financial sector so that Indonesia's financial sector development can be accelerated. The financial reform was established in the form of the Omnibus Law for Financial Sector, Law Number 4/2023. The law aims to improve access to financial services, broaden sources of long-term finance, promote competitiveness and efficiency, and increase the variation of instruments, as well as strengthen risk mitigation and consumer and investor protection. The law includes various reform initiatives, not only in the banking sector but also in capital markets, pension funds, and insurance, which are sources of long-term finance vital for financing economic development, including infrastructure. Therefore, the development of Indonesia's financial sector will not only support the accumulation of long-term funds but also the mobilisation of funding for infrastructure. With the new law, financial institutions can offer a greater variety of instruments that suit investors' risk appetites.

4. Future Challenges

Centennial Aspirations

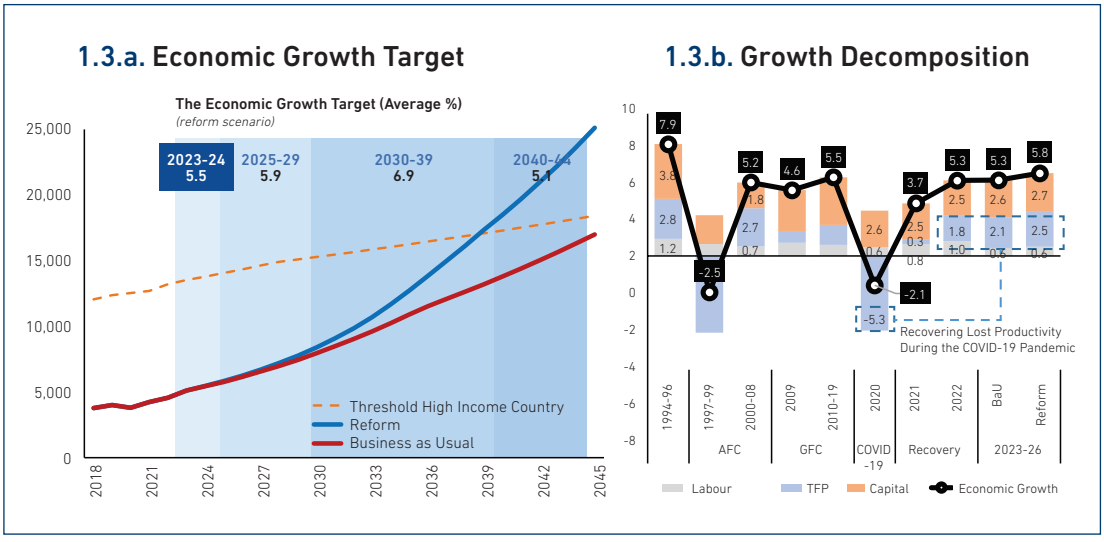
Indonesia will celebrate 100 years of independence in 2045. Indonesia's leaders aspire to make the country a high-income and more inclusive economy by then. Bappenas (2019) stated Indonesia's aspiration to become the fifth-largest economy with per capita income of US$23.199 in 2045. However, another blow to the economy came in early 2020 when the COVID-19 global pandemic hit. The pandemic was not only a health crisis but also a socioeconomic crisis that paralysed the global economy. The severity of the pandemic and its impacts on Indonesia have been discussed extensively by Indrawati et al. (2022), Witoelar and Utomo (2022) and Ing and Basri (2022). In short, the economy contracted by 2.07% in 2020 following an average of 5.3% growth in the previous decade. The pandemic brought Indonesia back to the low-middle-income country category in 2020. The poverty rate increased from 9.22% in September 2019 to 9.78% in March 2020.

Indonesia recovered and returned to its positive economic growth trajectory in 2021 and was back in the high middle-income country category in 2022 with a GNI per capita of US$4,580, despite the global economic uncertainties of 2022 resulting from the Ukraine war.[2] Social indicators also improved as the economy recovered. In 2022, the poverty rate was 9.54% and continued to decline to 9.36% in March 2023. The careful handling of the pandemic and its impact and coordinated monetary and fiscal policies were amongst the success factors for the quick recovery.

[2] The threshold for an upper middle-income country in 2022 was US$4,466.

Without the COVID-19 pandemic, Indonesia was projected to achieve the stated target by 2045 with an average growth of 5.7% during the period 2016–2045. With the COVID-19 pandemic and its consequential effects, Indonesia needs to work harder for the aspiration. The Ministry of Finance (2023) projected that it will require an average annual economic growth of 6% for the period 2023–2045 (Figure 1.3a). Not only additional labour and capital but improvement in productivity is also needed for accelerated growth (Figure 1.3b). Nevertheless, the challenges continue to mount, from the war in Ukraine, the Israel-Hamas war, rising protectionism, and the pressure of high interest rates in developed countries, including the United States, for a longer time.

Figure 1.3. Indonesia Growth Trajectory, 2018–2045



AFC = Asian Financial Crisis, GFC = Global Financial Crisism TFP = total factor productivity

Source. Ministry of Finance (2023).

The abundance of natural resources and human capital will be Indonesia's source of growth. Indonesia is the largest producer of nickel, an important material for EV batteries, and is also abundant in bauxite, an important material for packaging. Indonesia is the largest producer of palm oil, a potential source of green energy. The country is also labour-abundant, which offers a demographic bonus. In the 2030s, Indonesia will reach the peak of its demographic bonus, when 68% of its population will be of productive age. By 2045, the total population of Indonesia will reach 319 million people, with 70% of the population in the middle affluent-class category. The government has set pathways towards its aspirations in its medium-term and long-term economic planning by filling the existing human capital gaps, institutional gaps, and infrastructure gaps. More investor-friendly PPP will be needed.

Climate-resilient Infrastructure

Another challenge comes from climate change. In 2015, parties pledged in the Paris Agreement to keep the global temperature rise to below 2°C above pre-industrial levels and preferably to limit the increase to 1.5°C, meaning that global emissions must reach a peak before 2025 and global emissions reduced by 43% by 2030.

As we have passed the middle of the timeline between 2015 and 2030 this year, and there will be the first global stocktake at COP 28 at the end of 2023, the global temperature has risen 1.1°C. This means that to achieve the 1.5°C limit, we have only a 0.4°C increase left and need a far more aggressive strategy. Even achieving the 2°C target would be challenging from the current trajectory. It implies the need for a more ambitious effort to transform all sectors, starting from the highest emitters, such as energy, and highest carbon sequestration sources, i.e. forests, to the use of carbon capture for fossil-related sectors and cutting methane emissions, especially in the agriculture sector.

The challenge comes at a time with more fragmented global economies, heightened geopolitical tensions, and more inward-looking industrial and trade policies that could hamper global growth recovery. At the same time, countries are still facing challenges after the COVID-19 pandemic, with more limited fiscal space and rising interest rates to control inflation, which could hamper efforts to boost growth whilst at the same time creating additional challenges in external debt dynamics.

Climate has the characteristics of a public good, being nonexcludable and nonrivalry, which creates a strong global free-riding problem as the abatement cost of action is higher than the benefit for a certain country, corporation, or individual. Without strong global collective actions, there will always be weaker political willingness than necessary to be able to mobilise enough financing and effort to achieve the goal.

Similarly, the COVID-19 pandemic is also a global public good but has managed to gain more public attention because it has impacted people directly in a short period, unlike climate change. Fiscal spending during the two years of the pandemic reached US$9 trillion (excluding tax deferral, social security contributions, and government provisions for loans and equity and government guarantees), whilst the need for achieving net zero is around US$4 trillion per year for the transition to clean energy, according to the International Energy Agency.

The nature of a global public good could also explain the challenge for the global North to fulfil the US$100 billion per year pledge by 2020 or the heated discussion on Article 2.1c, which discusses the financial flows consistent with the pathway towards the Paris Agreement target. The world needs more financing for climate action from now until 2030, around US$1 trillion per year by 2025 to US$2.4 trillion by 2030 for emerging economies, excluding China, according to Songwe, Stern, and Bhattacharya's note that was published during COP27.

In addition to financing for the new low-carbon economy, countries undergoing transition will also need to 'pay' for the lost opportunity of the stranded asset. According to the International Energy Agency, US$90 billion of existing fossil-based energy facilities could be stranded and reach up to $400 billion by 2050. Emerging markets and developing economies will face a higher cost of stranded assets as most of these assets are younger than comparable assets in the global North.

Given these challenges, Indonesia continues to have a robust commitment, with the ambition to achieve net zero by 2060 or earlier, with an enhanced nationally determined contribution (NDC) for 2023 of 31.89%, or 43.20% with international support. The two major sectors for mitigation are forestry and energy, with 500 and 358 megatonnes of CO2-equivalent, respectively, accounting for more than 90% of Indonesia's target. However, there are differences in the abatement cost amongst sectors, with the abatement cost for the energy sector much higher than that for forestry.

We need a robust financing mechanism for green and transition activities, including a bottom-up approach, such as developing bankable projects ready for financing. Lowering the financing cost will require a greater mix of global concessional financing, especially from the multilateral development banks (MDBs). Concessional financing from the government and MDBs can help crowd-in the much-needed private investment and leverage private capital through innovative financing, such as equity investment. Expanding the role of the MDBs and, hence, MDBs' reforms for climate financing is timely.

At the country level, the government has prepared the right policy, instruments, and institutions needed for transition. Indonesia has established the Energy Transition Mechanism country platform to facilitate energy transition projects using blended financing, which will include de-risking instruments to crowd-in private investment.

In addition, Indonesia is currently developing the carbon market and carbon exchange to put a price on carbon and internalize externalities and, hence, impact carbon emissions through a pricing or market mechanism. President Jokowi announced the Indonesia Carbon Exchange in September 2023, right before the finalisation of this book.

At the global level, Indonesia helped push the development of transition finance, and during Indonesia's G20 Presidency, the Sustainable Finance Working Group agreed on the definition of and need for energy transition financing. The ASEAN Taxonomy for Sustainable Finance was also improved during Indonesia's ASEAN Chairmanship to include transition activities, such as coal phase-out.

Beyond this, further work on the transition finance ecosystem is needed, for example by creating credible disclosure and reporting needed for transition finance, as well as an internationally accepted verification body that is interoperable to ensure smooth transition financing flows globally.

The escalating risks posed by climate change necessitate concerted endeavours towards enhanced mitigation and adaptation strategies. Infrastructure has a crucial role in both mitigating and adapting to the challenges posed by disasters and climate change. It serves as a key component in enhancing resilience and facilitating the capacity to cope with disaster risks. Additionally, infrastructure also contributes to carbon emissions, further emphasising its significance in the context of climate change mitigation. According to Thacker et al. (2021), the majority of global greenhouse gas (GHG) emissions, specifically over 79%, may be attributed to infrastructure. Consequently, the implementation of suitable infrastructure has the potential to contribute to the reduction of GHG emissions.

The financing of climate-resilient infrastructure presents difficulties due to a discrepancy between the substantial initial investment required and the unobserved long-term intangible benefits. Intangible advantages may include increased resilience, reduced or avoided interruptions during catastrophic occurrences, fewer fatalities, damages, and productivity losses, as well as any other indirect socioeconomic benefits.

Although many calculations and practical evidence suggest that the advantages of resilient infrastructure outweigh the costs, private investors cannot include them as income streams in their business plans. Government intervention is required to choose between a climate-conscious infrastructure project and a business-as-usual infrastructure project.

Indonesia also issued green *sukuk*, a subset of sustainable bonds, to finance climate-adaptive infrastructure. The government launched its first worldwide green *sukuk*, worth US$1.25 billion, in March 2018. This offering was oversubscribed by 2.5 times. In the years that followed, Indonesia continued to issue green *sukuk*, with the government assuming the role of the primary issuer. It issued both domestic retail (denominated in rupiah) and international (denominated in US dollars) green sukuk. Other issuers, in addition to the government, supplied green bonds. By the end of 2020, the government owned US$3.1 billion of the total US$5.0 billion in outstanding green bonds.

The utilisation of risk structuring in blended finance schemes can also be applied to the structuring of the risks and returns associated with a climate-resilient infrastructure project. Concessional loans, grants, government funds, and philanthropic donations may be utilised to sustain intangible risks and returns that private investors would not assume. Whilst private funds finance the components that generate cost-recovery cash flows. The incorporation of targeted sustainable or climate-focused funds, such as climate funds and Just Energy Transition Partnership (JETP), may also be appropriate. Hence, resilient infrastructure can be developed by collective finance from multiple investors. Indonesia is committed to providing support for the advancement of many financial schemes aimed at enhancing and augmenting the development of robust infrastructure.

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INDORAMA

Chapter 2

Indonesia's Infrastructure and Inclusive Economic Growth

Kiki Verico
Riatu M. Qibthiyyah*

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This chapter examines if infrastructure – as an exogenous variable – is a vital source of inclusive or quality economic growth in Indonesia. This inclusive formulation combines the Solow growth model, Harrod-Domar model, Keynes's identity equation, and Cobb-Douglas model. It also examines if infrastructure helps achieve the Sustainable Development Goals to reduce the economic gap, poverty rate, and open unemployment and increase efficiency for the freer flow of goods and services, making Indonesia more attractive for foreign direct investment inflows. It concludes by examining the geopolitical and geoeconomic elements of infrastructure financing, featuring China's Belt and Road Initiative.

1. Background

During the past decade, Indonesia's efforts towards achieving inclusive growth have accelerated, resulting in improvements to the country's poverty rate and Gini coefficient. However, the COVID-19 pandemic set this achievement back. During the pandemic, the country's poverty rate rose to double digits, from 9.41% 2019 to 10.14% in 2021, before returning to 9.54% in 2022 (Statistics Indonesia). Similarly, before the pandemic, unemployment had steadily decreased from 6.14% in 2012 to 5.18% in 2019 (Statistics Indonesia). However, it rose to 7.07% in 2020 due to a shock to the labour market, given various activity restrictions and weak economic demand. The rate fell back to 5.86% in 2022.

Infrastructure development leads to higher productivity and growth, facilitates trade and connectivity, and promotes economic inclusion (ADBI, 2020). Despite a compelling argument for infrastructure development, some critics point out that infrastructure may not address inequality or substantially contribute to economic growth, or may be executed inefficiently. Calculating the incremental capital–output ratio (ICOR), which indicates the quantity of capital required to produce one unit of output, is one of the methods employed. The greater the ICOR, the greater the amount of capital required to produce the output. However, using the ICOR to assess the impact of massive infrastructure development through the *Proyek Strategis Nasional* (PSN) on economic growth is imperfect, as the ICOR covers only output impacts for a particular period. Indeed, results would be misleading, as the PSN is a multiyear project that needs time to generate complete impacts. Another weakness is that the ICOR's measurement is post-factum, while the development of the PSN is ongoing.

This chapter thus argues that an analysis of the PSN requires quality growth analysis as a proxy for the inclusive aspect. It also needs to consider that amidst the long period of PSN development, Indonesia's economic growth has been secure. In the realm of industrial sector development, encompassing infrastructure and manufacturing, Indonesia has made notable progress since the Asian Financial Crisis of 1998 During this period, the country successfully elevated the infrastructure's contribution to GDP, rebounding from a low of 35% in 2015 to 43% in 2019, as reported by Statistics Indonesia. This increase can also be viewed in annual terms, where the share of infrastructure in GDP climbed from 5.5% in 2000 to a significant 10.4% in 2021. Conversely, the manufacturing sector has been experiencing a reduction in its share, declining from 25% in 1998 to 19% in 2022, according to Statistics Indonesia. The upswing in infrastructure's contribution to GDP since 2015 reflects the effectiveness of the *Proyek Strategi Nasional* (PSN), which was initiated in 2016 and has played a pivotal role in this positive trajectory.

Another determinant of growth is participation in global trade. This can be assessed through indicators such as the country's current account and foreign direct investment (FDI). Both of these factors are closely tied to the performance of the manufacturing sector (Verico and Natanael, 2018). Specifically, a nation's manufacturing sector's economic competitiveness plays a pivotal role in determining the level of export-oriented FDI it attracts. This competitiveness is closely linked to the market mechanism indicator, which facilitates the free flow of goods and services. A conducive environment for such trade supports and enhances manufacturing competitiveness. Furthermore, it is worth noting that infrastructure, as an exogenous factor, comes into play subsequent to the assessment of total factor productivity (TFP) in influencing a country's growth trajectory. Therefore, another dimension for analysis is the impact of the PSN on the Logistic Performance Index (LPI) as a reflection of the free flow of goods and services as a driver of current account-oriented FDI inflows, reflecting the country's savings rate and economic growth.

In terms of a global consensus, infrastructure development is also a part of the Sustainable Development Goals (SDGs). SDG 9 touches on resilience infrastructure that promotes inclusiveness, implying a clear distributive impact and support for innovation towards sustainable industrialisation. In Indonesia, public investment and private financing play significant roles in providing infrastructure – as in the PSN – and are expected to maintain stable investment flows to the economy. Yet in the early period of the pandemic, public infrastructure spending was scaled back; in recent years, it has again increased. At the sub-national levels, infrastructure spending is also part of Indonesia's mandate of decentralisation.

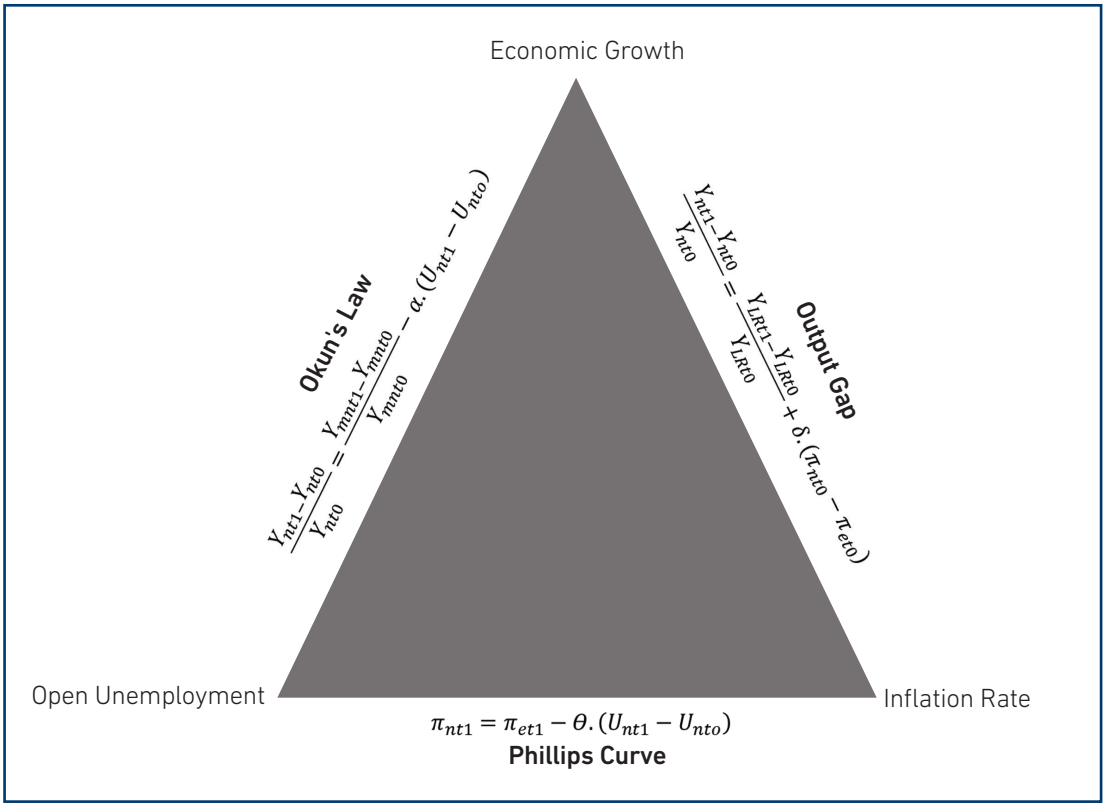
While some argue that a lack of available financing impedes infrastructure development, the literature has noted that infrastructure development must match financing with investable projects (Ehlers, 2014; Walter, 2016). Thus, the main challenge is to connect demand-side projects with economic viability – including project risk and risk mitigation – with the supply side of investable funds in search of optimal portfolio allocation. Project financing depends on banking expertise and lending as the funding source during the construction phase, while securitised bank debt and government bonds are the primary sources of funds during the operating phase (Walter, 2016). This financing aspect holds geopolitical and geoeconomic factors. From an international economics perspective, infrastructure development aims to enhance the bond amongst logistics services, current account, and FDI inflows as well as to accelerate economic growth.

This chapter seeks to examine the relationship between the extensive infrastructure development within the PSN and its impact on Indonesia's inclusive economic growth. It employs a mixed-method approach, encompassing one quantitative analysis exploring the triangular relationship between inclusive growth, open unemployment, and inflation rates (as per Verico, 2021) (see Appendix 2.1), as well as two desk-research methods involving descriptive data analysis and literature review.

The initial section of this chapter delves into the influence of infrastructure on Indonesia's inclusive economic growth. It asserts that higher infrastructure quality is correlated with more inclusive economic growth. To measure this quality, a triangular relationship is used, examining economic growth vis-a-vis open unemployment (utilising Okun's Law), open unemployment in relation to the inflation rate (as per the Phillips Curve), and economic growth juxtaposed with inflation (depicting the output gap) (refer to Figure 2.1).

The subsequent segment elucidates the role of infrastructure in fostering economic efficiency and economies of scale. To analyse economic efficiency, this chapter draws on pertinent literature reviews and descriptive data comparisons, particularly assessing progress in the Logistic Performance Index (LPI) and net foreign direct investment (FDI) inflows. It also provides an overview of Indonesia's infrastructure development over the past decade, focusing on its alignment with Sustainable Development Goals (SDGs), with a special emphasis on connectivity. Additionally, the chapter identifies trends in Indonesia's logistics sector performance and compares them with those of other Association of Southeast Asian Nations (ASEAN) Member States (AMS). It addresses ASEAN regional connectivity and offers recent updates on digital infrastructure and maritime connectivity. Lastly, the chapter delves into the geopolitical and geoeconomic dimensions of infrastructure financing.

Figure 2.1. Triangle of Economic Growth, Open Unemployment, and Inflation Rate



Source: Authors.

2. Analysis

2.1. Infrastructure and Inclusive Economic Growth

The notion that infrastructure development promotes economic growth has been documented in the literature (e.g. Calderón and Servén, 2004; Egert, Kozluk, Sutherland, 2009; Irawan et al., 2012). Extensive, good-quality infrastructure improves mobility and connectivity, which leads to the efficient distribution of goods and services and lower transport costs. To accelerate infrastructure development in Indonesia, the government – under *Komite Percepatan Penyediaan Infrastruktur Prioritas* (Committee for the Acceleration of Provision of Priority Infrastructure, KPPIP) – has identified 208 projects and 10 programmes to be a part of the PSN, according to the latest Ministerial Regulation (Permenko No. 7/2021).

In a multilevel government, like that of Indonesia, the infrastructure provided by the central government potentially expands the tax base at the central and sub-national levels. For example, regarding land transport infrastructure, the Trans-Sumatra Toll Road construction has been associated with an increase in per capita central government taxes in the region by 13% (Syahputra and Qibthiyyah, 2022). Road length has also been positively correlated with increased provincial tax revenues (Andriany and Qibthiyyah, 2018).

At the static level, infrastructure is a necessary condition and exogenous factor in accelerating economic growth. It is a necessary condition because infrastructure – in addition to human capital productivity – is essential to increase the value addition of land. Since it is exogenous, infrastructure development requires government intervention, which varies amongst countries; China tends to lean towards using state-owned enterprises, while the United States employs private enterprises.

This chapter shows that economic growth has two major factors: the increasing capital productivity (i.e. technological progress) and the quality of the institution (see Appendix 2.2 for the mathematical formulation and derivation). Both indicators reflect the country's efficiency or economies of scale. The output reflects the composite of long-run investment and net exports. Investments and net exports represent a country's competitiveness at the global level. Both trade competitiveness and long-run investment inflows are the results of the endogenous growth factors of environmental justice, population size, human productivity, and exogenous growth factors of land capital with the stimulating capital of infrastructure and technological level. It also represents continuous, never-ending reforms, which reflect the quality of institutions that depends on share value, integrity, transparency, anti-corruption behaviours, good governance, and clean government.

However, developing infrastructure from the construction phase to operation takes time. Costs arrive immediately, while the impact on output and outcome comes often much later. A commonly used indicator is the ICOR, which increases amidst massive infrastructure development like what Indonesia has been experiencing since 2016. The ICOR has increased, and the quality of economic growth during PSN development has been consistently good. This good quality can be seen in the triangular relationship between economic growth, open unemployment, and inflation (amongst Okun's Law, Phillips Curve, and the output gap) from 2016 to 2019 (see Appendix 2.3 for mathematical derivation).

This chapter shows that in the static-level analysis, the relationship between economic growth and infrastructure development is only accurate if not anchored to the ICOR – again, as the impact comes after, while the cost comes immediately. The output impact works only during the infrastructure construction phase; growth impact takes some time. Therefore, the measurement must include the quality of economic growth using the inclusive economic growth concept, which utilises the quality economic growth measurement of open unemployment, the Phillips Curve, Gini coefficient, poverty rate, and output gap. The last index compares economic growth and the inflation rate, which reflects the comparison of short- and long-run economic growth.

This chapter argues that if economic growth is higher than the inflation rate at the time of an open unemployment rate decline, this indicates that short-run economic growth is above that of the long run. This condition confirms the positive outcome of the output gap and that of Okun's Law on the quality of economic growth and Phillips Curve on a healthy inflation rate. To complete the output gap that compares short- and long-run economic growth, economic growth and the inflation rate are compared.

In 2019 – the pre-pandemic era – Indonesia's savings rate achieved 33.26% of gross domestic product (GDP) (Table 2.1). Indonesia's savings rate – compared to those of other AMS – was not low, with an economic multiplier of around three. It also shown that the higher the income per capita, the higher the savings rate or the lower the marginal propensity to consume. This comparison is consistent – except between Malaysia and Thailand, as Malaysia is supposed to hold a higher savings rate than Thailand (Table 2.1).

Table 2.1. ASEAN Member State Savings Rates, 2019
(% of GDP)

ASEAN Member State	GDP per capita (current $)	Gross Domestic Savings (% of GDP)
Singapore	65,831	54.19
Brunei Darussalam	31,086	54.51
Malaysia	11,433	28.57
Thailand	7,814	34.06
Indonesia	4,135	33.26
Philippines	3,485	14.33

ASEAN = Association of Southeast Asian Nations, GDP = gross domestic product.

Source: World Bank, World Development Indicators, https://data.worldbank.org/indicator (accessed 30 March 2023).

As Indonesia's economic growth was on average about 5.1%, the ICOR is 6.5. If Indonesia's ICOR is at its best, for instance, at 4.42 in the late 1980s and early 1990s, Indonesia's economic growth could be 7.5% (Table 2.2).

Table 2.2. Indonesia's ICOR by 5-Year Period, 1979–2019

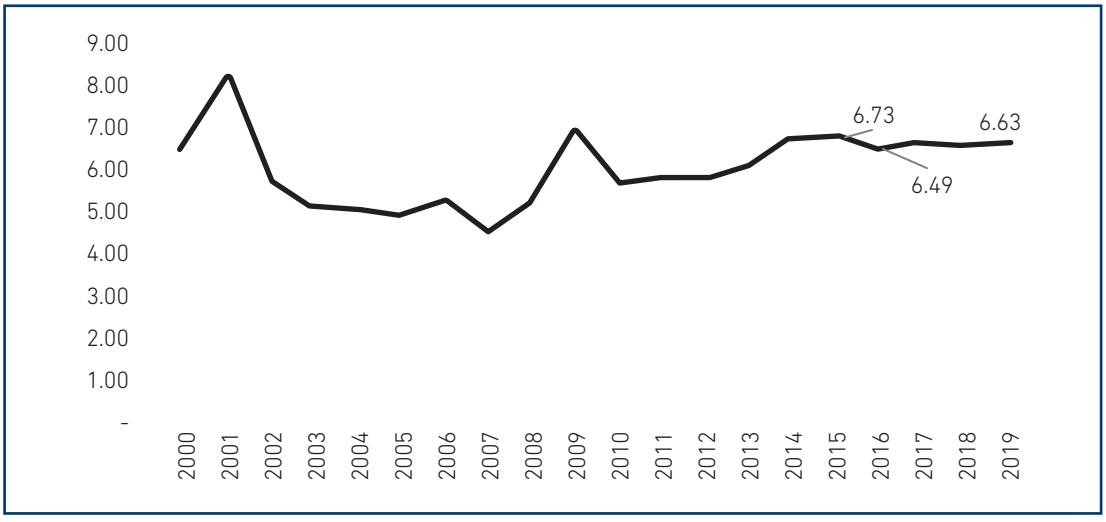
Period	ICOR
1979–1983	4.90
1983–1987	6.34
1987–1992	4.42
1992–1997	4.63
2000–2004	6.04
2004–2010	5.29
2010–2014	5.96
2014–2016	6.63
2016–2019	6.58

ICOR = incremental capital–output ratio.

Source: Authors.

Indonesia aims to increase its efficiency or to achieve economies of scale, which means decreasing its ICOR by developing massive infrastructure (i.e. the PSN). During the PSN, Indonesia's average ICOR from 2016 to 2019 increased to around 6.6. Yet, it decreased from 6.7 in 2015 (Figure 2.2).

Figure 2.2. Indonesia's ICOR, 2000–2019



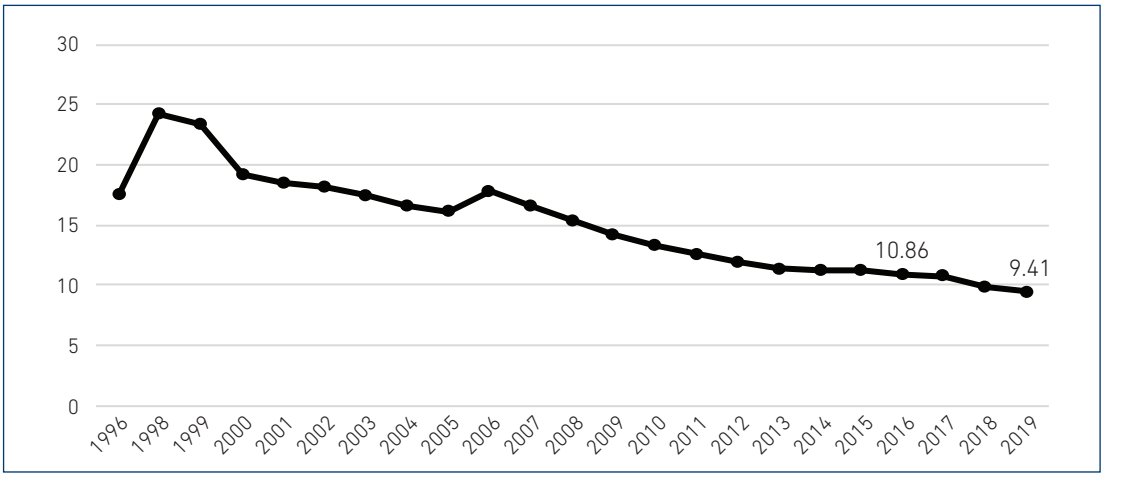
ICOR = incremental capital–output ratio.

Source: Authors.

Using ICOR as a measure to gauge the impact of infrastructure on growth can be misleading This is because ICOR is calculated by dividing the GDP investment share by the GDP growth rate during the same period, which may not align with the actual timing of infrastructure influence. A more appropriate approach is to assess the quality of economic growth using ICOR. This perspective integrates the concept of inclusive economic growth (Smith and Todaro, 2020; Jiang et al., 2022).

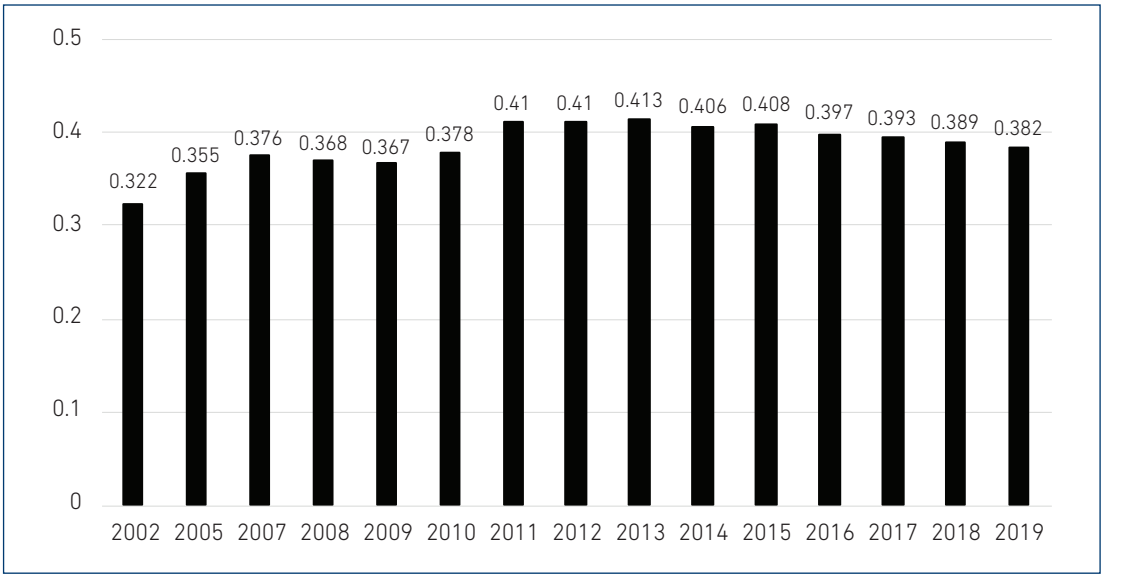
During the PSN period, spanning from 2016 to 2019, notable improvements were observed in key socio-economic indicators. Figures 1.3. illustrate a decrease in poverty rates, reflecting a decline in the percentage of individuals living below the poverty line. Additionally, there was a reduction in income inequality, as indicated by a decrease in the Gini coefficient (see Figures 1.4). These classical indicators help prove that the PSN's establishment did not reduce economic growth quality. Economic growth has been on track.

Figure 2.3. Indonesia's Poverty Rate, 1993–2019
(%)



Source: Statistics Indonesia.

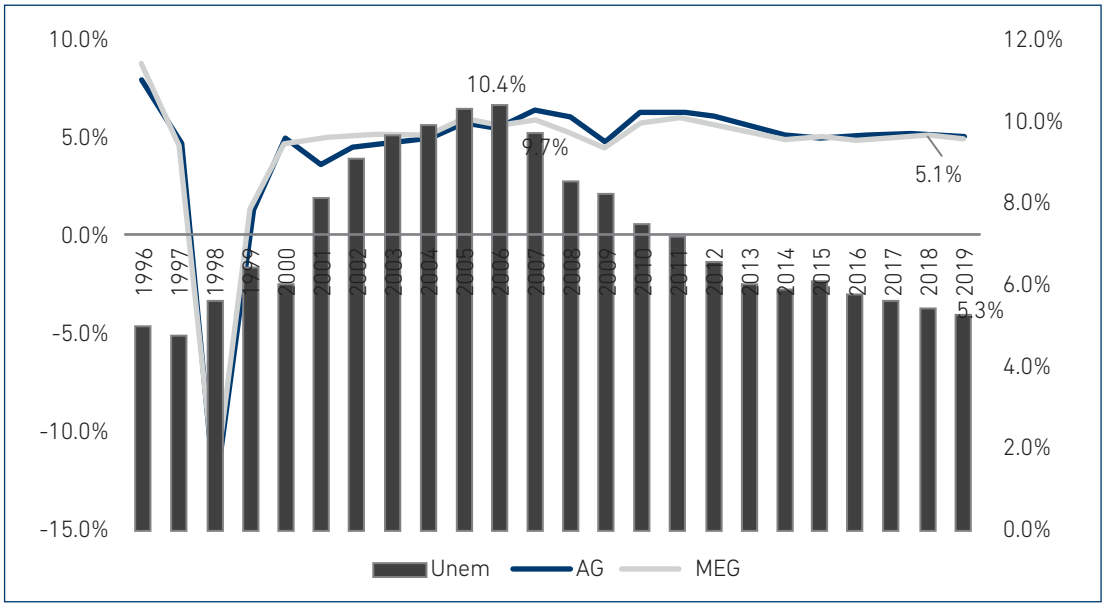
Figure 2.4. Indonesia's Gini Coefficient, 2002–2019
(%)



Source: Statistics Indonesia.

The triangular relationship further confirms the finding of these two economic growth measurements.

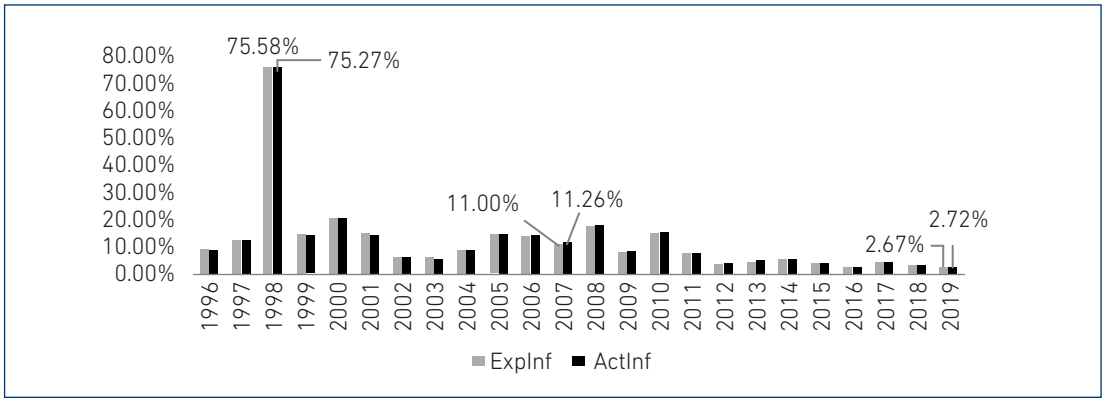
Figure 2.5. Okun's Law on Indonesia's Open Unemployment, 1996–2019
(%)



Unem = open unemployment, AG = average economic growth, MEG = minimum economic growth to generate jobs.
Source: Authors.

Moreover, the correlation between economic growth and open unemployment, commonly referred to as Okun's Law, indicates that prior to the pandemic, the real rate of economic development above the threshold required to generate employment opportunities within the labour market. This finding demonstrates an enhancement in the quality of economic growth during the period from 2016 to 2019.

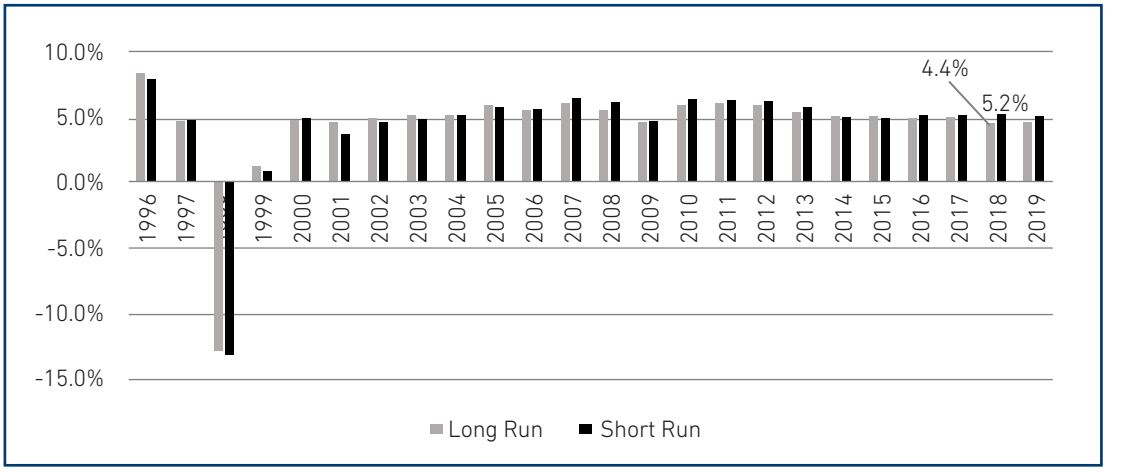
Figure 2.6. Phillips Curve on Indonesia's Inflation Rate, 1996–2019
(%)



Source: Authors.

The Phillips Curve confirms the findings of Okun's Law. From 2016 to 2019, Indonesia's inflation rate was healthy, validating the positive expectations for Indonesia's economy during this period. This finding is also useful as an early indicator that Indonesia's economy was productive, creating output more than raising prices.

Figure 2.7. Indonesia's Output Gap per Year, 1996–2019
(%)



Source: Authors.

Therefore, the comparison between short- and long-run growth as a proxy of the output gap shows that from 2016 to 2019, short-run economic growth was above long-run economic growth, indicating that the output gap was always positive amidst the massive infrastructure development of the PSN (Figure 2.7).

To further illustrate the positive output gap, economic growth and inflation rates are compared. The findings indicate that the period from 2016 to 2019 was a productive phase, defined as a period during which economic growth exceeded inflation. This implies that the economy generated more real output than it stimulated price hikes. In contrast, a less productive period is defined as a period when economic growth was lower than inflation. During the period from 1960 to 2022, there were a total of 15 productive years. The extensive infrastructure development of the PSN took place during these productive years. Throughout this period, the PSN consistently maintained a pace of inclusive economic growth, as reflected in Table 2.3. Additionally, this methodology helps identify recessionary periods marked by negative economic growth.

Table 2.3. Indonesia's Periods of Productivity, 1960–2022

Productive Years	1971, 1972, 1986, 1989, 2000, 2009–2012, 2016–2019, 2021, 2022
Less Productive Years	1960–1962, 1964–1970, 1973–1985, 1987–1988, 1990–1997, 1999, 2001–2008, 2013–2015
Stagflation Years	1963, 1998
Liquidity Trap	2020

Source: Authors.

Indonesia has only experienced 2 years of a negative growth crisis, in 1963 and 1998. It has never experienced a liquidity trap, where the inflation rate is below the economic growth rate. Yet a liquidity trap almost occurred in 2020 due to the pandemic, which made Indonesia's annual economy grow at –2.00% with a lower inflation rate with the absolute value of 1.68%.

In terms of green infrastructure, Verico (2022) confirmed that population and human productivity are the essential factors for achieving the SDGs.[1] This equation explained that the depletion and degradation of the environment are due to human capital. The better the productivity from improving ecological technology, the better the environment. The commitment to a green economy depends on human capital and technology orientation. The increasing population must be balanced with improving welfare, again showing the importance of inclusive economic aspects.

[1] $y_{nt(k_{nt})} = (\partial_{nt}) + n_{nt} + g_{nt}).k_{nt}$ ..... (a)
$MPK_{nt} = \partial_{nt} + n_{nt} + g_{nt}$ ..... (b)
$MPK_{nt} = \partial_{nt} = g_{nt} + n_{nt}$ ..... (c)
where $y_{nt(k_{nt})}$ is economic growth, ∂_{nt} is environmental justice, n_{nt} is population size, $g_{nt} = \frac{\partial E}{E\ nt}$ is human productivity, and MPK is marginal productivity of capital.

2.2. Infrastructure and Competitiveness

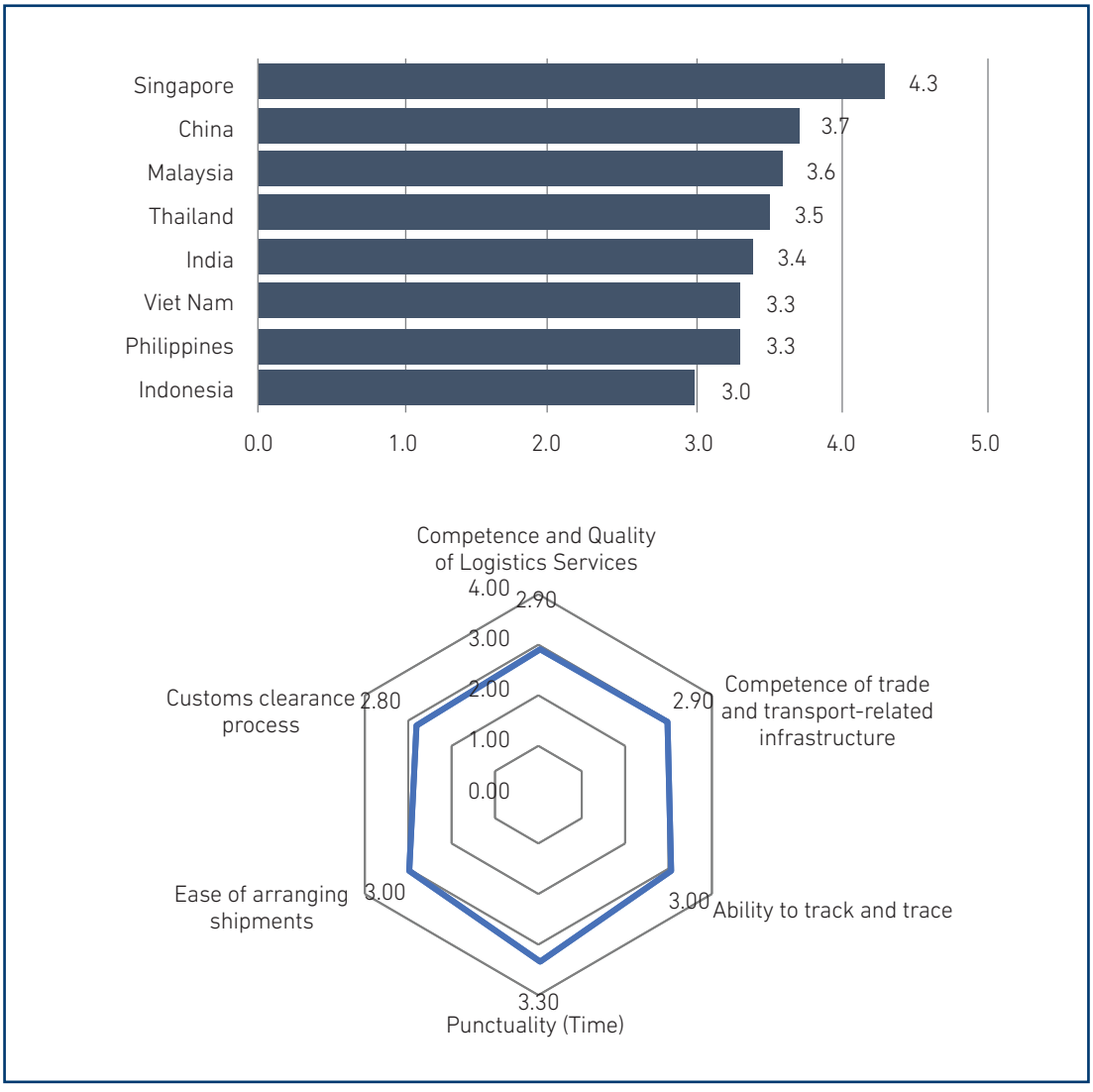
According to Tongzon (2012), the evaluation of infrastructure's impact on economic growth through the Harrod-Domar-Keynesian framework suggests that trade liberalisation in Indonesia necessitates more extensive deregulation in logistical services, particularly infrastructure support. This is a challenge for Indonesia. Logistics services are a significant prerequisite to improving the free flow of goods, both exports and imports. This improvement increases the current account and attracts future FDI inflows. The rising connection between the current account and FDI inflows boosts economic growth and international reserves, which will strengthen the local currency.

The World Bank (2023) produced an index to measure each country's logistics performance, conducted bi-annually since 2010. In 2018, Indonesia measured a 2.60 in its customs clearance process; 2.89 in the quality of trade and transport-related infrastructure, indicating the need to invest in new vessels and to rehabilitate its main ports; and a 3.67 in punctuality. In 2023, its customs clearance process rose to a 2.80, and the quality of trade and transport-related infrastructure reached a 2.90 (Figure 2.8).

Some studies have shown that the declining cost of logistics decreases total costs by 30% (e.g. Fink, Matoo, Neagu, 2000) and increases profits 5%–8% for every 1% decrease in logistics costs (Hummels, 1999). Indonesia's international economic efficiency has several positive factors: port infrastructure, bonded zones, export-processing zones, custom clearance, other administration, and digital platform utilisation. They cover 15%–25% of the total cost (Tongzon, 2012; World Bank, 2013). Yet according to Arvis et al. (2010), in the second World Bank's release of LPI in 2010, Indonesian infrastructure reached 2.54[2] while its customs clearance reached 2.43 and logistics competence 2.47. Its highest scores were for timeliness (3.46), international shipment services (2.82), and tracking-tracing (2.77).

[2] The LPI covers customs clearance, infrastructure, international shipment, logistics service quality, tracing and tracking, and timeliness.

Figure 2.8. Logistics Performance Index by Category, 2023



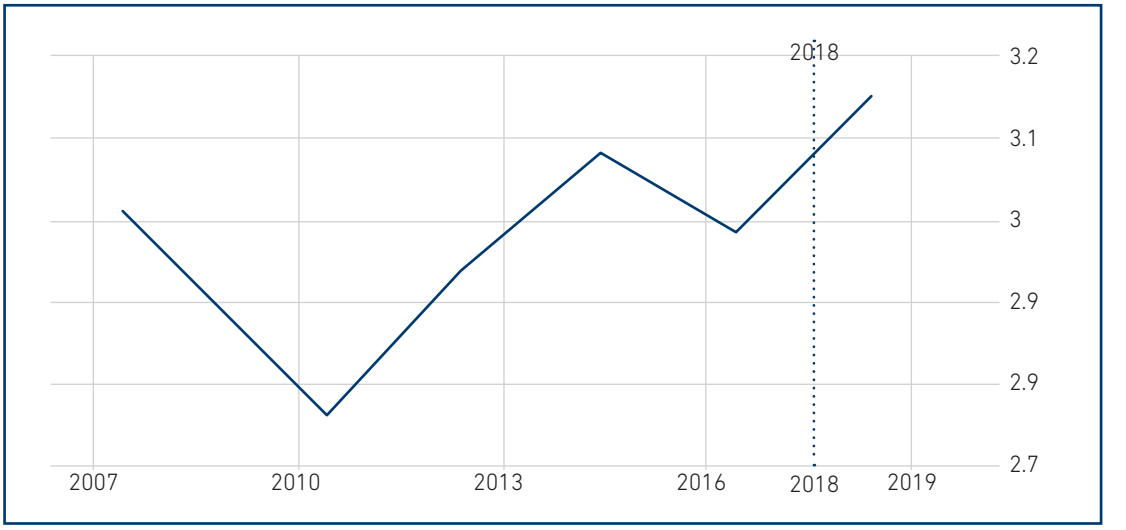
Source: World Bank (2023).

The Government of Indonesia has placed maritime connectivity at the core of its infrastructure improvement policy. Given this, the cargo loaded in 2021 increased 2.5 times since 2006. In 2015, the government launched the Maritime Highway Programme to induce new economic activity and to reduce the price disparity between islands. The programme aims to subsidise private operators and state-owned enterprises in specific transport lanes to minimise transport costs. The Economic Research Institute for ASEAN and East Asia (ERIA) (2021) evaluated this policy's effectiveness, finding that it comes with increased economic activity in areas near the ports, increased household consumption, and a heterogenous effect on price disparity for several commodities.

From 2007 to 2023, Indonesia recorded LPI scores between 2.5 to 3.2, classified as a partial performer (Fajarini, 2023).[3] This classification is in line with the income per capita of this lower middle-income country. The first step to improve Indonesia's logistics and related infrastructure is establishing a lead institution; in 2018, it began a national single window under the Ministry of Finance to oversee the free flow of goods and services.

Using 2018 as the cut-off year (before the pandemic affected global trade and logistics), Indonesia's LPI scores, which cover both administration and infrastructure, improved (Figure 2.9). This indicates that government interventions are essential in enhancing the necessary exogenous sources of economic growth-entitled infrastructure.

Figure 2.9. Indonesia's Logistics Performance Index, 2008–2019

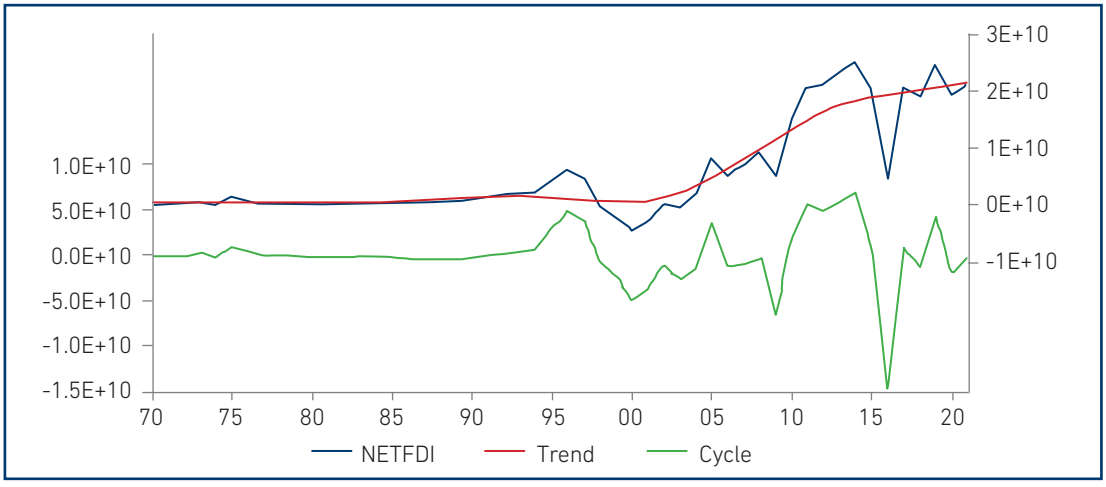


Source: World Bank (2023).

[3] There are four classifications for the LPI: poor (below 2.5), partial (2.5–3.2), consistent (3.3–3.6), and excellent/logistic friendly (above 3.6).

Hypothetically, the improvement of Indonesia's LPI scores since 2018 has attracted more FDI inflows. Figure 2.10 indicates that since 2018, the net FDI inflows have indeed been growing above their potential level. Yet the COVID-19 pandemic hit the global economy and caused a decline in flows of FDI around the globe, including towards Indonesia. The overshot effect had stopped by 2019, just before the pandemic impact hit Indonesia. This figure initially proves the hypothesis that the LPI's improvement positively affects FDI inflows.

Figure 2.10. Net Foreign Direct Investment Inflows of Indonesia with the Hodrick-Prescott Filter, 1970–2021



FDI = foreign direct investment.

Source: Authors.

Figure 2.10 also indicates that the LPI had a 1-year lag effect on FDI inflows. Indonesia's rank improved from 2014's 53 to 2018's 46, and FDI inflows increased significantly from 2018 to 2019. Moreover, it fell from the rank of 17 with a score of 3.15 in 2018 to 63 in 2023 with a score of 3.0-. This decreasing index will affect Indonesia's FDI inflows in 2024, as it now needs to put more effort into attracting investment in 2024 (Fajarini, 2023). Efforts can focus on improving the decreasing points in the LPI in 2023: timeliness, tracking and tracing, international shipments, and logistics competence and quality. Two improved indexes were customs, from 2.67 to 2.80, and infrastructure, 2.89 to 2.90. Timeliness and international shipment require international collaboration, while tracking and tracing and logistics competence need strong cooperation between the government and related business entities.

Efficiency in logistics and infrastructure can transform the Indonesian economy from forwards participation (i.e. exporting raw materials) to backwards participation (i.e. a production base country for intermediate input). Indonesia favours keeping forwards participation above backwards participation, which would create a down-streaming unorthodox approach.

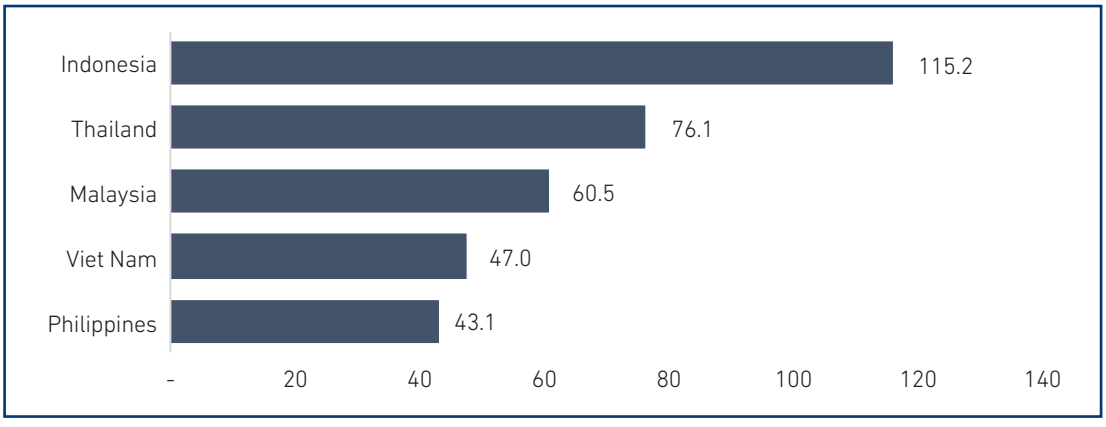
2.3. Transport and Digital Infrastructure

Infrastructure is critical to the development agenda. The 17 SDGs require infrastructure, both directly and indirectly. Transportation is an essential enabler of various SDGs. It makes a significant contribution to the SDGs in terms of economic development, industrial development, and SMEs. These will affect employment creation and welfare while reducing disparities and exclusion. Furthermore, information and communication technologies (ICTs) can help to accelerate progress toward the SDGs. ICTs enable the delivery of high-quality goods and services in some sectors, including health care, education, banking, trade, agriculture, and governance. They can help in generating new employment opportunities, fighting poverty and hunger, promoting better health, increasing energy efficiency, enhancing adaptation and mitigation efforts, and ensuring the sustainability of living spaces and ecosystems. In this section, we discuss the development of transport and digital infrastructure in Indonesia.

2.3.1. Air Transport

Amongst AMS, Indonesia has the largest passenger air transport market, with as many as 115 million passengers served in 2018 (Figure 2.11). As an archipelagic country with the largest population in the region, air transport is driven by domestic flights. The primary challenge facing this industry stems from the unequal distribution of population across Indonesia's expansive archipelago. As a result, achieving economies of scale in transportation and logistics becomes challenging when attempting to reach remote areas characterised by low population density.

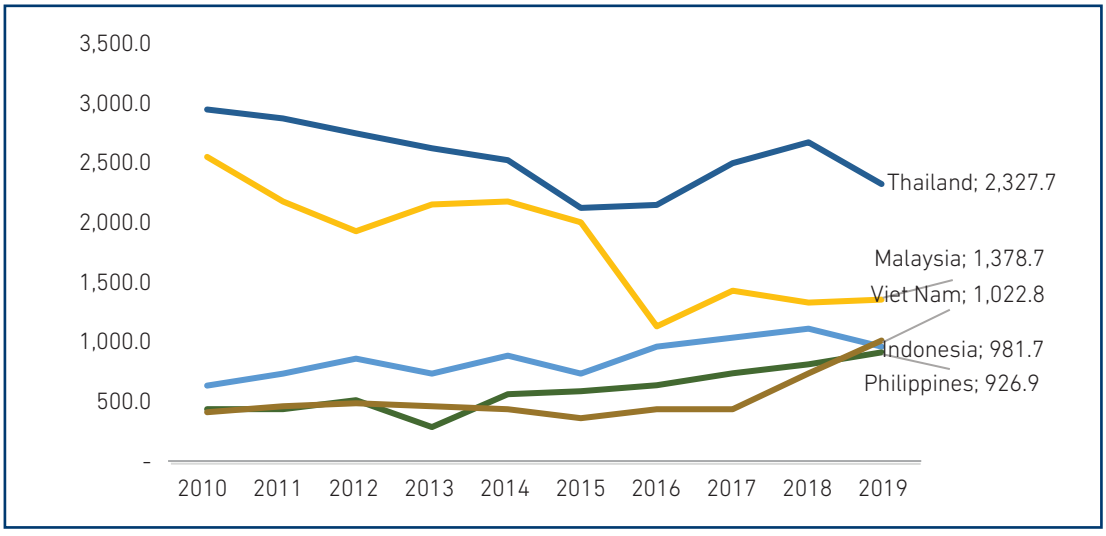
Figure 2.11. Air Transport Passengers in Selected ASEAN Member States, 2018
(million people)



Source: World Bank (2023).

While most logistics are delivered by sea, air freight transport is vital for high-value goods where speed matters. In the last decade, the number of goods transported by air in Indonesia has steadily climbed (Figure 2.12). In 2018, the number of goods transported through air freight transport was around 1.1 billion tonnes-kilometre before falling to 982 million ton-kilometres in 2019. The number, however, is below the statistics of neighbouring countries, like Thailand, Malaysia, and Viet Nam – but higher than the Philippines.

Figure 2.12. Air Transport, Freight, Selected ASEAN Member States, 2010–2019
(million tonne-kilometres)

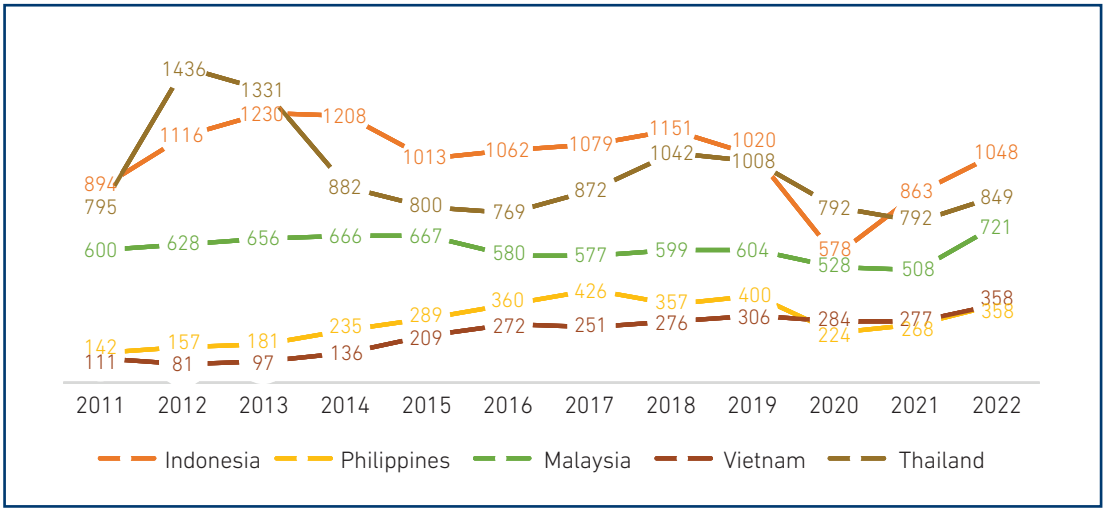


Source: World Bank (2023).

2.3.2. Land Transport

Data show that the number of vehicles sold in Indonesia has been consistently above 1 million per year since 2012. Indonesia experienced the largest decline in vehicle sales in 2020 compared to other AMS, but vehicle sales in 2022 exceeded the pre-pandemic level in 2019. For 2021–2022, vehicle sales in Indonesia were the largest in the ASEAN region (Figure 2.13).

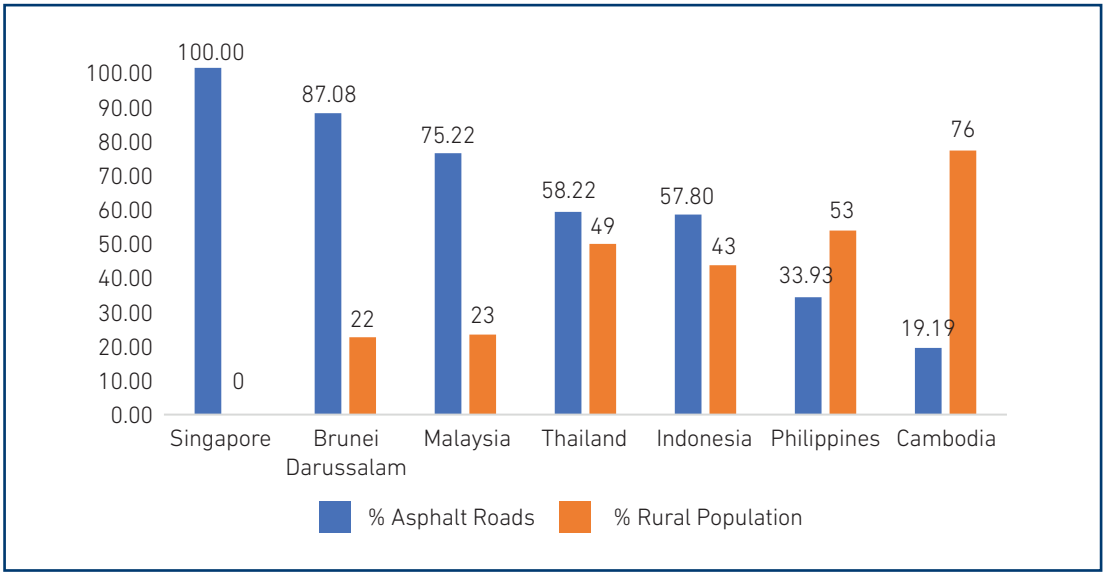
Figure 2.13. Vehicles Sold in Selected ASEAN Member States, 2011–2022
('000 units)



Sources: Gaikindo (2023), CEIC, Indonesia Premium Database, https://insights.ceicdata.com/ (accessed 30 March 2023).

An increased trend of paving roads fell in 2021, however, indicating that roads must improve (Figure 2.14). The percentage of paved roads tends to be higher in relatively urbanised countries.

Figure 2.14. Asphalt Roads, 2021 and Rural Population, 2020, Selected ASEAN Member States
(%)

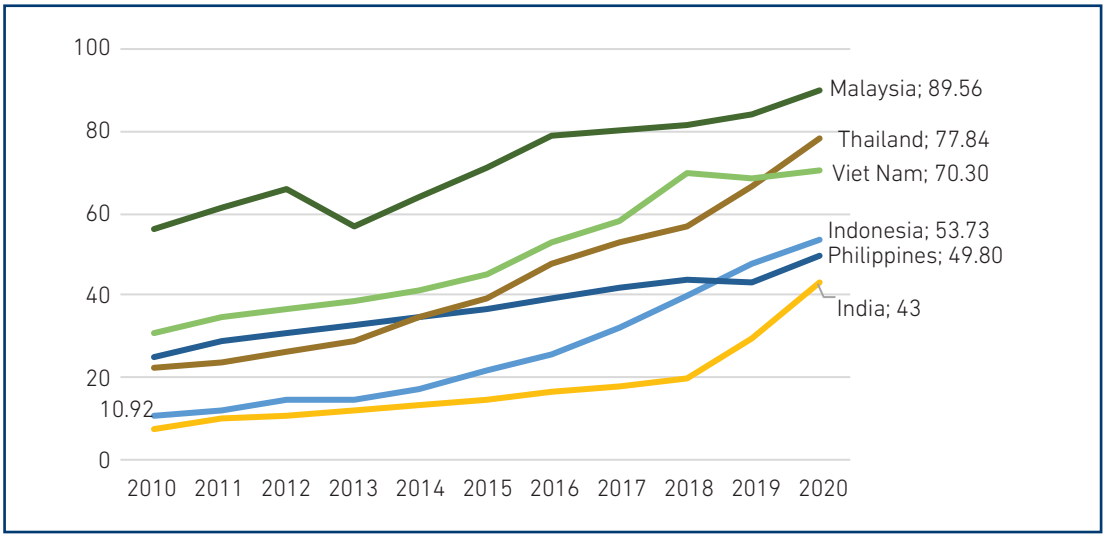


Sources: Gaikindo (2023), CEIC, Indonesia Premium Database, https://insights.ceicdata.com/ (accessed 30 March 2023), ASEAN database dashboard (accessed 30 March 2023), and the ASEAN Rural Landscape (2022).

2.3.3. Digital Infrastructure

Today, connectivity has grown beyond mobility to digital presence, which has been improving due to advancements in technology and the expansion of internet access. Internet adoption has grown strong over the last decade as internet coverage widened and social media use rose. In 2010, only 10.9% of the population in Indonesia used the internet; this number increased almost five times to 53.7% in 2020 (Figure 2.15). Despite rapid growth, this rate is still lower than those in neighbouring countries such as Malaysia, Thailand, and Viet Nam. Nevertheless, the coverage is still superior to that of the Philippines and India.

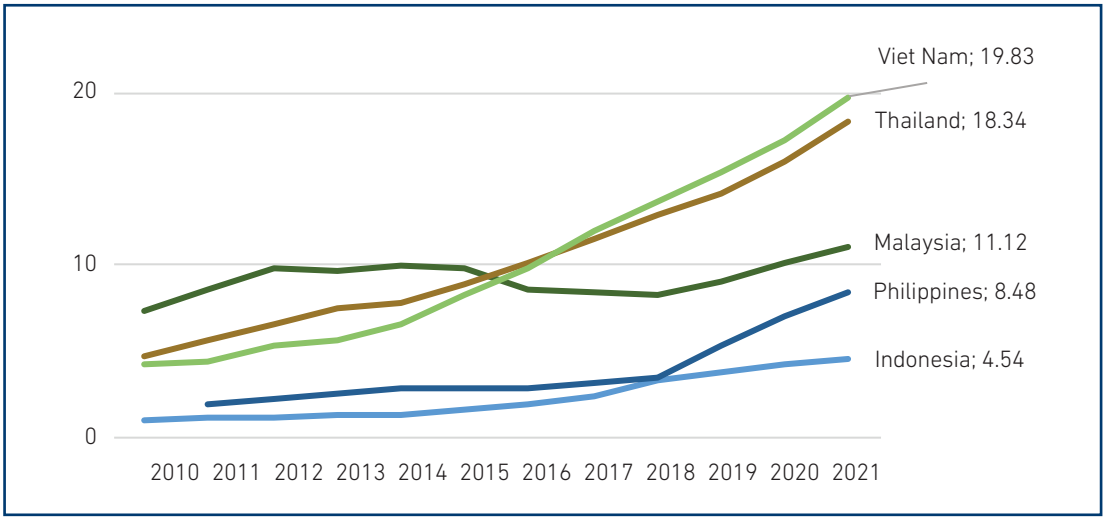
Figure 2.15. Individuals Using the Internet, Selected Countries, 2010–2020
(% of the population)



Source: World Bank (2023).

Indonesia needs to improve in terms of fixed broadband infrastructure, as it has the lowest rate in the region – 4.5 fixed broadband subscriptions per 100 people (Figure 2.16). Viet Nam and Thailand lead with 19.8 and 18.3, respectively, followed by Malaysia (11.1) and the Philippines (8.5).

Figure 2.16.Fixed Broadband Subscriptions, Selected ASEAN Member States, 2010–2021
(per 100 people)



Source: World Bank (2023).

The Digital Evolution Index[4] shows that the Republic of Korea, Singapore, and Malaysia are the three best countries for digital evolution as they have achieved excellent static and momentum levels (Figure 2.17). If the current state is low, but momentum is high, such a countries – which includes China, Indonesia, and Thailand – will soon break out. If momentum is low and the current state is high, a country is classified as a stall out (e.g. Australia and Japan). The Lao People's Democratic Republic is classified at the watch-out level, as both its current state and momentum are slow.

[4] Digital Evolution Index is an index that plots countries across four drivers of digitalisation, including (1) supply condition, (2) demand conditions, (3) institutional environment, and (4) innovation and change. The complete study can be accessed in The Fletcher School, Tufts University, Digital Intelligence Index, https://digitalintelligence.fletcher.tufts.edu/trajectory (accessed 29 March 2023).

Figure 2.17. Digital Intelligence Index

Source: The Fletcher School, Tufts University, Digital Intelligence Index, https://digitalintelligence.fletcher.tufts.edu/trajectory (accessed 30 March 2023).

Digital economic infrastructure and development stages conform to the inclusive principle, and have a positive impact on MSMEs. The transformation from offline to online e-commerce increases smartphone usage, thereby accelerating the development of business and consumer relationships.

2.4. Infrastructure and Geopolitical Aspects

Indonesia, as a significant emerging country, has garnered considerable interest from major stakeholders in the infrastructure industry as it advances its infrastructure development endeavours. Globally, international investors seek profitable ventures. In addition to economic incentives, infrastructure development is not immune to political interests. China has demonstrated a strong inclination towards investment in significant infrastructure projects across the Asian region. It has made investments in and undertaken the development of various significant infrastructure projects within the Indochina area, Southeast Asia, and South Asia. A significant number of these projects are included within the framework of regional connectivity as outlined by the Belt and Road Initiative (BRI). The BRI was launched in 2013 and is part of President Xi Jinping's international cooperation policy to increase China's connectivity with over 100 countries and to connect Asia with Africa and Europe via land and maritime networks. Zhang (2018) argued that the BRI carries much geopolitical weight as it aims to reduce tensions and to increase mutual trust with neighbouring countries.

The BRI comprises the Silk Road Economic Belt, a transcontinental passage that links China with South-East Asia, South Asia, Central Asia, Russia, and Europe by land; and the Maritime Silk Road, a sea route connecting China's coastal regions with South-East Asia, South Asia, the South Pacific, the Middle East, and Eastern Africa, all the way to Europe. The BRI possibly encompasses an area that accounts for 55% of global gross national product, 70% of the world's population, and 75% of all known energy sources (Bondaz, 2015). It aims to improve regional integration, increase trade, and stimulate economic growth. Five priorities include policy coordination, infrastructure connectivity, unimpeded trade, financial integration, and connecting people.

Worried that the BRI would challenge and undermine the influence of the United States, the Donald Trump Administration often publicly criticised the initiative; President Trump once said the initiative was 'insulting' (Karni, 2018). Vice-President Mike Pence claimed the US will not 'offer a constricting belt or a one-way road' when speaking at the Asia-Pacific Economic Cooperation (APEC) meeting in November 2018 (Reuters, 2018).

[5] G7 nations recently established the Build Back Better World programme as an alternate means of assisting lower-income countries with infrastructure development, which is viewed as a counterbalance to the BRI.

Previous studies have indeed identified challenges in the BRI, yet specific details are scarce, particularly at the bilateral level (Bondaz, 2015). Bondaz (2015) discussed a geopolitical and diplomatic offensive. Critics are also apparent in how China uses debt and market traps to 'reshape international relations in its favor' through fostering reliance on BRI partner countries (Mobley, 2019).[5]

The debts of more than half of the nations listed under the BRI are rated as 'junk' or are not graded due to domestic political and economic difficulties. Some of these nations are susceptible to dependency and economic pressures because they have few options. Chinese loans typically lack restrictions but frequently demand that projects be provided to Chinese firms and 'at least 50% of material, equipment, technology, or services' be supplied from China, in contrast to loans from multilateral financial organisations, which insist on responsibility and reforms (Eva et al., 2018 in Mobley, 2019).

President Xi jointly announced the plan to extend the BRI when visiting Indonesia in October 2013. In the same year, the two countries expanded their longstanding partnership into a comprehensive strategic partnership that includes industry, infrastructure development, and the transport sector (Damuri et al., 2019). In October 2016, it was announced that China won the bidding for the Jakarta–Bandung High-Speed Railway, a flagship project of President Joko Widodo now part of the BRI (Sulaiman, 2023). The first high-speed railway in South-East Asia, it covers 142.3 kilometres and is expected to reduce travel time to 40 minutes, as the train will be able to travel at up to 350 kilometres per hour.[6] A trial run has been conducted since May 2023, and the high-speed railway is expected to begin its operation in August 2023.

[6] The current railway between Jakarta and Bandung takes from 2 hours 50 minutes to 3 hours 29 minutes and covers 168.5 kilometres.

3. Conclusion

The relationship between infrastructure and economic growth must be considered over the medium to long term. Infrastructure requires large upfront investments yet has long-term benefits. It takes time for its effects on economic growth to manifest. As discussed in this chapter, ICOR is not suitable for measuring the effects of infrastructure on economic growth. Consequently, if the ICOR is adopted, it must use dynamic or momentum analysis after the establishment or construction phase. In addition, the ICOR can be misleading if not connected to economic transformation; meanwhile, the acceleration of economic growth for economic transformation requires the manufacturing sector, which usually increases the ICOR.

Amidst the development of infrastructure – particularly massive projects such as the PSN – a measurement of the quality of economic growth should be adopted in addition to the quantity of economic growth. This concept is known as the inclusive aspect of economic growth.

Thus, an ICOR calculation was performed, using both quality measurement forms of the classical inclusive indicator of the poverty rate and Gini coefficient as well as the triangular relationship between economic growth and open unemployment (i.e. Okun's Law), open unemployment and inflation rate (i.e. Phillips Curve), and growth and inflation rate (i.e. the output gap). It showed that during the massive development of the PSN and pre-pandemic period – in order to avoid the bias of the pandemic – the ICOR increased, indicating a greater inefficiency or diseconomy of scale condition. Nonetheless, the quality of all modes of economic growth improved. This finding demonstrated that the PSN improved development quality, resulting in inclusive economic growth.

For Indonesia's economy to be competitive on the global market, logistics and infrastructure must be improved. Government intervention is essential in enhancing the role of infrastructure, given that it is a necessary exogenous factor of economic growth. Consequently, cargo loaded in 2021 increased 2.5 times since 2006. Although sea transport is the predominant mode of logistics in Indonesia, air freight is essential for high-value products because it is faster. Indonesia is not the largest air freight transport market in the ASEAN region but it has grown consistently over the past decade prior to the pandemic. This fact indicates the acceleration of Indonesia's economic development.

Two significant objectives of Indonesian logistics are its customs clearance process and the quality of trade and transport-related infrastructure, which indicate the need to invest in new vessels and to rehabilitate its main ports. Note that infrastructure is the primary asset of Indonesia's logistics performance at present.

One of the Sustainable Development Goals is to develop quality, reliable, sustainable, and resilient infrastructure, including regional and transborder infrastructure, by 2030. As an archipelagic country with the largest population in the region, Indonesia has the largest passenger air transport market in South-East Asia. Regarding road infrastructure, although the length of roads in Indonesia has consistently increased, geographical challenges as an archipelagic country and a still-dominant rural population indicate the need to increase quality to meet proper transport needs. Additionally, Indonesia must enhance its fixed broadband infrastructure. Furthermore, the Digital Evolution Index demonstrates that Indonesia's present state is low but its momentum is high, classifying it as a break-out country.

Lastly, there has been a notable emergence of substantial competition between the G7 and China in their efforts to provide assistance to lower-income nations in the realm of infrastructure development.

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Appendix

Appendix 2.1. Digital Intelligence Index

Okun's Law (Economic Growth and Open Unemployment):

$$\frac{Y_{nt1} - Y_{nt0}}{Y_{nt0}} = \frac{Y_{mnt1} - Y_{mnt0}}{Y_{mnt0}} - \alpha.(U_{nt1} - U_{nto}) \quad (1)$$

where Y = gross domestic product (GDP) constant price, n = country, m = minimum economic growth to generate employment, U = open unemployment rate, t = time, and α = elasticity of economic growth and unemployment.

Phillips Curve (Inflation Rate and Economic Growth):

$$\pi_{net1} = \pi_{nat1} - \beta.\left(\frac{Y_{nt1} - Y_{nt0}}{Y_{nt0}} - \frac{Y_{mnt1} - Y_{mnt0}}{Y_{mnt0}}\right) \quad (2)$$

where π = inflation rate, na = actual of n country, e = expected of n country, and β = elasticity of economic growth relative.

Unemployment Gap (NAIRU and Inflation Rate):

$$NAIRU_{nt1} = U_{nt1} + \gamma.(\pi_{nat1} - \pi_{net1}) \quad (3)$$

where NAIRU = non-accelerating inflation rate of unemployment of country n at time t, and γ = elasticity of inflation rates relative.

Long-Run Aggregate Supply (LRAS) and Inflation Rate:

$$\frac{Y_{nt1} - Y_{nt0}}{Y_{nt0}} = \frac{Y_{LRt1} - Y_{LRt0}}{Y_{LRt0}} + \delta.(\pi_{nat1} - \pi_{net1}) \quad (4)$$

where LR = natural growth/long run, and δ = elasticity of economic growth and inflation rate.

This formula requires secondary data analysis regarding Okun's Law, Phillip's Curve, and Output Gap. This chapter provides the data analysis to confirm the equations. The critical factor in this triangular relation is open unemployment, meaning job creation reflects the quality of economic growth, healthy inflation rate, and positive output gap.

Appendix 2.2. Understanding the Role of Infrastructure as a Necessary Exogenous Factor

$$\frac{\Delta y_{it}}{y_{it}} = \frac{s_{it}\sqrt{\frac{K_{it}}{L_{it}}} - \left((\partial_{it} + n_{it} + g_{it})\sqrt{\frac{K_{it}}{L_{it}}}\right) + s_{it}\sqrt{\frac{k_{it}}{l_{it}}} - \left((\partial_{it} + n_{it} + g_{it})\sqrt{\frac{k_{it}}{l_{it}}}\right)}{icor_{it}}$$

$$\frac{\partial y_{nt}}{y_{nt}} = \frac{\left\{\left[[I_{nt} + (X_{nt} - M_{nt})] - \left(\partial_{nt} + \rho_{nt} + \frac{\partial E}{E}_{nt}\right)\right].\left[\sqrt{\frac{(K,k)_{nt}}{(L,l)_{nt}}}\right]\right\}}{c_{nt}}$$

where $\frac{\partial y_{nt}}{y_{nt}}$ = real economic growth for country *n* at time *t*, s_{it} = savings rate, I_{nt}=manufacturing strategies–based investment, X_{nt} - M_{nt} = current account, ∂_{nt} =depreciation and depletion of environment, ρ_{nt} = population, $\frac{\partial E}{E_{nt}}$ = marginal productivity of labour, K_{nt}/L_{nt} = infrastructure support, k_{nt}/l_{nt} = *level of technology (manufacturing strategy),* and c_{nt} = ICOR.

Appendix 2.3. Determining Quality of Economic Growth

Closed Economy:

$$Y_{it} = C_{it} + I_{it}; \frac{Y_{it} - C_{it}}{l_{it}} = \frac{I_{it}}{l_{it}}; sy_{it} = i_{it} \quad \text{(A)}$$

where C is consumption, I is investment, i is country dimension, t is time dimension, s is savings rate, y is gross domestic product (GDP), and l is labour.

Solow Growth:

$$\frac{\Delta K_{it}}{l_{it}} = \frac{I_{it} - (\partial_{it}.k_{it})}{l_{it}} = i_{it} - \partial_{it}k_{it}; \Delta k_{it} = sy_{it} - \partial_{it}k_{it} \quad \text{(B)}$$

where K is the capital factor, and ∂ is the depreciation value.

Cobb-Douglas:

$$\frac{Y_{it}}{l_{it}} = \frac{K_{it}^{\frac{1}{2}} . l_{it}^{\frac{1}{2}}}{l_{it}} = \frac{K_{it}^{\frac{1}{2}}}{l_{it}^{\frac{1}{2}}} = \sqrt{\frac{k_{it}}{l_{it}}}; \sqrt{\frac{K_{it}}{L_{it}}}; \sqrt{k_{it}} = y_{it}; k_{it} = {y_{it}}^2 \quad \text{(C)}$$

where k is infrastructure for input land (L) and technology type for input labour (l).

Harrod-Domar:

$$\frac{ICOR_{it}}{l_{it}} = \frac{\Delta K_{it}/l_{it}}{\Delta Y_{it}/l_{it}} = \frac{sy_{it} - \partial_{it} k_{it}}{\Delta y_{it}} = \frac{sy_{it} - \partial_{it} {y_{it}}^2}{\Delta y_{it}}$$

$$\frac{\Delta y_{it}}{y_{it}} = \frac{s_{it} - \partial_{it}\, y_{it}}{icor_{it}} = \frac{s_{it} - \partial_{it} \sqrt{k_{it}}}{icor_{it}}$$

$$y_{it(k_{it})} = (\partial_{it} + n_{it} + g_{it}) k_{it}; \; MPK_{it} = \partial_{it} + n_{it} + g_{it}$$

$$MPK_{it} - \partial_{it} - n_{it} = g_{it} \quad \text{(D)}$$

where MPK is the marginal productivity of labour, n is population per labour, g is labour productivity, and $ICOR$ is the incremental capital output ratio.

Open Economy:

$$Y_{it} = C_{it} + I_{it} + G_{it} + (X_{it} - M_{it})$$

$$Y_{it}/l_{it} = C_{it}/l_{it} + I_{it}/l_{it} + G_{it}/l_{it} + \left(X_{it}/l_{it} - M_{it}/l_{it}\right)$$

$$y_{it} = c_{it} + i_{it} + g_{it} + (x_{it} - m_{it})$$

$$(y_{it} - t_{it} - c_{it}) + (t_{it} - g_{it}) = i_{it} + (x_{it} - m_{it})$$

$$s_{it} = i_{it} + (x_{it} - m_{it}) \quad \text{(E)}$$

where G is government expenditure, X is exports, and M is imports.


INDORAMA

Chapter 3

The Challenges of Infrastructure Development in Indonesia

Darwin Trisna Djajawinata
Andre Permana
M. Halley Yudhistira

This chapter discusses infrastructure development in Indonesia after the 1997 Asian financial crisis. It focusses on Indonesia's challenges to improving its infrastructure, including the critical issues associated with the slow progress of infrastructure development and how the government has addressed these issues, including problems with land acquisition, poor intergovernmental coordination, and incompatible regulatory and institutional frameworks. It also discusses how President Joko Widodo accelerated development through the *Proyek Strategis Nasional* (PSN). It concludes by discussing the lessons learned from the PSN projects to accelerate the country's infrastructure development process, notably to boost private capital mobilisation and to improve expertise in executing infrastructure programmes.

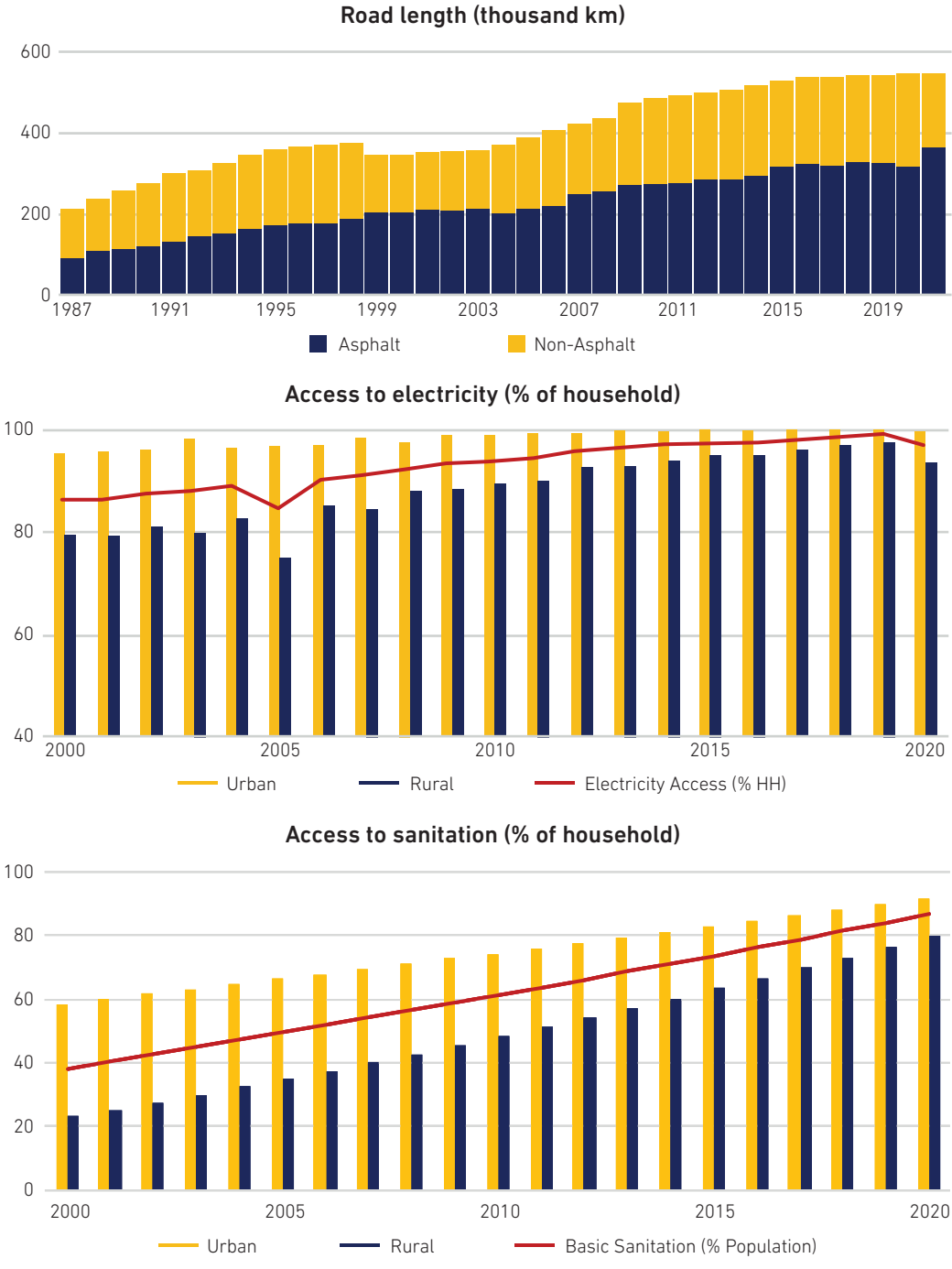
1. Background

Infrastructure plays a strategic role in facilitating economic activities and improving interregional connectivity. Infrastructure – defined here as broad physical structures and facilities, including transport, electricity, water and sanitation, telecommunications, and housing – is an indispensable factor in determining a nation's structural transformation process (ADB, 2017). It is also essential as it presents short- and long-term beneficial impacts. The availability of infrastructure allows more social interactions due to higher mobility, better access to public facilities, and promotion of equality amongst regions (Bhattacharyay, 2008, 2010; Runde, 2017). Good-quality infrastructure also lowers distribution costs (Wong and Tang, 2018). Further, the existence of infrastructure unlocks economic potential in regions, thus creating job opportunities and increasing welfare in general. It facilitates the exchange of ideas, fosters productivity, increases living standards, and cultivates social interactions.

Underinvesting in infrastructure, however, results in inconveniences and impedes higher economic growth (Salim and Negara, 2018). Immense funds are needed to finance infrastructure development, but finding a suitable source is only part of the solution. The dynamics of infrastructure development are affected by other factors such as politics, horizontal conflicts, and bureaucracy, which are often presented as additional barriers.

This chapter analyses the infrastructure development of Indonesia after the 1997 Asian financial crisis (AFC). The first part provides a brief overview of infrastructure development in Indonesia and how its investment compares to other developing countries. It also details infrastructure development post-AFC, including during the Joko Widodo Administration, focussing on *Proyek Strategis Nasional* (PSN). The chapter concludes by discussing the lessons learned, feasible strategies, and fundamental mechanisms that the government can adopt to accelerate the infrastructure development process further, particularly to boost private capital mobilisation and to improve expertise in executing the PSN.

Figure 3.1. Progress of Selected Infrastructure in Indonesia



Sources: Statistics Indonesia, Panjang Jalan Menurut Jenis Permukaan (km), https://www.bps.go.id/indicator/17/51/1/panjang-jalan-menurut-jenis-permukaan.html (accessed September 2, 2023), and World Bank, World Development Indicators, https://databank.worldbank.org/source/world-development-indicators (accessed 2 September 2023).

2. Development of Infrastructure Sectors

2.1. Progress in Infrastructure Outcomes

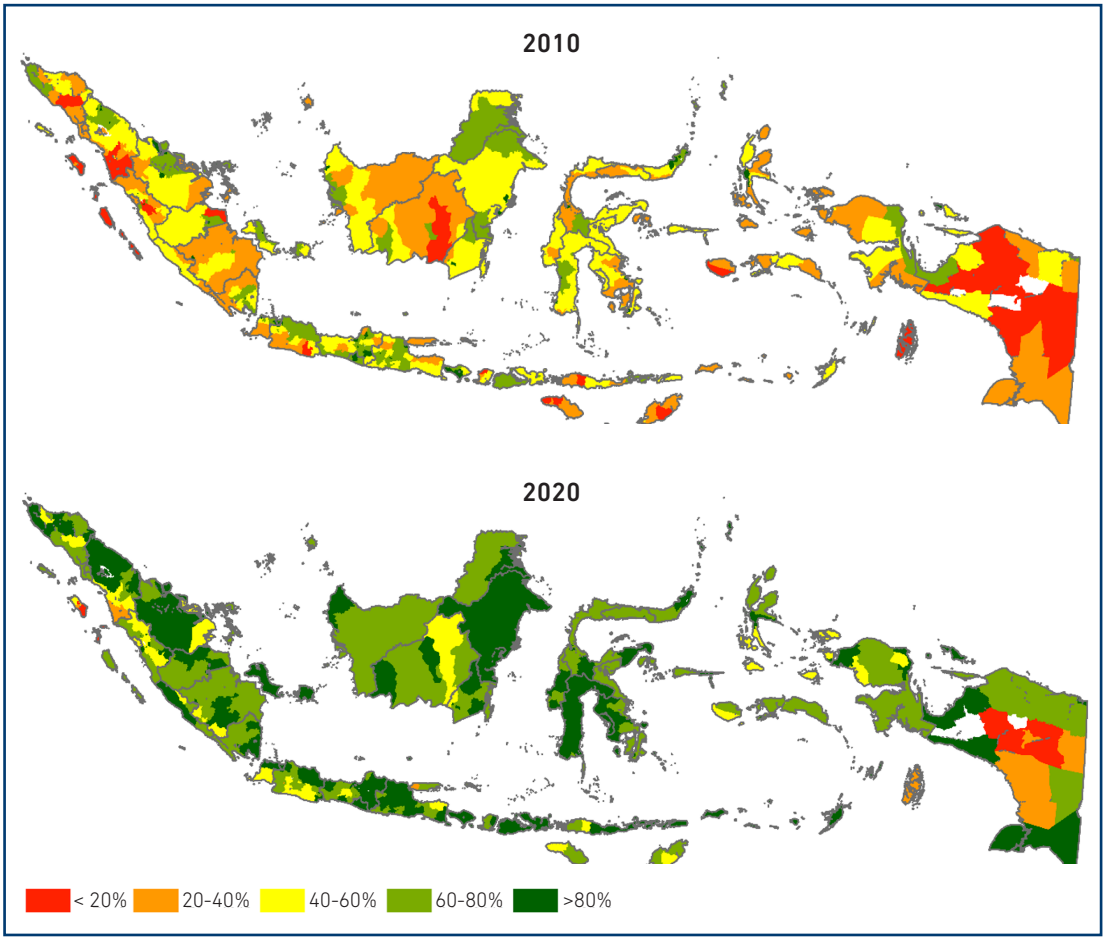
One important indicator reflecting infrastructure development progress is the length of roads. The length and quality of roads are associated with connectivity and accessibility amongst regions. Since the Suharto Administration, the length of roads has consistently increased, except for a small decline shortly after the AFC. On average, the length of additional roads constructed reaches about 10,100 kilometres annually (Figure 3.1). In 2021, out of 546,000 kilometres of roads constructed, 67% were asphalt roads. As a comparison, 298,00 kilometres were constructed 20 years ago, 45% of which being asphalt roads.

Another indicator of infrastructure development – electricity access – has also increased over time. In 2020, about 97% of households in Indonesia had access to electricity, rising from 88% in 2000 (Figure 3.1). A similar rising pattern is found in other indicators, such as basic sanitation. In 2020, the percentage of population with basic sanitation was recorded at 86.5% – much greater than only 38.0% in 2000. On average, the population with basic sanitation access in Indonesia grows 4.2% annually (Figure 3.1).

These figures also suggest that the gap between urban and rural populations remains, despite a narrowing trend in the last 2 decades, as those in urban areas have better access to electricity and basic sanitation than those in rural areas. In 2020, almost all urban households had electricity access (99.6%), while a lower percentage (93.5%) had electricity access in rural areas (Figure 3.1). Likewise, access to basic sanitation had higher rates in urban areas – 92% of urban households versus 80% of rural households (Figure 3.1).

While the urban and rural gap has coloured Indonesia's infrastructure progress, regional disparity is also a persistent issue. Taking access to basic sanitation as an illustration, regional disparity in infrastructure remains prevalent although it has decreased over the last decade (Figure 3.2.). Comparing the national socio-economic surveys in 2010 and 2020, basic sanitation access impressively improved from 57.3% of households in 2010 to 80.3% in 2020 (Statistics Indonesia, 2010, 2020). However, the figure also indicates a regional variation at the district level. Some districts – particularly in Eastern Indonesia – saw less than 20.0% of households with basic sanitation access in 2020.

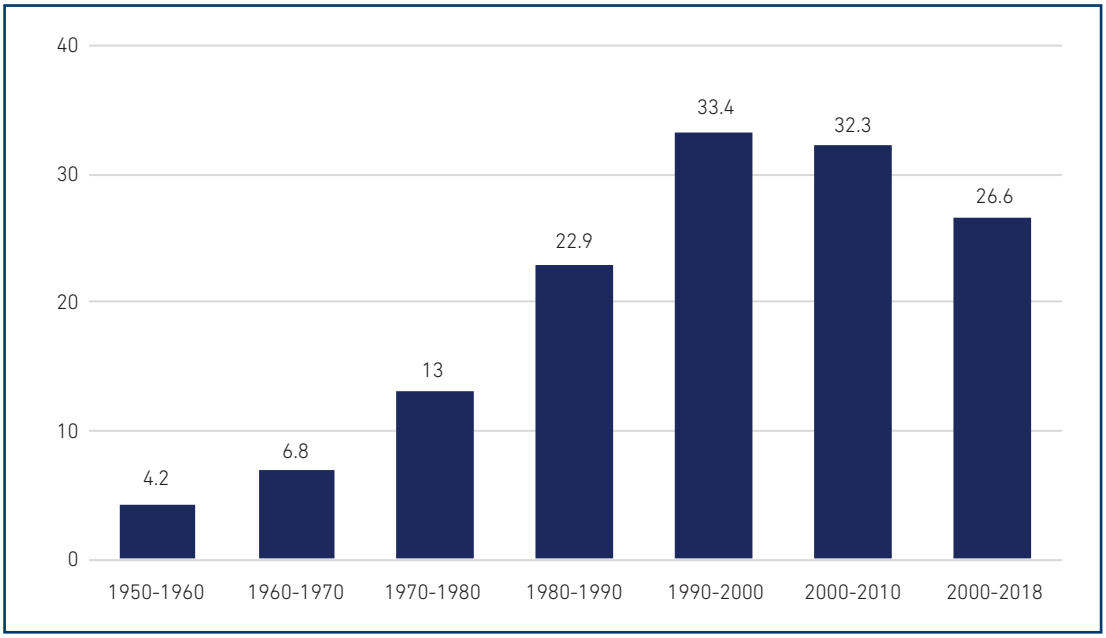
Figure 3.2. Regional Variation in Decent Sanitation Access, 2010 and 2020
(% of households)



Sources: Statistics Indonesia (2010, 2020).

The urbanisation trend also presents another challenge in providing equitable infrastructure. While the natural population growth has been a major contributing factor in the urban population increase, inequal access to public facilities between urban and rural areas and the lack of development in some regions have worsened the situation. These problems have forced an exodus to urban areas, thus creating issues such as urban poverty and inequality as cities become denser. With an additional 100 million people living in Indonesia's urban areas since early 1990s, Indonesia is categorised as having intermediate urbanisation (Figure 3.3).

Figure 3.3. Urban Population Increase in Indonesia by Decade
(millions of persons)

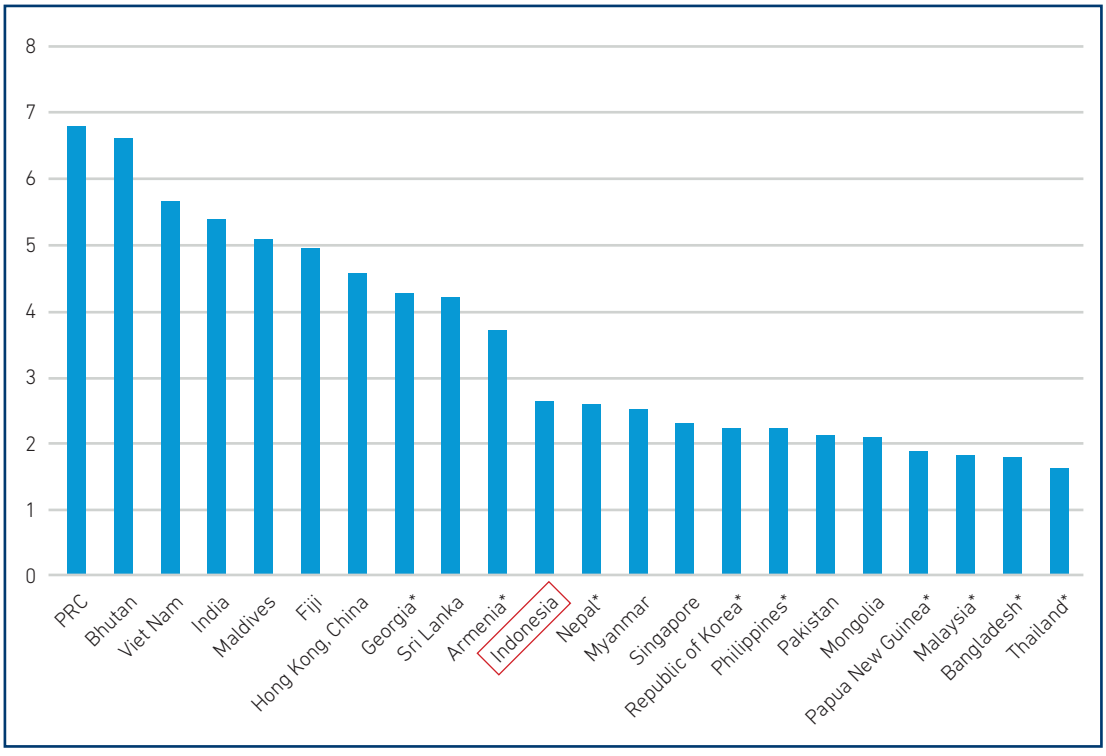


Source: United Nations, World Urbanization Prospects 2018, https://population.un.org/wup/DataQuery/ (accessed 2 September 2023).

While there is no exact answer on how much Indonesia should invest in infrastructure, cross-country comparison suggests that Indonesia's infrastructure investments are relatively low. With average infrastructure investment of approximately 2.5% of gross domestic product (GDP), Indonesia's rate is on par with that of Myanmar and lower than those of Viet Nam, India and China (Figure 3.4).[1]

[1] A similar pattern also appears when comparing the gross fixed capital formation value, where Indonesia ranked the lowest amongst other selected countries. However, the figure does not include investment by sub-national governments, which could increase the overall nominal investment (ADB, 2017).

Figure 3.4. Infrastructure Investment in Asia, Various Years
(% of gross domestic product)



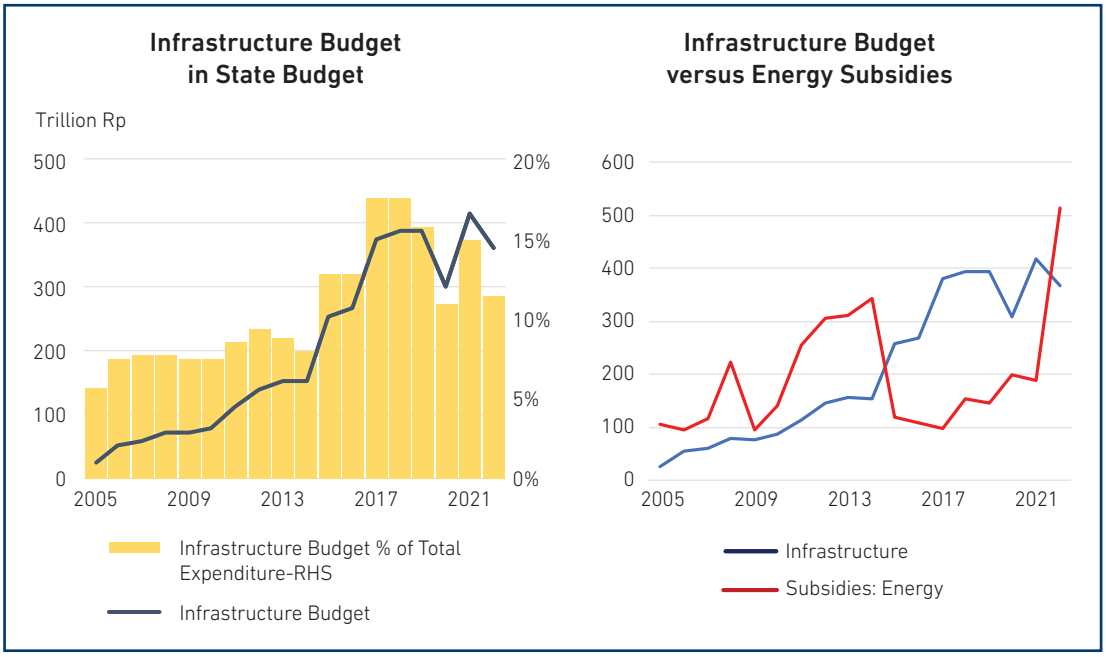
PRC = People's Republic of China.
Note: *Central government budget only.
Source: ADB (2017).

Another challenge for Indonesia in sustaining infrastructure development is its heavy reliance on public funding. During the 1970s to 1980s, the Suharto Administration allocated 30%–40% of the State Budget towards infrastructure development. Then, Indonesia was hard hit by the AFC; allocated funds for infrastructure declined from around 9% of GDP before the AFC to about 2% of GDP in 2001 (OECD, 2015). The result was a dramatic decline in Indonesia's infrastructure availability and quality. After the AFC, Indonesia struggled to find sustainable sources to finance its infrastructure development given the immense development needs to be supported by the State Budget. Indonesia has not experienced any significant recovery in infrastructure investment, except for a slight lift in 2008 (Roberts, Gil Sander, Tiwari, 2018). By 2015, the allocated infrastructure investment share of the State Budget remained below 3% of GDP.

2.2. Widodo Administration Policy on Infrastructure Development

Under the Joko Widodo Administration, the government committed to accelerating infrastructure development under nine priority programmes called Nawacita, which were officially incorporated into the Rencana Pembangunan Jangka Menengah Nasional (Medium-Term National Development Plan, RPJMN), 2015–2019. The RPJMN, 2015–2019 stressed the need to advance inter-island connectivity, improve the distribution network with roads and railways, and meet sufficient energy and food supply needs. To achieve the goal of accelerating infrastructure development, the RPJMN, 2015–2019 noted financial needs of approximately Rp4,796 trillion. For the State Budget, by 2015, the infrastructure budget only reached Rp256.1 trillion, around 13% of the State Budget's total expenditure (Figure 3.5). This amount was higher relative to years before the Widodo Administration, when the share of the infrastructure budget ranged from 6% to 9% of the total expenditure.[2]

Figure 3.5. Indonesia's Infrastructure Budget, 2005–2021
(Rp trillion)



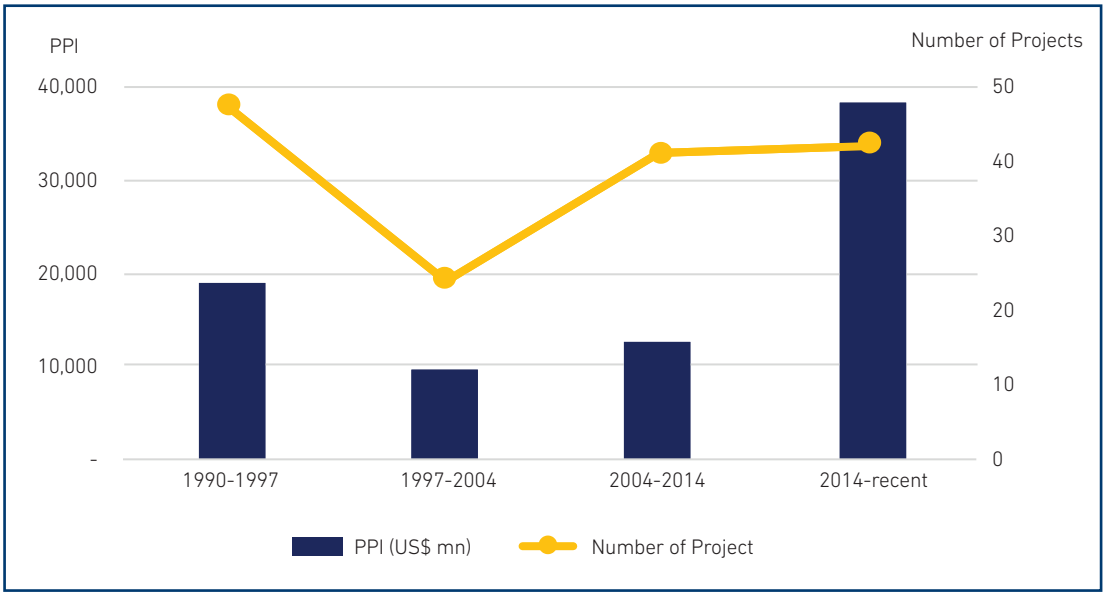
Sources: MOF and ADB (2017).

[2] The more significant allocation for infrastructure was a result of a massive cut in fuel subsidies, creating a relatively larger fiscal space. However, there was a sudden increase in energy subsidies in 2022 to address the lower purchasing power associated with the pandemic. Yet, these subsidies were partly reduced by September to maintain budget sustainability.

Nevertheless, relying on public funds for infrastructure development was insufficient. The RPJMN, 2020–2024 states that infrastructure financing needs are increasing to Rp6,445 trillion, a sum that cannot be met solely through public funds or state-owned enterprises (SOEs), which cover only 37% and 21% of the total required, respectively. To close the gap in financing, the government thus aims to incorporate more participation from private entities through public–private partnerships (PPPs), which involves private participation in project financing, development, and management. By implementing PPP schemes, the government also anticipates optimising public services, attracting competitive businesses for procurement, and enhancing access to global financing through transparent selection processes and investment competition (Minister of National Development Planning/ Head of National Development Planning Agency, 2023).

Before 2014, private participation in PPP schemes was relatively low. However, since the Widodo Administration, Indonesia has seen a surge in private participation, amounting to $38 million, a three-fold increase from 2004–2014 (Figure 3.6.). Thus, it can be concluded that the role of the private sector in Indonesia's infrastructure has improved relative to past trends.

Figure 3.6. Private Participation in Infrastructure
($ million)



PPI = private participation in infrastructure.
Source: World Bank.

3. Challenges and Issues in Infrastructure Development

What are the primary reasons for the sluggish advancement of infrastructure in Indonesia? This chapter identifies at least five key factors that have given rise to the challenges leading to underinvestment in infrastructure.

3.1. Land Acquisition

The complicated and time-consuming process of land acquisition has frequently impeded infrastructure development in Indonesia. Infrastructure development is often delayed by years or halted because of the slow-moving land acquisition process. The government has provided a legal basis to acquire land for national development as well as improvements to administrative procedures and legal resolutions pertaining to land procurement disputes. However, several issues remain, including:

(i) **Definition of public interest.** There is set of criteria outlining the types of infrastructure that serve the public interest, but these criteria may not necessarily align with the interests of local authorities or communities. Often, such parties oppose a project or demand significantly higher compensation prices. For instance, the Bedugul Geothermal Development Project in Bali was denied by the provincial government because it had the potential to disrupt the ecosystem of a regional water catchment area, and the construction phase of the Batang Asai Dam Project in Jambi Province was delayed by 2 years due to the failure of the local community and the central and regional governments to reach an agreement.

(ii) **Method and basis for calculating compensation for landowners.** The basis for calculating compensation for land acquisition is limited to physical losses (e.g. land, buildings, and crops), while non-physical sociological losses are ignored. The existing regulations do not guarantee that landowners will live better than they did before transferring their land rights to the government.

(iii) **Mechanism for acquiring land**. Inconsistencies can occur between land acquisition planning documents for national infrastructure projects and regional spatial planning documents (e.g. if the land acquisition site is within the forest zone declared by regional governments), which can impede infrastructure development.

3.2. Coordination between Governments

The key to interregional infrastructure development is effective collaboration between the national and sub-national governments from the planning phase to implementation. This is difficult to achieve, however, because each level of government has sectoral views and different perspectives regarding infrastructure development authority and responsibilities. Delays and complexity in the application process for a spatial permit or approvals for investment – as well as low levels of political willingness to provide funding – are examples of the consequences of ineffective coordination between national and sub-national governments.

Prior to 2014, the government established a committee to coordinate national–regional infrastructure provision policies known as Komite Kebijakan Percepatan Penyediaan Infrastruktur (Committee for Policy on the Accelerated Provision of Infrastructure). However, the national government observed the need for enhancing the committee's decision-making authority; limited roles in all phases of the project, from planning to construction; lack of flexibility to provide incentives and disincentives to accelerate projects; and a too-large structure, resulting in ineffective decision making. In 2014, the committee was reformed to become the Komite Percepatan Penyediaan Infrastruktur Prioritas (Committee for Acceleration of Priority Infrastructure Delivery, KPPIP) through Presidential Regulation No. 75/2014. KPPIP was established to serve as a single point of contact for all government agencies, potential funders, and private sector investors for infrastructure initiatives deemed to be of strategic importance.

3.3. Regulatory and Institutional Framework

Infrastructure planning in Indonesia involves various ministries, agencies, and sub-national governments to ensure that both top-down and bottom-up processes are operating concurrently, resulting in complex coordination and even overlapping planning, regulations, and priorities across government bodies. Involving numerous parties in the planning process for infrastructure provision policies often prolongs it, thus making businesses unable to operate efficiently and effectively. For example, more licenses and permits must be obtained to complete the bureaucratic administrative process. In this regard, simplifying the regulatory and institutional framework can aid in accelerating infrastructure development.

3.4. The Availability of Long Term Financing Instruments

Financing is a crucial factor in the success of infrastructure projects. One of the main challenges for infrastructure development is the mobilisation of financial sources to fund projects, as the government has limited fiscal space for infrastructure spending. Infrastructure projects are capital-intensive with a relatively long payback period. Therefore, such investment needs long-term financing sources to ensure steady long-term cashflows. The national government had been prompted to design alternative financing schemes for infrastructure projects to attract private sector participation – aside from multilateral loans and bonds – to bridge the funding gap. However, the financing strategy is not operating as initially envisioned, especially in cases where an infrastructure project is economically feasible but lacks financial viability. As the concept of PPPs was introduced as a policy innovation to address the funding difficulties associated with infrastructure projects, there is now an opportunity to address delayed infrastructure projects. However, there are various challenges associated with implementing long-term financing instruments or schemes in Indonesia, including:

1. Implementing non-recourse debt in project finance schemes remains challenging in Indonesia due to lenders' preferences for collateral, such as assets or sponsors, particularly in new sectors and untested schemes lacking proven precedents.
2. The 'estafet financing' scheme faces challenges as its market realisation has not taken shape, despite the potential financing capacity of financial institutions for infrastructure in the secondary market. Obstacles for the non-bank financial industry in infrastructure investment include meeting high current-year targets. Additonally, infrastructure projects are sometimes still under construction or in the land development stage (greenfield) (Kartika Sari, 2017).
3. It is crucial to optimise capital market instruments such as mutual funds, asset-backed securities, and sharia-compliant instruments for infrastructure financing. There is also a need to issue and enhance regulations that enable the issuance of new capital market instruments, including Perpetual Bonds, Infrastructure Bonds, and Project Bonds, to facilitate financing for infrastructure development (OJK, 2017).

3.5. Public and Private Sector Capacity and Public Awareness

The public sector capacity plays a crucial role in ensuring fiscally responsible infrastructure development, especially considering the scale of ambitious infrastructure development plans, which require significant financial resources. This requirement often surpasses the resources that can be solely allocated from the State Budget. To meet the challenge of financing extensive infrastructure projects without overburdening the state budget, public entities should actively explore alternative funding sources. The process should also seek alternative funding sources

so as not to create excessive dependence on SOEs and impose a significant financial burden on businesses. This will diversify financial resources, reduce fiscal strain, and tap into innovative financing mechanisms, such as public–private partnerships (PPPs) and other creative financing schemes, to help bridge the funding gap and promote sustainable infrastructure development.

Investing in comprehensive capacity-building initiatives is also essential for enabling the public sector to grasp the intricacies of innovative financing mechanisms and adeptly manage and oversee these projects. A collaborative approach involving various stakeholders, such as the central government, the SMV within the Ministry of Finance, and esteemed academic institutions, can provide the resources and expertise needed to support these endeavours. In addition, the literacy of creative financing for infrastructure projects is not limited to the central government; it extends to a wide range of stakeholders, including the general public, financial institutions, and many others. A community of practice platform can provide a valuable forum for stakeholders from different sectors to share knowledge, collaborate on projects, and learn from each other's experiences. This process can enhance public awareness of infrastructure development, garnering stronger support for infrastructure initiatives.

4. The PSN as a Catalyst of Infrastructure Development

4.1. Legal Basis

In light of Indonesia's urgent infrastructure requirements and related challenges, the government needs to hasten the execution of PPPs. This accelerated process is primarily conducted within the PSN framework. President Widodo issued Presidential Instruction No. 1 of 2016 to take necessary steps for the acceleration and support of the PSN. In response, the government introduced Presidential Regulation No. 3 of 2016 to accelerate projects that fulfil basic needs and enhance the welfare of the population. Since its inception, this regulation has been amended three times with the aim of accelerating regional infrastructure development. The most recent amendment was Presidential Regulation No. 109 of 2020, which granted stimulus measures to PSN projects in the form of 0% tariffs for land and building rights acquisition fees. Additional, the government established Government Regulation No.42 of 2021 as the legal foundation for the incentives accessible to central government, regional governments, or private entities engaged in PSN Projects.

This amendment also provides a legal basis for the Coordinating Ministry of Economic Affairs to make necessary updates to PSN projects. In essence, the list of PSN projects was annexed in this latest amendment, with provisions for further amendments based on studies to determine feasibility conducted by KPPIP. The results of this evaluation are reflected in the Regulation of the Coordinating Minister for Economic Affairs No. 7 of 2021, which was last amended by the Regulation of the Coordinating Minister for Economic Affairs No. 21 of 2022. The PSN list incorporates additional projects suggested by the central government, regional administrations, or private entities. These projects are vetted by KPPIP against a set of criteria that includes strategic value, interregional linkages, existing infrastructure, and project completion timelines. Inclusion on the PSN list provides numerous benefits, such as hastened progress, since any regulatory or permit-related impediment must be addressed by pertinent ministers, governors, and regents. Furthermore, these projects enjoy expedited land allocation and are ensured political security. Projects that have been successfully completed are removed from the PSN list during each amendment.

The government further enacted Government Regulation No.42 of 2021, aimed at expediting the implementation of PSN projects, with a particular focus on enhancing community services through the development of strategic infrastructure. This regulation is designed to facilitate the central government, regional governments, and businesses in this endeavour.

In support of the ease of implementation of the PSN, the government has demonstrated its commitment by establishing additional supporting regulations on special economic zones (Government Regulation No. 40 of 2021); simplification of land procurement procedures (Government Regulation No. 19 of 2021); easing land acquisition in forested areas (Government Regulation No. 23 of 2021); and streamlining the resolution of spatial planning inconsistencies (Government Regulation No. 43 of 2021).

The PSN can be characterised as an all-inclusive programme, devised to steer Indonesia's socio-economic growth towards the ambitious Golden Indonesia 2045 target. It embodies a commitment to sustainable, balanced, and fair economic development that harmonises immediate requirements with the nation's long-term objectives. By involving all relevant stakeholders, it strives to ensure that the fruits of economic growth reach all strata of society. The crucial features of the PSN can be detailed as follows:

(i) **Goals.** Projects undertaken by the central government, sub-national governments, and/or business entities must be of strategic significance in boosting economic growth and promoting equitable development with the aim of advancing societal well-being and regional progress. PSN projects are executed in line with the country's development policies and priorities. These consider the requirements, advantages, and supportive capabilities necessary for the effective operation of these strategic projects. Furthermore, they also consider the interlinkages between infrastructure and/or hubs of economic activity.

(ii) **Strategic nature.** The strategic essence of the PSN encompasses government leadership, intersectoral collaboration, and requisite stakeholder engagement. Indeed, government leadership plays a pivotal role in guiding and coordinating PSN initiatives by defining the strategic pathways, allocating funds, and formulating the essential regulatory structures. When considering intersectoral collaboration, PSN initiatives often span across several sectors and necessitate cooperation amongst diverse government departments, private sector entities, and other stakeholders to leverage varied expertise and resources. Moreover, the participation of stakeholders is vital for their success. Stakeholders can include communities, civil society organisations, affected industries, and other pertinent parties whose involvement aids in ensuring that the project caters to their requirements and addresses their concerns.

(iii) **Project governance framework.** The government ensures that PSN projects are effectively supervised, monitored, and communicated while maintaining adaptability to dynamic circumstances. A project governance framework encompasses accountability and transparency measures as well as stakeholder engagement, all of which are critical for the success of these strategic initiatives. It incorporates a robust governance accountability system, which includes oversight, investigative audits, loss estimation, post-audit supervision, and assistance in the procurement of goods/services. The government maintains scrutiny over the progression of PSN projects and conducts regular evaluations to measure their impact. Frequent assessments aid in identifying any discrepancies or shifts from initial plans, enabling necessary amendments to keep projects aligned with their goals. Open and effective communication with the public is indispensable; the government is obligated to offer regular updates, initiate dialogue with stakeholders, address their concerns, and uphold transparency throughout a project. Given the dynamic nature of PSN projects, they often demand flexible and adaptive management. Any changes in external conditions, emerging technologies, or unexpected challenges may call for modifications in project scope, timeline, or methodology. As such, the government should be prepared to adjust and to respond accordingly.

(iv) **Scope and criteria.** As per the Regulation of the Coordinating Minister for Economic Affairs of the Republic of Indonesia No. 21 of 2022, PSN projects are organised into 14 sectors and 12 national strategic programmes. Broadly, the 14 sectors can be categorised into three types of infrastructure groups: connectivity economic infrastructure, non-connectivity economic infrastructure, and social infrastructure. The list of PSN projects is periodically evaluated to meet the national objectives. Connectivity economic infrastructure encompasses a range of infrastructure such as road, rail, sea, air, and land connectivity, inclusive of their related infrastructure. Non-connectivity economic infrastructure includes a variety of economic infrastructure beyond connectivity, comprising drinking water and sanitation, dams and irrigation, energy, technology, tourism, and plantation infrastructure. Lastly, social infrastructure encompasses a spectrum from regional and housing sectors to the educational sector. The programmes should also align with national/regional medium-term development plans and spatial and regional guidelines. Projects should have a strategic influence on the economy, social welfare, national defence, and security, and foster connectivity between regions. Moreover, these initiatives should play a strategic role in stimulating regional economic growth.

(v) **Financing and funding.** Financial planning for these initiatives can draw upon the State Budget, regional budgets, other valid funding sources, or a combination. Mechanisms such as PPPs and/or other collaborative financing strategies, can also be used in line with legal regulations (See Chapter 3 for a detailed discussion on innovative funding). PPP funding for PSN initiatives can be based on initiatives from the government or business entities. If a PPP is driven by a business entity, the entity must submit a feasibility study for the proposed PSN project, which may include aspects like public service infrastructure provision, optimisation of state- and regional-owned goods, enhancement of SOE assets, and/or augmentation of state and/or regional revenue. To enhance the feasibility and bankability of projects, the government offers various facilities, including the Project Development Facility (PDF), viability gap funding (VGF), financing guarantees, tax incentives, availability payments, and the Revolving Land Fund.

4.2. Institutional Support for the PSN

For the successful execution of the PSN, the involvement of various actors is critical. As stipulated by Government Regulation No. 42 of 2021, PSN projects entail several stages: planning, preparation, transaction, construction, and operation and maintenance. Different agents contribute to each stage, streamlining the process and ensuring smooth facilitation. Table 3.1 summarises the principal public agencies, institutions, and firms associated with the PSN.

Table 3.1. Principal Public Agencies, Institutions, and Firms Supporting the PSN

	Key Actors	Function
Government Agencies	Coordinating Ministry for Economic Affairs through Committee for the Acceleration of Providing Priority Infrastructure (KPPIP)	Facilitates coordination in the efforts to alleviate bottlenecks for the PSN and priority projects.
	Ministries/Institutions/Local Governments	Offers governmental budgetary support and assistance.
	Ministry of National Development Planning (BAPPENAS)	Creates regulations for PPP projects.
	National Public Procurement Agency (LKPP)	Guarantees the integrity of transactions and equitable bidding processes for PPP projects.
	Ministry of Agrarian Affairs and Spatial Planning/National Land Agency, and Ministry of Marine Affairs and Fisheries (KKP)	Provides recommendations concerning the suitability of land and sea activities for a project.
	Ministry of Environment and Forestry	Facilitate land acquisition in forested areas for the PSN.
	Other Ministries/Institutions/Local Governments	Acts as the responsible party for the PSN within its jurisdiction.

	Key Actors	Function
Supporting Institutions	PT Sarana Multi Infrastruktur (SMI)	Offers financial support for infrastructure and consultancy services for PPP projects.
	Indonesia Infrastructure Finance (IIF)	Offers investment for infrastructure and consultation services for PPP projects.
	Indonesia Infrastructure Guarantee Fund (IIGF)	Provides sovereign guarantee and project development services for PPP and PSN projects.
	Asset Management Agency (LMAN)	Provides funding for land acquisition for the PSN.

PPP = public–private partnership, PSN = Proyek Strategis Nasional.

Source: Authors.

(i) **Project Planning.** After the projects are listed, they are in the planning stage. Planning facilitation includes identification of permits and non-permits, spatial plans, land acquisition, use of forest areas, sector master plans, and financing planning. The establishment of Coordinating KPPIP serves as a pivotal step towards enhancing effective coordination and resolving issues arising from the lack of harmonious collaboration among various stakeholders. Its primary objective is to act as a coordinating unit, streamlining decision-making processes and facilitating debottlenecking efforts for National Strategic Projects and Priority Projects. Chaired by the Coordinating Minister for Economic Affairs, the Committee comprises key representatives from high-level essential instituions, including the Minister of Finance, Minister of PPN (National Development Planning)/Head of Bappenas (National Development Planning Agency), and Minister of Agrarian Affairs and Spatial Planning.

(ii) **Project Preparation.** The preparation phase puts into action the plans laid out in the previous stage by supplying necessary documents such as the feasibility study, spatial planning compatibility, land acquisition determination, environmental report, and financing sources. Thus, the previously mentioned actors involved in the planning stage also contribute to this phase. While ministries, institutions, and/or sub-national governments are responsible for generating the required documents, KPPIP acts as a coordinator, and MOF steps in to explore different financing mechanisms, such as domestic and international loans, bonds, sovereign wealth funds, and private investments. It assesses the financial feasibility of projects, negotiates loan agreements, and oversees disbursement and repayment processes. The PDF acts as a facility to enhance the effectiveness of the preparation and transaction process, if necessary.

(iii) **Project Transaction**. The next stage involves transactions using PPPs. Significant roles are performed by the National Development Planning Agency (Bappenas), MOF, and Lembaga Kebijakan dan Pengadaan Barang/Jasa Pemerintah (National Public Procurement Agency, LKPP). These institutions are responsible for regulating, executing, and monitoring the PPP, from the project's planning, financial, to procurement aspects. Through PT Penjaminan Infrastruktur Indonesia (PT PII), MOF also manages associated financial risks. It conducts risk assessments, develops risk mitigation strategies, and establishes mechanisms to monitor financial risks throughout the project lifecycle. It also utilises the IIGF or PT PII as the fiscal tool in managing risks from the sovereign guarantee provided to PSN projects, including those using PPPs. Ministries, institutions, and/or sub-national governments serve as the executing bodies of the project, while KPPIP functions as the coordinating entity, ensuring efficient execution.

(iv) **Project Implementation**. Ministries, institutions, and/or sub-national governments that act as the government institution responsible for the project implementation based on their authority control the construction stage. During implementation, KPPIP monitors the project. Ministries, institutions, and/or sub-national governments shoulder various responsibilities in developing the operation and maintenance protocols for a PSN project. Upon the conclusion of the collaboration between governmental entities and the private sector, the project assets transition from private assets to being state and regionally owned assets, a process overseen by MOF.

4.3. Lessons Learned

In this section, lessons learned from the PSN framework will be provided in dealing with the challenges previously mentioned, such as land acquisition, government guarantees, risk mitigation, SOEs capacity, and public supports.

Land acquisition should be accelerated through a dedicated government body. Land acquisition is a substantial expense to the PSN. LMAN serves as a solution for the land acquisition problem in PSN projects. However, if land acquisition processes are drawn out, the project may be delayed, escalating total costs due to the price of the land, legal expenses, costs associated with resettlement or compensation of existing landowners, and other relevant expenditures, thus potentially impacting the financial feasibility of the project. To enhance the accountability and efficiency of the PSN pertaining to the land acquisition process, the formulation and implementation of more stringent regulations and laws aimed at expediting land acquisition are essential.

Government support and financing facilities must be plentiful. To underscore the government's commitment to the PSN, various forms of assistance and facilities are provided to increase the feasibility and attractiveness of projects, including the IIGF, PT SMI, PT IIF, and LMAN. In addition, the government provides supportive measures and technical assistance through VGF and the PDF, along with government guarantees and an availability payment scheme in addition to user fees for new returns on PSN investments using PPPs.

Projects with high social and economic impacts must be commercially feasible to attract private sector participation. However, since not all these projects are financially feasible, government guarantees are needed. PT IIGF provides a guarantee for the PSN projects, while PT SMI offers innovative financing through cash-deficiency support. Nevertheless, in some projects, these support mechanisms and facilities may be insufficient to counteract selective involvement exhibited by the private sector. To address these challenges, it is recommended that the government extend more comprehensive support to other sectors, not only those demonstrating high economic and social impacts but also those that are financially promising. By doing so, it could stimulate more active and diverse private sector involvement in the PSN.

Risks should be mitigated. There are unpredictable risks from government factors such as political and regulatory changes, external factors such as demand and unforeseen circumstances, or from the project itself (e.g. engineering, construction, and operation and maintenance) that may increase the vulnerability of a PPP-based project contract. Major improvements in the PPP regulatory framework by Presidential Regulation No. 38 of 2015 allow risk management to be allocated to both parties.

Additionally, the government implements relational contracts that allow internal or non-court renegotiation when unforeseen risks happen. For example, the IIGF was created as market solution insurance for central or regional government risks in PPP projects, which helps provide contingency support and guarantees against government-related financial risks to private entities. Specifically, the IIGF guarantees the government contractor agency's financial obligations by paying compensation to business entities when infrastructure risks arise in accordance with the allocation agreed in the PPP agreement.

SOEs should be carefully selected according to capacity and quality. The national government, represented by PT SMI, entrusts specific SOEs to participate in the PSN via an assignment scheme. For example, PT Hutama Karya and PT Kereta Api Indonesia were assigned to the Trans-Sumatra Toll Road project and the Light Rail Transit Jabodebek project, respectively. The PSN initiative must be delegated to the proper SOE, which must possess the required expertise, good financial stability, and good corporate governance. Given that many PSN projects are financially unfeasible but have significant social and economic impacts, the distribution of projects should not harm the financial stability of the assigned SOE. Additionally, implementing good corporate governance, which includes accountability and transparency, at every stage of infrastructure project development, is key as monitoring project progress is crucial to ensuring that the project can proceed as intended.

There should be adequate public awareness and support. Infrastructure development without adequate efforts to raise public awareness will increase the likelihood that local communities will reject infrastructure projects. For instance, the government had to remove the Tiro Dam project in Pidie Regency (Aceh) from the PSN list in 2022 due to massive local opposition. The government was forced to select an alternative location to minimise conflicts with local people, delaying the project's start. Box 3.1 illustrates some lessons learned from the PSN project on the water supply system in Umbulan.

Box 3.1. Complexity in Delivering High Social Impact Project but Financially not Feasible: Case Study of the Umbulan Water Supply Distribution System

The Umbulan Water Supply Distribution System (known as the Umbulan SPAM) is the first urban water infrastructure project administered by the central government in Indonesia that successfully employs the public–private partnership (PPP) financing model. The objective of the project is to increase the clean piped water supply in five municipalities or regencies in East Java that form the Surabaya Metropolitan Area (i.e. Gresik Regency, Pasuruan City, Pasuruan Regency, Sidoarjo Regency, and Surabaya City) by using a spring in Umbulan Village, located about 17 kilometres from Pasuruan. The Umbulan SPAM includes construction of a raw water intake building, transmission pipelines, pump houses, offtake units, reservoirs, and a main distribution network. Moreover, it is a PSN project under Indonesia's national planning for 2020–2024, which aims to increase access to safe drinking water for 100% of the country's population by 2024 by improving piped water services.

The Umbulan SPAM has had a long history of development. From 1970 to 1972, the East Java provincial government initiated actions to utilise a spring in Umbulan, a valuable natural asset for local communities, providing fast-flowing, pure water and green scenery (Soekarwo, 2018). During 1986–1987, the Ministry of Public Works endowed the Umbulan Drinking Water Project with a $120 million soft loan from Japan's Overseas Economic Cooperation Fund (Kurniawan, 2020). However, the partnership was dissolved because of a change to the implementation plan involving private participation. The difficulties in advancing the tender proposal through private participation persisted until 1999.

During 2000–2010, Bappenas and the Ministry of Public Works and Housing conducted a study on a procurement scheme for the Umbulan SPAM, with the provincial government wanting the Indonesia Infrastructure Initiative to be the project manager. In 2011, the Umbulan SPAM was established as a PPP per Presidential Decree No. 67/2005, while the provincial government conducted the prequalification of business entities, approving five consortiums. In 2012, it continued the tendering process by releasing initial bid documents,

followed by two amendments to the documents in 2012 and 2013, before conducting multiple consultations with each consortium. Yet the auction process was unable to proceed as the viability gap funding (VGF) was not approved. The Umbulan SPAM ground-breaking and construction process started in 2017 and were expected to be completed within 2 years. Finally, in 2021, Umbulan SPAM construction was completed, installing safe, clean water access for 320,000 homes (Bappenas, 2022).

Under the PPP financing plan, the provincial government acts as the responsible party, and the central government oversees the build–operate–transfer contract procedure for private sector firms to build Umbulan SPAM's main distribution network, while local drinking water corporations manage the secondary and tertiary water distribution infrastructure.

The Umbulan SPAM project had capital expenditures of Rp2.39 trillion, supported by a Viability Gap Funding (VGF) of Rp818 million and insured by PT Penjaminan Infrastruktur Indonesia (PII) (Ministry of Finance, 2023). In addition, PT Indonesia Infrastructure Finance (IIF) and PT Sarana Multi Infratstuktur (SMI) signed an Rp840 billion SPAM Umbulan arranged financing agreement that will speed up project completion (SMI, 2023). The duration of the construction phase for this project spans a period of three years, while the concession period extends for a duration of twenty-five years and nine months. The return on investment is realiszed through user payments. With a capacity of 4,000 literes per second, the project will provide water from the Umbulan spring to an estimated 1,300,000 households in five districts/cities of East Java.

The PPP approach utilised in Umbulan SPAM resolved the following issues: (i) land acquisition increasing after the completion of the detailed engineering design, (ii) community disapproval and social conflict, (iii) problematic spatial licensing, (iv) inflated water distribution costs due to toll-road pipe land rental, and (v) pre-operation electricity costs.

Meanwhile, several lessons learned from Umbulan SPAM include successfully utilising a PPP scheme for financing urban water management activities; obtaining local government before executing the urban infrastructure project to avoid underutilisation and lower economic visibility; and understanding that not all local governments and local drinking water firms will provide secondary and tertiary pipe networks to optimise water distribution.

Source: Author's compilation except where referenced. Ministry of Finance, 2023 and SMI, 2023.

There are further opportunities to augment the effectiveness of the PSN. First, government commitment consistency should be enhanced, including financial backing. Second, knowledge management and knowledge transfer should be boosted in creating more effective and efficient PSN projects. This includes helping bolster the decisiveness of the government contracting agents and the readiness of the technical team. Third, long-term financing options should be expanded to provide more opportunities for infrastructure investment. Last, local political dynamics should be mitigated to pave the way for smoother project implementation.

5. Conclusions

High-quality infrastructure is crucial for economic development. However, providing infrastructure is often challenging due to its complex and dynamic nature. It involves multiple stakeholders with varying interests, expectations, and capacities, creating additional barriers and requiring careful planning, coordination, and execution. Like other countries that must invest in their infrastructure sector to fully reap the benefits of economic development, Indonesia faces challenges in providing adequate infrastructure, particularly since the 1997 AFC. Traditional issues like land acquisition, intergovernmental coordination, and regulatory constrains arise during project implementation, in addition to the struggle to find sustainable sources to finance the infrastructure development.

In response to formidable challenges, Indonesia has initiated a strategic policy under the Widodo Administration known as the PSN, serving as a catalyst for accelerating infrastructure development. This includes prioritising physical infrastructure initiatives such as road connectivity, electricity, housing, and water and sanitation, which are given heightened importance compared to other sectors.

Learning from completed PPP-based projects, the success of PPP framework, the success of PPP implementation depends on the following factors: (i) alignment of PPP objectives with national development priorities and public interest; (ii) availability and affordability of long-term financing and risk-sharing instruments; (iii) capacity and transparency of public institutions in terms of supporting regulatory reforms the PPPs; and (iv) engagement and participation of stakeholders, especially local communities and civil society organisations.

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Appendix

Appendix 3.1. Government Supports for PSN PPP Projects (Data as per September, 2022)

No.	Project Name	Value (Rp)	Government Support	Status
1	High Throughput Satellite	6.42 trillion	IIGF Guarantee, AP	Construction
2	West Palapa Ring ICT Backbone	1.2 trillion	PDF, IIGF Guarantee, AP	Operation
3	Central Palapa Ring ICT Backbone	1.1 trillion	PDF, IIGF Guarantee, AP	Operation
4	East Palapa Ring ICT Backbone	5.1 trillion	PDF, IIGF Guarantee, AP	Operation
5	Krian–Legundi–Bunder–Manyar Toll Road	12.9 trillion	IIGF-MOF Guarantee	Partial COD
6	Serang–Panimbang Toll Road	8.6 trillion	IIGF-MOF Guarantee	Partial COD
7	Cileunyi–Sumedang–Dawuan Toll Road	8.4 trillion	IIGF-MOF Guarantee	Partial COD
8	Probolinggo–Banyuwangi Toll Road	23.4 trillion	IIGF-MOF Guarantee	Construction
9	Jakarta Cikampek II Selatan Toll Road	14.7 trillion	IIGF-MOF Guarantee	Construction
10	Manado–Bitung Toll Road	4.9 trillion	IIGF Guarantee	Operation
11	Semarang–Demak Toll Road	5.4 trillion	IIGF Guarantee	Construction
12	Balikpapan–Samarinda Toll Road	11.9 trillion	IIGF Guarantee	Operation
13	Komodo–Labuan Bajo Airport	1.2 trillion	IIGF Guarantee	Pre-FC
14	East Java's Umbulan WSS	2.1 trillion	PDF, VGF, IIGF Guarantee	Operation
15	Bandar Lampung WSS	750 million	PDF, VGF, IIGF Guarantee	Operation
16	West Semarang WSS	417 million	PDF, IIGF Guarantee	Operation
17	Jogjakarta's Kamijoro Regional WSS	437 million	PDF, VGF, IIGF Guarantee	Preparation
18	Central Java's Wosusokas Phase II Regional WSS	919 million	PDF, VGF, IIGF Guarantee	Preparation
19	Metropolitan Cirebon (Jatigede) Regional WSS	3.39 trillion	PDF, VGF, IIGF Guarantee	Preparation

No.	Project Name	Value (Rp)	Government Support	Status
20	Makassar–Parepare Railway	989 million	PDF, IIGF Guarantee, AP	Construction
21	Papua's Teluk Bintuni Industrial Estate	1.73 trillion	PDF, IIGF Guarantee	Preparation
22	West Java's Legok Nangka Regional Waste Management	4.05 trillion	PDF, VGF, IIGF Guarantee	Transaction
23	South Tangerang Waste Management	1.8 trillion	PDF, IIGF Guarantee	Preparation*
24	Semarang's Jatibarang Waste Management	2.8 trillion	PDF, IIGF Guarantee	Preparation*
25	New Ambon Port	4.5 trillion	PDF	Planning
26	Integrated Palapa Ring ICT Backbone	7.7 trillion	AP, IIGF Guarantee	Planning
27	Java's Callender Hamilton Bridges	2.2 trillion	AP, IIGF Guarantee	Construction
28	Gas Housing Distribution Network in Batam	2.37 trillion	PDF, IIGF Guarantee	Preparation
29	Gas Housing Distribution Network in Palembang	3.2 trillion	PDF, IIGF Guarantee	Preparation

AP = availability payment, COD = Commercial Operations, FC = Financial Closure, ICT = information and communications technology, IIGF = Indonesia Infrastructure Guarantee Fund, MOF = Ministry of Finance, PDF = project development facility, VGF = viability gap financing, WSS = water supply system.

* PDF Facility has ended.

Source: MOF.


INDORAMA

Chapter 4

Innovative Financing for Strategic Infrastructure Development

Venkatachalam Anbumozhi
Teuku Riefky
Eri Hariyanto
Halim Alamsyah

Infrastructure contributes positively to resolving economic, social, and environmental issues through its role in improving economic growth, decreasing disparity, enhancing connectivity, and strengthening resilience through climate mitigation and adaptation efforts; infrastructure development in Indonesia is unquestionably needed. However, there is a substantial gap in infrastructure financing. As stated in the *Rencana Pembangunan Jangka Menengah Nasional* (National Medium-Term Development Plan), national infrastructure investment throughout 2020–2024 necessitates Rp6,445 trillion. Such an amount entails the need for alternative financing. This chapter formulates policy recommendations that could be implemented to spur the growth of innovative financing for infrastructure development.

1. Background

Indonesia spans more than 5,000 kilometres across South-East Asia, comprising over 17,000 islands. It straddles the equator and is positioned in the Ring of Fire, where almost 90% of global earthquake events occur (Kramer, 1996). Indonesia is home to a population exceeding 275 million people, ranking it as the fourth most populous country globally.[1] With the third-longest coastline, Indonesia faces a heightened vulnerability to the adverse effects of climate change and biodiversity loss.

The ramifications of climate change in Indonesia are multifaceted, encompassing aspects like increasd precipitation, sea-level rise, and disruptions in the food supply (Case, Ardiansyah, and Spector, 2007). The susceptibility of Indonesia towards rising sea levels is also reflected by the fact that around 25% of Indonesian economic activities takes place on its coastline (Dahuri and Dutton, 2002). A 1-metre sea-level rise could flood 405,000 hectares of coastal lands, specifically on the northern coast of Java, eastern coast of Sumatra, and southern coast of Sulawesi (Oktaviani et al., 2011). This could impact agricultural activities through storm surges, flooding, and salinisation of coastal aquifers. Moreover, Badan Riset dan Inovasi Nasional (National Research and Innovation Agency, BRIN) estimated that hundreds of Indonesia's small islands are at serious risk of sinking due to sea-level rise and land subsidence (Ramdhan, Amri, Priyambodo, 2019).

The changing global climate also poses a serious threat to Indonesia's food security and overall well-beingwelfare. Boer (2010) estimated that climate change maycould lead to a reduction of approximately reduce its rice supply and maize output by around 300,000 tonnes in rice supply and up to 10,000 tonnes in maize output in the country. Given that Indonesia has the , respectively.

[1] Worldometer, Countries in the World by Population (2022), https://www.worldometers.info/world-population/population-by-country/ (accessed 16 July 2023).

Having the sixth-largest cropland area worldwideglobally, nearly almost 30% of itsIndonesia's labour force is engaged is working in agricultureal--related sectors, and contributinges to approximately around 12% of the country's Indonesian its rice supply by about 300,000 tonnes and maize output by up to 10,000 tonnes. As a country with the sixth-largest cropland area in the world, almost 30% of its labour is working in agriculture-related sectors, contributing around 12% of gross domestic product (GDP) (Statistics Indonesia, 2022). The threat risk of elevated high and fluctuatimg volatile food prices is especially pronounced for impoverished even more prevalent for poor and vulnerable households ,as the lowest bottom decile allocates as much as their spending to food up to 64.3% of their expenditure to food, in stark contrast to the while the top 20% of households, who allocate 'only' allocated 41.9% of their spending toon food (World Bank, 2020). Furthermore, it ihas beens also observed in poor household that impoverished households experience a higher incidence of they have higher incidence of food malnutrition, often due to as it is related to a rather insufficient access to healthcare conditions and calorie intake.

Indonesia is also the fourth-biggest polluter in the world, producing around 1,959 metric tonnes of carbon dioxide equivalent.[2] Economic activity is driven by highly carbon-intensive manufacturing, the largest sector in the economy with around 20% of contribution to GDP. While Indonesia has sustained a steady 5% growth rate over the past 2 decades, this achievement has come at a significant environmental cost. The expansion of production and economic activities has led to extensive deforestation. In the period from 2001 to 2020, Indonesia lost approximately 227.7 million hectares of forest cover, which accounts for roughly 17% of the country's total forest cover and 6.7% of the global tree cover loss.[3] Consequently, the forestry sector emerges as the leading source of greenhouse gas emissions in Indonesia.

All of these issues have hindered Indonesia's achievement of the Sustainable Development Goals (SDGs). Of 17 SDGs, seven are still facing 'major challenges', seven are facing 'significant challenges', and only three face 'challenges' (Sachs et. al., 2023). Regardless, Indonesia is progressing steadily towards SDG achievement. In 2010, its overall SDG index was 61.7, gradually increasing to 69.2 in 2022. Four SDGs are on track, nine have been moderately improving, and four are stagnating (Sachs et al., 2023).

Indonesia is thus at a critical juncture. After the turmoil brought by the COVID-19 pandemic, it is time to face the challenges of long-term development such as economic growth, welfare, and climate change. Infrastructure serves as a fundamental means to resolve these challenges. The provision of well-distributed and resilient infrastructure contributes to wide-ranging goals, from poverty eradication to resolving climate threats. SDG 9 – building resilient infrastructure, promoting inclusive and sustainable industrialisation, and fostering innovation – is the most direct reference to the role of infrastructure in supporting the sustainable development agenda. Indonesia also

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[2] Climate Watch, http://cait.wri.org

[3] Global Forest Watch, https://www.globalforestwatch.org/ (accessed 10 May 2022).

must push forward climate-change adaptation efforts, and resilient infrastructure plays a vital role in this effort. Indonesia will suffer a loss of Rp544 trillion during 2020–2024 from climate change without substantial adaptation efforts (Bappenas, 2021); therefore, it must incorporate resiliency in its infrastructure development. Resilient infrastructure is defined as 'a component, system or facility that is able to withstand damage or disruptions, but if affected, can be readily and cost-effectively restored' (Scalingi, 2007). The Organisation of Economic Co-operation and Development (2018) further elaborated that resilient infrastructure should anticipate, prepare for, and adapt to changing climate conditions so that this idea is integrated into every stage of infrastructure development.

According to Lu (2019) and World Bank (2019), building resilient infrastructure provides extensive benefits, especially for Indonesia as one of the most disaster-prone countries in the world. Identifying climate and disaster risks in building and the maintenance of infrastructure increases infrastructure's lifespan and ensures prolonged utilisation and lower maintenance costs, and minimises the damage to livelihoods and welfare of citizens impacted by disasters. Moreover, resilient infrastructure can ensure business continuity due to minimum business disturbances in the event of a disaster.

Infrastructure development plays an important role towards achieving other SDGs (Casier, 2015). In terms of economic growth and distribution, various studies found that infrastructure provision promotes economic growth, and higher quantity and quality of infrastructure are associated with lower income inequality (Kessides, 1933; Calderón and Servén, 2004; Égert, Kozluk, Sutherland, 2009; Srinivasu and Rao, 2013; Mutiiria, Ju, Dumor, 2020; Syadullah and Setyawan, 2020; Fosu and Twumasi, 2022).

The government's commitment to accelerate infrastructure development is demonstrated by the creation of a priority programme known as Proyek Strategis Nasional (PSN), managed by Komite Percepatan Penyediaan Infrastruktur Prioritas (the Committee for the Acceleration of Priority Infrastructure Delivery, KPPIP). By developing infrastructure, the PSN aims to accelerate economic growth, accelerate the development agenda, increase welfare, and reduce socioeconomic inequalities across its many regions in a sustainable manner. PSN projects span various sectors – such as transport, energy, information technology, and housing – and are aligned with the SDGs.

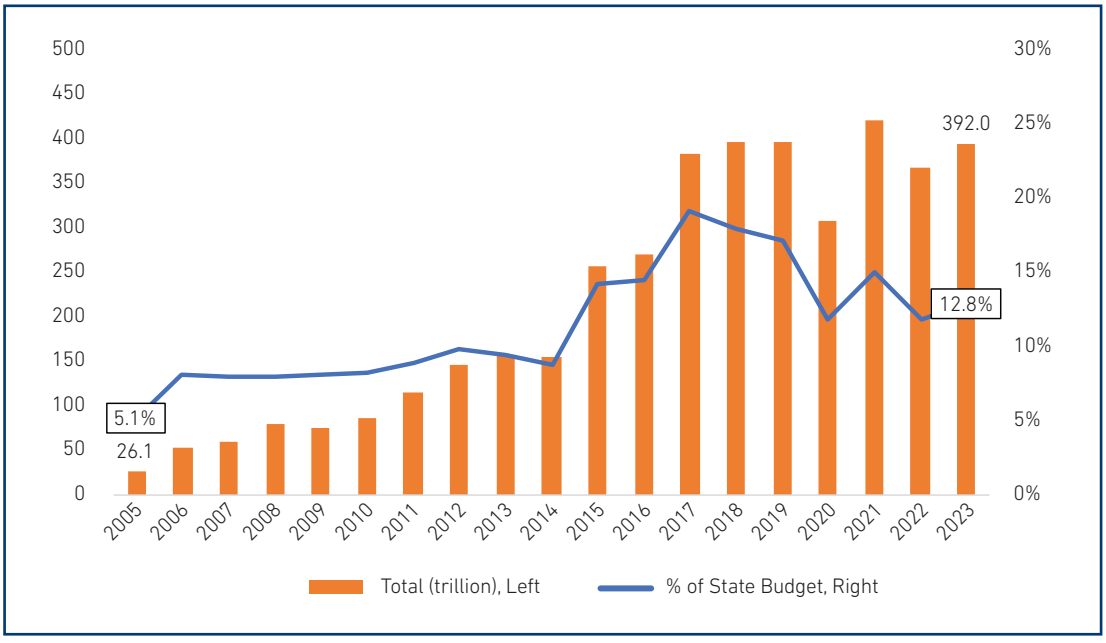
Given Indonesia's limited financial resources, the most significant obstacle is financing these enormous undertakings. Due to the inflexibility of the State Budget on both the expenditure and revenue sides, financing infrastructure development requires substantial contributions from other sources – a prevalent global practice. Infrastructure also necessitates technological innovation, which is the primary capability of the private sector. Consequently, there is a pressing need to utilise the private sector for infrastructure financing. Yet accessing private funds is difficult, particularly given Indonesia's relatively shallow financial market.

2. Financing Sources for Infrastructure in Indonesia

As stated in the *Rencana Pembangunan Jangka Menengah Nasional* (National Medium-Term Development Plan, RPJMN), 2020–2024, the need for national infrastructure investment will reach Rp6,445 trillion – equivalent to around 11% of the annual GDP, 68% of annual realised national government spending and 29% of total financial assets (CEIC, n.d.). The State Budget is expected to fund 37%, state-owned enterprises (SOEs) 21%, and the private sector 42%.

KPPIP has completed 153 PSN projects, with estimated financing of Rp1.040 trillion since 2016 (KPPIP, 2022). This amount is small to the total financing needs for all PSN development, as total projects number 210. From 2022 to 2024, total investment needs for all PSN projects is around Rp5.746 trillion (KPPIP, 2022).

Figure 4.1. Infrastructure Allocation in State Budget, 2005–2023



Source: CEIC (n.d.).

Allocation for infrastructure spending is Rp392 trillion or around 12.8% of total 2023 State Budget expenditure (Figure 4.1). Despite increasing over the last 15 years, infrastructure spending has slightly decreased from its peak of Rp418.26 trillion in 2021. Also, as a portion of the State Budget, infrastructure spending reached its height in 2017, at almost 20% of the total State Budget. The State Budget for infrastructure spending will be allocated through four spending groups.

Of the Rp392 trillion, Rp189.2 trillion (48%) will be from various ministries and governmental bodies. About Rp93.0 trillion (24%) will be from regional governments, which includes *dana alokasi khusus* (special allocation funds, DAK), special autonomy funds for infrastructure, and village funds. Next, Rp85.7 trillion (22%) will be allocated through refinancing, which includes a liquidity facility and penyertaan modal negara (state equity participation, PMN) for SOEs. While there are no details regarding PMN in the infrastructure budget for 2023, its figure reached its peak in 2022 with Rp38.5 trillion, an increase of more than 100% compared to only Rp19.0 trillion in 2021. This spending was intended to restructure some infrastructure SOEs and to bolster their financing capacity in building infrastructure. In addition, non-governmental bodies will contribute about Rp24.2 trillion (6%), including viability gap funding (VGF) and official grants and assistance. Official grants and assistance reached Rp4.8 trillion in 2022 and are expected to decrease; as of 2023, Indonesia is no longer categorised as lower middle-income country but as a upper middle-income country.

From the standpoint of the State Budget, Indonesia is comparable to most developing nations in that it has relatively limited fiscal space. The RPJMN 2020–2024 projects that the State Budget contribution to infrastructure investment will be approximately Rp477 trillion per year or Rp2,384.65 trillion until 2024. However, cumulative spending for infrastructure from the State Budget during 2020–2023 only amounted to Rp1,483 trillion or Rp371 trillion annually. As mentioned, according to the 2023 State Budget, the allocation for infrastructure spending is only around Rp392 trillion, suggesting that the allocation for infrastructure spending in the 2024 State Budget must reach Rp902 trillion – an increase of 230% from 2023 – to fulfil its expected contribution.

Increasing the State Budget allocation for infrastructure would be challenging. Due to numerous mandatory spending items, debt burden obligations, a sizable amount of social spending, and brown energy subsidies, Indonesia's public spending posture is relatively inflexible regarding prioritising infrastructure financing without drastic reform. The State Budget's realisation for energy subsidies and compensation in 2022 was recorded at Rp551.2 trillion, around 40% higher than allocated infrastructure spending for 2023.

The government did announced a fuel subsidy reformreform of fuel subsidy reform in September 2022. This reform involved is done by raising fuel prices to preempt potential increases in anticipate further fuel subsidies hike and to better target improve subsidies target towards vulnerable groups. NeverthelessHowever, Indonesia's efforts to reform fuel subsidiesy reform in Indonesia should be accompanied by a comprehensive strategy to enhance the complemented with various effort of quality of government spending improvement.

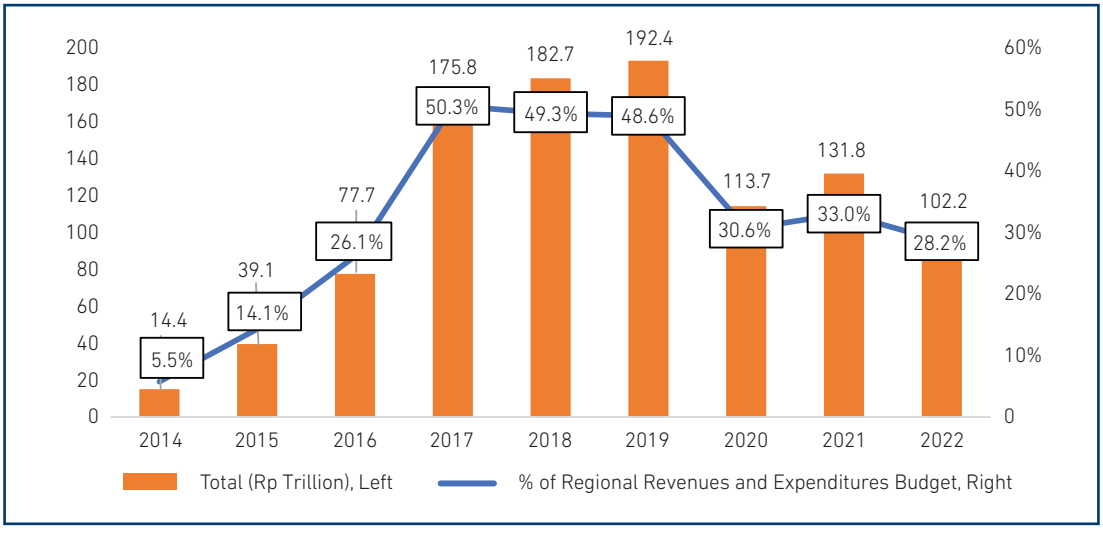
Indonesia's Several key areas to be focused on by Indonesia's fiscal spending should prioritise several key areas, as outlined by the World Bank in 2020, includinge social assistance, education, healthcare, housing, road and infrastructure, road development, water resources, and sanitation

(World Bank, 2020). MoreoverFurthermore, efforts to improve spending allocation must be improvement should also be coupled with advancements improvement in expenditure management, the utilisation of data, utilization, and reforms in intergovernmental fiscal transfer systems reform.

Nevertheless, the question of increasing overall budget spending or increasing the budget deficit is often met with the issue of debt sustainability. Although the State Budget deficit must stay below 3% of GDP each year, the current burden of interest payments as a share of government expenditure has been doubled due to the need for expansionary fiscal policy during the COVID-19 pandemic. Now at 15% of total State Budget expenditure, interest payments more than doubled compared to the 2013 figure of only around 7%. In addition, the current higher interest rate regime cycle has pushed up government bond yields. Therefore, the inevitability of accumulating more debt arises if any augmentation in fiscal spending is not accompanied by a proportionate increase in revenue. Consequently, a larger share of future spending will have to be allocated to interest payments, further exacerbating Indonesia's debt sustainability challenges.

The challenge of enhancing fiscal capacity also lies in revenue. Indonesia enjoyed stable and high economic growth due to a commodity boom until 2013. During 2022, the world experienced a cycle of high energy prices; Indonesia had a windfall profit in terms of state revenue, marking its first budget surplus since 2014. However, during the normal absence of high commodity prices, Indonesia has had stubbornly low tax revenue. Despite a slight increase to 10.4% of tax revenue to GDP in 2022 from 9.1% in 2021, Indonesia's average tax ratio has been 10.3% since 2010, substantially lower than the Asia-Pacific average of 21.0% and Organisation for Economic Co-operation and Development (OECD) countries' average of 33.4%.

Figure 4.2. Region Transfer and Village Funds for Infrastructure Purposes



Source: CEIC (n.d.).

On the sub-national level, the capacity to finance infrastructure development is also low. Based on the 2022 realised provincial state budget, total provincial state expenditure is around Rp361 trillion (Figure 4.2). Comparing this with the total regional transfer and village funds for infrastructure from the central government, the central government share in the regional state budget for infrastructure is rather substantial. Despite showing a lower trend, the share in 2022 is around 28%, suggesting that the financing for infrastructure development on the sub-national level relies heavily on the budget transfer from the central government.

Given the inflexibility of the State Budget – both from the expenditure and revenue side and on the national and sub-national level – financing for infrastructure development requires considerable contributions outside of the State Budget. In addition, forcing the State Budget to carry the burden of infrastructure development without significant contributions from other economic actors is not feasible. The government is aware of this situation; the RPJMN 2020–2024 suggests that 19% or Rp1,353 trillion of infrastructure investment will be from SOEs. The largest portion of infrastructure investment – around 42% – will be contributed by the private sector, around Rp2,706 trillion.

The government may mandate that SOEs build particular projects or may invite SOEs to participate in the public–private partnership (PPP) tendering process as profit-seeking enterprises competing with other private companies – however, this action should be done with caution. Crowding-out effects must be avoided, which would prevent private investment from taking part in the infrastructure sector if SOEs compete with other private enterprises for PPP contracts. It is crucial to support the private sector in the long run to have a robust, effective, and healthy infrastructure market. SOEs may be granted some advantages over their wholly private competitors, however. For instance, they can obtain funds from the State Budget at a lower rate.

If SOEs are given infrastructure development tasks that are unattractive to private enterprises, they may forgo their potential earnings by taking on riskier projects. Although the government's assignment is often accompanied by a partial capital injection, projects with a low ability to recover costs may require further subsidies to operate. This may reveal hidden liabilities for the State Budget's future. Policymakers should thus place SOEs and private investors fairly to avoid jeopardising their potential for growth and to balance their respective contributions to the infrastructure market.

Indeed, tapping into private funds for infrastructure development is by no means easy. One substantial factor is Indonesia's relatively shallow domestic financial market, which is characterised by the dominance of the banking sector, which accounted for around 76% of total financial sector assets. Banking dominance poses a problem, as bank lending is not well designed

to finance long-term infrastructure projects. Today, high infrastructure financing demand cannot be matched by bank financing only, as the 2008 global financial crisis resulted in stricter regulations on banks and their lending requirements under Basel III. Banks that have short-term liabilities are not well suited to hold long-term debt, as this inevitably limits infrastructure assets that can safely be held. Thus, Indonesia's financial market must be deepened to enhance domestic resources mobilisation towards infrastructure.

3. Innovative Finance: Potential and Implementation

3.1. Definition

The inability to fulfil the investment needs for Indonesia's infrastructure development agenda through the State Budget and traditional private financing schemes has created the need to use innovative financing. The term 'innovative financing for development' was coined in the early 2000s, but there is no internationally agreed on definition. The term encompasses a heterogeneous mix of innovations in fundraising and innovations in spending. The World Bank (2009) defined innovative financing for development as

> those that depart from traditional approaches to mobilizing development finance—that is, through budget outlays from established sovereign donors or bonds issued by multilateral and national development banks exclusively to achieve funding objectives. Innovative development finance therefore involves non-traditional applications of solidarity, PPP, and catalytic mechanisms that (i) support fundraising by tapping new sources and engaging investors beyond the financial dimension of transactions, as partners and stakeholders in development; or (ii) deliver financial solutions to development problems on the ground.

In addition, Sandor et. al. (2009) from OECD considered innovative financing to comprise the mechanism of raising funds or stimulating actions in support of international development that go beyond traditional spending approaches by either public or private sectors.

Based on those definitions, innovative financing can take many forms, including government *sukuk*, PPPs, and SDG financing. To enhance the potential of innovative financing, it is essential to formulate the right scale and mix of finance and to leverage synergies between private and public financial flows. Further, domestic resources mobilisation is crucial to optimise the flow of financing towards infrastructure projects. Besides domestic resources, external funding can be key (Songwe et al., 2022). This external financing can come from multilateral institutions, philanthropy, or international private financial institutions.

3.2. Types

There are two popular types of innovative finance: PPPs and blended finance. In both cases, additional funding is provided by sources other than the government budget, with stipulations attached. Depending on the instruments' funding requirements, the public sector can be responsible for raising or authorising them, albeit through innovative forms of mobilisation.

3.2.1. Public–Private Partnerships

In Indonesia, PPPs began in the early 1990s when the private sector started to participate in toll-road and energy sector projects. From 1990 to 2022, 147 PPPs in Indonesia across various sectors were completed, with a total investment of $74 billion.[4] Based on sectoral contribution, electricity dominated, with 72 projects and a total investment of $43 billion, followed by roads with 29 projects and a total investment of $8 billion. However, 13 projects representing 9.16% of total investment were cancelled.

To support the development of PPPs to enhance investment participation from the private sector, the government has made continuous efforts to institutionalise and to promote PPPs by enhancing the PPP regulatory framework. Currently, Indonesia has several innovative financing instruments as PPP-facilitating mechanisms, including the Project Development Facility (PDF), guarantees, VGF, availability payments, and a land acquisition financing mechanism. Furthermore, various institutions were established to support PPP facilitation in Indonesia, including PT Indonesia Infrastructure Finance (PT IIF), a private nonbanking finance corporation; PT Penjaminan Infrastruktur Indonesia (PT PII), an SOE under the Ministry of Finance (MOF) that is responsible for providing government guarantees for infrastructure projects developed under PPPs; and PT Sarana Multi Infrastruktur (PT SMI), an SOE that provides long-term financing and advisory services for infrastructure development.

While PPPs continue to play roles in infrastructure investment and innovative financing, the adoption of PPPs still can be improved. Several characteristics are considered significant in spurring their adoption, including consistent policy, public sector capability to handle PPPs appropriately, public sector commitment to developing cooperative relationships with private partners, and leadership (Zen, 2019). In addition, there are four key areas that can be addressed to improve private participation in infrastructure development: improving efficiency in bureaucracy and regulations, enhancing government support and facilities, providing more efficient land acquisition support and mechanisms, and strengthening PPP contracts (APEC Policy Support Unit, 2019).

[4] World Bank, Country Snapshots: Indonesia, https://ppi.worldbank.org/en/snapshots/country/indonesia

3.2.2. Blended Finance

Blended finance schemes are implemented to discover optimal financial structures that combine multiple funding and financing sources from the government, the private sector, donors, and philanthropists in a single project. They aim to reduce risk or to modify risk-reward to transform an intolerable investment opportunity into an acceptable one. Blended financing can be implemented to support the entire lifecycle of a project by being tailored to each phase. For example, a concessional fund assumes a sizeable portion during high-risk phases and progressively decreases as commercial funding increases.

The PDF, VGF, guarantees, and availability payments are all examples of government support for blended finance. The concepts of innovative financing and blended finance have been implemented in infrastructure development in Indonesia, as in the Sumatra Toll Road project. This is a project for 24 toll roads in Sumatra that connect Lampung to Aceh. With a total toll length of 2,749 kilometres, the required investment cost is estimated at Rp684.7 trillion. Due to the large investment cost, based on a presidential regulation, the government optimised the role of SOEs by assigning PT Hutama Karya to construct the toll road. The construction of 24 sections was divided into 4 phases, which are targeted for completion by the end of 2024.

Although the Sumatra Toll Road has a low level of financial feasibility, it provides a crucial economic multiplier impact for the development of Sumatra. In assigning PT Hutama Karya, the government provided guarantees for loans and provision of state equity participation to fulfil the project's equity. In addition, in maintaining the sustainability of toll-road development, the government provided an option for PT Hutama Karya to be able to divest the sections operating, where the proceeds can be used to reduce its financial burden or as capital for the construction of other sections. The asset-recycling concept implemented through the toll-road divestment is a form of blended finance, making several sections have a level of financial feasibility attractive to investors.

Blended finance was implemented in the second phase of the project as well. Through Presidential Decree No. 131 of 2022, the government formulated a funding scheme for the completion of Phase 2 through a construction support scheme – funded through the Ministry of Public Works and Housing's capital expenditure or domestic and foreign loans – and an annuity payment periodically made from the ministry to PT Hutama Karya for services on the Sumatra Toll Road according to the quality and/or criteria stipulated in the toll road concession agreement.

In addition, Indonesia has established SDG Indonesia One, a platform utilising a blended finance scheme to attain the SDGs. Its concept includes SDG development facilities, SDG de-risking facilities, SDG financing facilities, and an SDG equity fund. As of April 2023, it has secured $3.27 billion in funding commitments, including $939 million in agreements and $325 million in realised funds. SDG Indonesia One includes funding for 17 sectors, 38 grants, and 42 technical assistance activities. It has delivered five project preparation, six project financing, and one project management documents as well.[5]

3.2.3. Green Bonds and *Sukuk*

Initiatives to promote the development of green bonds have also started to occur in Indonesia. Since the establishment of the regulation for the issuance and terms of green bonds by Otoritas Jasa Keuangan (Financial Services Authority, OJK) in 2017, the green bond market has slowly been emerging. The regulation brought a positive impact on the development of domestic green bonds and triggered the issuance of 13 deals of green bonds, including 5 corporate bonds issued domestically (Table 4.1). The size of Indonesia's green bond market has grown to $6.3 billion, the second-biggest green bond market in the Association of Southeast Asian Nations (ASEAN) region after Singapore. According to Badan Kebijakan Fiskal (the Fiscal Policy Agency, BKF) (2019), the green bond market has played a special role in the development of the Ecological Fiscal Transfer instrument in the budget transferring mechanism to sub-national governments.

The green bond market in Indonesia is still dominated by the government, as green bonds issued by MOF and PT SMI account for around 69% of total outstanding green bonds. This is an improvement, as the domination of the government/government-related green bonds issuance previously reached 83% of the total in 2021 (Climate Bonds Initiative, 2022).

[5] PT SMI, SDG Indonesia One, https://ptsmi.co.id/sdg-indonesia-one

Table 4.1. Green Bond Issuance in Indonesia

Issuer Name	Amount Issued	Issue Date	Use of Proceeds
Indonesia (green retail *sukuk*)	$350 million	Nov 2021	Energy, Waste, Water
Indonesia (global green *sukuk*)	$750 million	Jun 2021	Energy, Waste, Water
Indonesia (green retail *sukuk*)	$378 million	Dec 2020	Energy, Waste, Water
Star Energy Geothermal (Darajat II)	$320 million	Oct 2020	Energy
Star Energy Geothermal (Darajat II)	$790 million	Oct 2020	Energy
Indonesia	$750 million	Jun 2020	Energy, Waste, Water
Indonesia (green retail *sukuk*)	$98 million	Nov 2019	Energy, Waste, Water
Indonesia	$750 million	Feb 2019	Energy, Waste, Water
OCBC NISP	$150 million	Aug 2018	Energy, Transport, Water
PT Sarana Multi Infrastruktur	$350,000	Jul 2018	Transport, Energy, Waste, Water, Land Use
Star Energy Geothermal (Wayang Windu)	$580 million	Apr 2018	Energy
Indonesia (global green *sukuk*)	$1.25 billion	Mar 2018	Energy, Waste, Water
Tropical Landscape Finance Facility I	$96 million	Feb 2018	Land Use
Total	**$6.3 billion**		

Source: Climate Bonds Initiative (2022).

One of the emerging green bond investment categories is land use (Climate Bonds Initiative, 2019a). As land use, including forestry, is considered a key driver for environmental issues and emits greenhouse gases, it helps increase green bonds in Indonesia and make a positive impact on the environment. One region that targets land use in its green bonds is Latin America (Climate Bonds Initiative, 2019b).

Currently, corporate green bond development is relatively scarce. Besides a liquidity problem, Climate Bonds Initiative (2019a) identified several other aspects that limit the growth of Indonesia's green bond market. First, the cost of green bonds for small issuers is more expensive than loan financing. Legal fees and the costs of reviews and obtaining credit profiles may be an obstacle for smaller borrowers. Second, credit profiles are crucial for investors to determine their willingness to invest in any projects, including green projects. Credit profiles for green projects include the track record of the project sponsor, an independent credit rating (both domestic and international), execution risk, and market risk. A poor credit profile will attract less financing for a project;

in Indonesia, the number of green projects with good credit profiles is low. The absence of an independent multinational rating for green projects also makes it difficult for foreign investors to assess domestic green projects. Furthermore, while some green project developers have good domestic credit ratings, an international credit rating for issuers is usually much lower due to additional risk, such as country and currency risks.

Moreover, there is a lack of market awareness of green instruments. Most developing countries lack awareness of such financial instruments, explaining the shallow financial markets and low demand. This barrier limits the domestic demand for such instruments, so green bonds may need to access international bond markets to gather adequate funds for projects.

3.2.4. Pension Funds

As the nature of infrastructure development is long term, the instruments to fund such projects need match its time horizon. An ideal source of alternative financing is thus pension funds. The stream of funds for pensions is relatively stable; investors are aiming for the long term. Globally, the total value of pension funds invested in infrastructure increased from less than $29 billion in 2007 to almost $245 billion in 2018. In addition, the infrastructure investment share of pension funds was 12.0% in 2007, rising to 47.5% in 2018.[6]

A study by Carlo et. al. (2023) found that pension funds with higher allocations to alternative assets are more likely to invest in infrastructure. Infrastructure investment was amongst the best-performing asset classes as measured by net returns, and there was persistence in pension fund infrastructure investment performance over a 1-year horizon.

In Indonesia, utilisation of pension funds for infrastructure investment has potential. As of April 2023, the asset size of pension funds in Indonesia was Rp352 trillion (OJK, 2023). Considering its size, pension fund contribution – if all assets are allocated – to infrastructure investment would be equivalent to 13% of total infrastructure financing by the private sector.

[6] CEM, https://www.cembenchmarking.com

3.2.5. Trust Funds

Trust funds are an underdeveloped financial instrument in Indonesia. Due to the lack of a supporting enabling environment that arises from regulation and policy circumstances, many entities – such as ultra-wealthy individuals, international donors, and investors – have placed their money abroad in trust funds. Some grants, formed from these trust funds, which are dedicated to climate finance in Indonesia are managed by the Indonesia Climate Change Trust Fund (ICCTF). In the first quarter of 2023, cumulative funds disbursed by the ICCTF were $4.34 million, from a total grant amount of $5.22 million (ICCTF, 2023). Despite the ICCTF being responsible for piloting managerial and technological innovations that foster the mainstreaming of climate-relevant programmes and activities, the establishment of resilient infrastructure is still lacking in those projects. Meanwhile, in Japan, the Japan International Cooperation Agency Trust Fund managed a ¥4.6 billion grant for rehabilitation and recovery from Typhoon Yolanda in the Philippines, including increasing the resiliency of Tacloban Airport, which amounted to ¥237 million[7] (JICA, 2022).

3.2.6. Venture Capital

Venture capital typically comes from investors with long-term investment horizons. These investors usually provide a minimum, early-stage investment – seed capital – to spur private investment and to raise more capital. This kind of investment can boost the bankability of infrastructure projects as they address investment gaps from an early stage. One example is Meridiam Infrastructure; with more than 120 projects around the world focussed on critical public services, sustainable mobility, and innovative low-carbon solutions, Meridiam Infrastructure has invested more than $80 billion since 2005 and currently has more than $20 billion worth of assets under management.[8]

In Indonesia, there is currently no venture capital investment in infrastructure. In 2021, the value of venture capital funding in Indonesia amounted to around Rp139.5 trillion (Statista, 2023). However, most of this fund has been channelled into digital start-up companies. While it is relatively uncommon to tap venture capital funds to finance infrastructure projects, Indonesia could bridge the infrastructure investment gap. Venture capital is known to have a high tolerance for risks, which is suitable to finance certain infrastructure projects such as geothermal energy power plants.

[7] https://www2.jica.go.jp/en/evaluation/pdf/2021_1560330_4_f.pdf

[8] Meridiam, Meridiam at Numbers, https://www.meridiam.com/our-impact/meridiam-in-numbers/

3.2.7. Hajj Funds

Another potential source of funds for in Indonesia – a country with the highest Muslim population in the world – are Hajj funds. Pilgrims' saving accounts are managed by the Ministry of Religious Affairs. Based on 2022 financial statements of Badan Pengelola Keuangan Haji (Hajj Fund Management Agency, BPKH), its total assets amount to Rp167.8 trillion – plenty of funds to be invested in conventional bonds, *sukuk*, and state securities. Yet with its nature of long-term income streams, infrastructure serves as an ideal investment alternative in the hajj savings portfolio. Funds can be used to finance resilient infrastructure in accordance with Sharia, as hajj savings requires its use of proceeds to follow such laws.

In Malaysia, Lembaga Tabung Haji has completed projects exceeding RM1 billion in value, including those for infrastructure. However, considering the high risks embedded in these projects, the implementation of hajj savings as a non-conventional financing scheme for resilient infrastructure may be difficult. Therefore, support from other schemes, such as guarantees, can ensure the feasibility of hajj savings as a non-conventional financing scheme.

3.2.8. Land Value Capture

Land-value capture (LVC) is an economic policy approach and type of public financing that recovers and recycles value that public infrastructure generates for private landowners. The uplift in land and property values that result from public investments (e.g. a new road) can be substantial, and LVC allows governments to 'capture' some or all of this uplift to fund the public infrastructure or service provision.

LVC can take various forms and has been implemented in many countries, such as through an infrastructure levy (Colombia), developer obligations (Germany), charges for development rights (Brazil), land readjustment (Japan), and strategic land management (Netherlands). Another example is the extension of the Jubilee Line in London. In the late 1990s, the London Underground extended the Jubilee Line to include several new stations, which improved public transport accessibility to previously less-connected areas (Banister, 2005). This extension led to an increase in property values within 1 kilometre of the new stations by approximately £13.0 billion; the cost of extending the Jubilee Line was only around £3.5 billion. At the time, there was no established LVC mechanism, so the public sector could not capture this uplift in land and property values to help fund the extension.

This case underlined the potential of LVC as a funding source for infrastructure projects and led to a renewed interest in LVC mechanisms throughout the world. It also illustrated missed opportunities when mechanisms are not in place to capture value uplift, emphasising the importance of putting such systems in place before undertaking major infrastructure projects. To anticipate a similar situation in the future, the Greater London Authority and Transport for London are exploring ways to use LVC to fund infrastructure projects, including the Northern Line extension to Battersea and the proposed extension of the Bakerloo Line (Greater London Authority, 2017).

LVC schemes have not been implemented in Indonesia, and the legal framework for LVC is non-existent. The Trans-Sumatra Toll Road, however, has the potential to implement an LVC instrument (ADB, 2021). The challenge is to build the capacity of the relevant parties and to incorporate suitable LVC mechanisms into the development of business cases for large-scale infrastructure projects. ADB (2021) suggested establishing a policy framework, building capacity, and implementing smaller pathfinding projects within the existing regulatory and tax framework in the short term. An action plan would require regulatory changes in the national tax framework, implementation of a national LVC legal framework, and implementation of economic development corridor projects.

3.2.9. Carbon Pricing

As part of an effort to expand fiscal space on the revenue side, MOF implemented tax policy reforms in 2022 through the issuance of the Law on Harmonisation of Tax Regulations. The legislation includes carbon tax regulations and serves as an integral part of Indonesia's broader carbon pricing road map, which also includes introduction of an emissions trading system and carbon crediting mechanism. The initial plan was to implement a 'cap-and-tax' scheme for coal-fired power generations from 1 April 2022, but as of July 2023, there is no clarity on the updates of the carbon tax launch. The regulation specifies that the carbon tax will serve as a levy for coal-fired power plants of Rp30,000 per metric tonne of carbon dioxide equivalent above a set limit.

Despite its limited sector coverage and a relatively low carbon price compared to other nations, the implementation of the carbon tax in Indonesia represents a step forward in the journey towards climate transition and lays the groundwork for the establishment of a carbon market by 2023. The introduction of a carbon market would rectify market distortion by aligning incentive mechanisms with the appropriate level of carbon pricing (Basri and Riefky, 2023). The carbon price needs to be $50 to $100 per tonne of carbon dioxide equivalent by 2030 to keep global warming to 2°C (High-Level Commission on Carbon Prices , 2017). Considering this number, the potential revenue from the carbon tax instrument, once implemented, would be substantial and could increase the financing for general infrastructure and other sustainability efforts in Indonesia.

4. Institutions to Implement Innovative Financing

4.1. PT SMI

As a response to the government's commitment to the Paris Agreement and low-carbon and green growth movement, PT SMI is committed to promoting green financing in Indonesia. PT SMI is an SOE and special mission vehicle under MOF. In 2018, as an infrastructure development catalyst, it issued Green Bond Berkelanjutan I Sarana Multi Infrastruktur Stage I. The amount issued was Rp500 billion, part of Rp3 trillion in total, with 3–5-year tenor. About 80.5% of investors are government-related institutions, followed by corporations (10.1%), banks (9.0%), pension funds (7.2%), and individuals (0.2%) (PT SMI, 2022). The Center for International Climate Research-Oslo confirmed that PT SMI's green bond framework complies with the Indonesia Financial Services Authority regulation concerning green bonds and the core principles of *Green Bond Principles 2017* issued by the International Capital Markets Association and ASEAN *Green Bond Standards 2017* issued by the ASEAN Capital Markets Forum (PT SMI, 2020).

Green bonds are used to finance some categories of projects, such as renewable energy, energy efficiency, sustainable pollution management and prevention, low-emissions transport, sustainable natural resources and land-use management, and sustainable water management. These categories ensure alignment with the government's goal regarding green projects. PT SMI stated that projects must have clear environmental benefits and aim to protect, preserve, and/or improve quality and environmental function. PT SMI has allocated all of its funds to three selected projects, two mini hydro projects and one light rapid transit project. It also committed to publishing a report annually to provide investors with information and the progress green bonds on their website. According to World Bank (2018), PT SMI green projects are evaluated based on financial viability and screened for environmental and social risks. PEFINDO, as the rating agency in Indonesia, rates PT SMI's green bonds as AAA.

PT SMI also contributes to infrastructure development through the creation of a funding collaboration platform called SDG Indonesia One. This platform utilises funds from various sources, including private, philanthropic, donor, bilateral and multilateral financial institution, banking, and insurance. As of December 2022, SDG Indonesia One is developing 62 blended finance projects with a $3.19 billion commitment[9] through several facilities, including development facilities, de-risking facilities, financing facilities, and equity funds.

[9] PT SMI, SDG Indonesia One, https://ptsmi.co.id/sdg-indonesia-one

4.2. PT PII

Government guarantees for PPPs are part of the role of PT PII as a special mission vehicle of MOF. Additionally, PT PII offers loan guarantees to foreign financial institutions as well as *Pemulihan Ekonomi Nasional* (National Economic Recovery Program) for loans to SOEs. As stated in PPP agreements, the infrastructure guarantee comprises assurances to reimburse business entities for infrastructure-related risks. MOF and PT PII create a joint guarantee when PT PII's financial capacity is insufficient to meet the underwriting.

Infrastructure guarantees have benefited several PPP projects, such as the multifunctional satellite, Palapa Ring Package (West, Central, and East), multiple water supply systems, toll roads, power plants, and trains. These assurances are essential for protecting the project implementing agency's assets and reducing infrastructure risks to the benefit of commercial enterprises.

Through the PDF, PT PII also helps with project planning and transaction support. To obtain funding from financial institutions and to achieve financial closure, the project implementing authority prepares final feasibility studies, tenders paperwork, and offers comprehensive support. An example of a PDF-supported project is the natural gas distribution network for Batam City and Palembang City. Additional projects have received combined PDF and infrastructure guarantees, such as the Makassar–Parepare railway and the Piyungan waste treatment facility.

The combination of the PDF, feasibility support (i.e., VGF), and infrastructure guarantees has also helped facilitate several water supply systems. Feasibility support helps PPP projects with financial feasibility that have already shown economic viability but need more. With approval from the House of Representatives, sub-national governments may also contribute to this support.

As of June 2023, PT PII guaranteed 48 projects with an investment value of Rp498 trillion, including 32 PPP projects and 16 non-PPP projects. The 32 PPP projects are spread across six different sectors, including roads (15 toll roads and 3 non-toll roads), telecommunications (4), electricity (1), water supply (6), transport (2), and energy conservation (1) (PT PII, 2023).

4.3. Lembaga Manajemen Aset Negara

Infrastructure necessitates property acquisition. However, land acquisition presents challenges. Negotiations with landowners frequently involve communities with historical connections to the land. To avoid conflicts and to obtain public support for infrastructure projects, it is necessary to balance the interests of stakeholders and to compensate affected parties. Transparent and inclusive land acquisition procedures aid in problem resolution and confidence building. This method encourages ownership and cooperation amongst affected stakeholders, which facilitates project implementation.

In Indonesia, Law No. 2 of 2012 regulates and simplifies land purchases in the public interest. It defines the government's responsibility for purchasing property for public infrastructure construction. Land acquisition costs are budgeted to ensure the availability of public land. The government has thus established a new position for Lembaga Manajemen Aset Negara (State Asset Management Agency, LMAN) to handle the land acquisition process budget for the PSN. The appointment is governed by Presidential Regulation No. 102 of 2016. LMAN can thus optimise PSN project allocation based on government prioritisation and manage the budget without a 1-year restriction.

During the land acquisition process, several entities collaborate; the procedure is divided into four major steps. The planning process is led by the sector ministry, the project owner. The second stage – preparation – is overseen by the local government. Third, the National Land Agency oversees implementation. Finally, the output is handed up to the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency. During execution, LMAN pays landowners, ensuring fair compensation.

LMAN has updated its landowner compensation policy as well via Presidential Regulation No. 66 of 2020 and MOF Regulation No. 139/PMK.06/2020. The *pembayaran langsung* (direct payment) plan, which pays qualified parties directly, has grown. *Dana Talangan Tanah* (Land Advance Fund, DTT) accounted for 89% of 2020 compensation disbursements (LMAN, 2023).

LMAN received investment budget land acquisition cash from below-the-line State Budget finance, Rp144.46 trillion on 30 June 2023 (LMAN, 2023). LMAN-compensated landowners received Rp113.458 trillion for land for 52 toll road projects, 44 water resource infrastructure projects (38 dam projects, 5 irrigation projects, and 1 raw water facility project), 9 railway projects, 1 port project, 1 national tourism strategic area project, and 6 national capital projects.

4.4. KPPIP

KPPIP plays a significant role in facilitating infrastructure financing in Indonesia. While KPPIP is not a financing entity itself, its work influences the financing environment for infrastructure projects in several ways. First, KPPIP plays a crucial role in preparing projects to make them more attractive to private investors. This includes identifying viable revenue streams, conducting feasibility studies, and helping structure projects in a way that mitigates risks for investors. Second, KPPIP helps facilitate PPPs for infrastructure projects, which can attract private sector financing. It offers VGF and availability payments for projects that are economically viable but not financially viable. Third, KPPIP provides recommendations to the government on policy improvements needed to attract more private sector investment in infrastructure. This can include recommendations on regulatory changes, tax incentives, or other measures to improve the investment climate. Currently, KPPIP is initiating the development of a regulatory framework for LVC in Indonesia and an improvement proposal for infrastructure financing through limited management rights (KPPIP, 2022).

Fourth, KPPIP promotes priority infrastructure projects to potential investors, both domestically and internationally by providing information on projects, facilitating connections between investors and project implementers, and promoting the benefits of investing in Indonesian infrastructure. Lastly, KPPIP acts as a trouble-shooter, helping resolve issues that arise during the financing and implementation of projects. It coordinates with relevant ministries and agencies to address regulatory hurdles, land acquisition issues, and other obstacles that can affect financing.

4.5. Indonesia Investment Authority

The Indonesia Investment Authority (INA), also known as the Sovereign Wealth Fund of Indonesia, was established in 2021 to manage and to invest state funds in productive sectors that can generate economic returns as well as attract foreign investment. INA received a seed capital injection of Rp75 trillion by the government as state equity participation carried out in stages in 2021 (INA, 2023). Until July 2023, INA was able to secure investment commitments from both domestic and foreign investors, amounting to Rp400 trillion.[10] In terms of key sectors, infrastructure is a priority sector of the INA investment portfolio.

As a *sui generis* institution, INA has the unique feature of full authority in investment decision-making to achieve optimal risk-adjusted returns. As an independent entity with a commercial focus, it has the flexibility to explore innovative financing mechanisms and investment structures. This can include infrastructure bonds, green bonds, or other novel financing methods. In addition,

[10] INA, Audited Financial Statements, https://www.ina.go.id/financial-statement

INA can play a role in risk mitigation, for example by providing guarantees or other forms of risk sharing. This can make infrastructure projects more attractive to private sector investors. INA can participate in PPPs as an equity investor, helping make infrastructure projects more financially viable and attractive to private sector investors.

5. Financial Market Expansion and Deepening

Generally, financial markets in developing countries are considered underdeveloped, usually characterised by few new transactions, low trading volume, and low liquidity. Indonesia's financial market is no exception. In the context of the bond market, Indonesia is still dominated by local currency-denominated bonds with an amount outstanding at approximately $411 billion, making up almost 73% of the market. The outstanding amount of foreign currency bonds is about $152 billion (Asian Bonds Online–ADB, 2023). Regarding local currency bonds, the government also dominates issuance, as 92% of local currency bonds are issued by the central government, sub-national governments, and the central bank (OJK, 2023). Furthermore, as of July 2023, the amount of outstanding corporate bonds only amounted to Rp443 trillion from total bonds outstanding of Rp5,900 trillion, contributing only 8% of Indonesia's bond market (OJK, 2023). Even amongst corporate bonds, the market is rather concentrated. The 30 largest deals account for approximately 70% of the market, with banking and finance sectors dominating others.

Furthermore, only a small fraction of total outstanding conventional bonds and *sukuk* (including green bonds and green *sukuk*) are traded in the secondary market. The small overall size and over-the-counter nature make Indonesia's bond market relatively illiquid, limiting the development of bond issuance for infrastructure purposes, such as green and infrastructure bonds.

Therefore, financial market expansion and deepening are urgently needed. Towards this agenda, the government recently passed the Law on Development and Strengthening of Financial Sector Reform with the purpose of accelerating domestic financial market deepening. Further, it needs to push for the participation of institutional investors who have relatively long-term investment horizons and thus are better suited to financing infrastructure projects.

6. Conclusion and Way Forward

There is little doubt that Indonesia needs to develop its infrastructure. Through its role in boosting economic growth, reducing inequality, and enhancing connectivity, infrastructure provision plays a positive role in resolving economic, social, and environmental issues. It also helps strengthen resilience through efforts at climate mitigation and adaptation. Infrastructure is ideally situated to help Indonesia achieve its long-term development agenda. Indonesia has a significant infrastructure gap that needs to be closed, and doing so will entail a sizable amount of funding.

The main issue is how to finance these enormous projects given Indonesia's comparatively limited financial resources. With the high inflexibility of the State Budget – both from the expenditure and revenue sides – financing for infrastructure development requires considerable participation outside of the State Budget. The urgency to tap potential funds from the private sector to finance infrastructure projects is therefore self-explanatory. Tapping into private funds is by no means easy, especially as Indonesia has a relatively shallow financial market.

Designing and utilising innovative financing, as has been exemplified in other countries, is a critical strategy at this juncture for the successful development of infrastructure projects in Indonesia. If investing in domestic infrastructure projects is commercially viable, the private sector will likely participate. However, because some projects are not fully commercially viable, de-risking measures must be taken. One approach is to expand the use and enhance the utilisation of innovative financing. Considering its potential, the role of innovative financing for infrastructure projects could be optimised through improvements in various aspects.

From an institutional and regulatory standpoint, significant legal restrictions are reasons why some potential sources of finance, including pension funds and hajj savings, are still not fully exploited. The limitation manifests itself as a restriction on investment placements, both in terms of nominal amounts and instrument types. To be able to utilise these sources, some regulatory adjustments are needed, either through reducing limitations or by encouraging investment in resilient infrastructure. In addition, limited institutional capacity to take advantage of innovative financing potential also hampers its growth. This impediment stems from various factors, including a limited supply of capable human resources and incompatible political-economic incentives by policymakers to act in the best interest of infrastructure development. Structural issues, like lack of depth in the domestic financial market, also play a part.

Actions to address the institutional, regulatory, and structural challenges – while enhancing the enabling environment for investment flows – will be vital in unlocking the full potential of innovative financing to support infrastructure in Indonesia.

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INDORAMA

Chapter 5

Massive Infrastructure Development and Its Impact on Indonesia's Economy

Khoirunurrofik
Titik Anas*

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This chapter shows the multiplier effects of the *Proyek Strategis Nasional* implemented during 2016–2022 using an RAS-updated 2016 Input-Output Table reflecting the economy in 2019. It shows that the projects generated a total economic output of Rp1,933.21 trillion, added economic value of Rp891.41 trillion, and created total household income of Rp354.25 trillion. The projects also resulted in total employment of approximately 5.4 million man-years over the same period. Annually, the projects' potential economic value added and job opportunities corresponded to 0.23% of Indonesia's gross domestic product and 0.19% of the national workforce in 2022, respectively. Estimates for regional multiplier effects show that North Sumatra and South Sulawesi provinces had the highest multiplier values. Sectoral analysis then shows that economic and industrial zones, bridges and roads, and electric power had the greatest economic and labour impacts. Due to data availability, the study focusses on the impact of construction activities, although impacts from operations may increase the multiplier effects.

1. Background

Infrastructure development plays a vital role in economic growth both directly and indirectly. Many studies have shown the relationship between infrastructure development and economic growth, including Kessides (1993) and Srinivasu and Rao (2013).

Borrowing the framework in Barro (1990), infrastructure is an enabling resource in the context of economic growth. The availability of infrastructure affects the marginal productivity of capital and complements private capital (Kessides, 1993). Another study by Weil (2009) suggested that a gap in the availability of physical and human capital contributes to differences in economic growth amongst countries.

At the micro level, infrastructure development contributes to economic growth through lowered costs of production and transport to users who have better access to the infrastructure itself. Road infrastructure, for example, reduces prices of a community's inventory storage. It also increases companies' productivity via greater access to the labour market and agglomeration of economic activities (Duranton and Turner, 2012; Wan and Zhang, 2018).

Studies have also demonstrated that infrastructure can benefit a country's economy by increasing private sector productivity. Wan and Zhang (2018) found that infrastructure – such as roads, telecommunications servers, and cables – increased company productivity in China via agglomeration. Li, Wu, and Chen (2017) also posited that road investment in China increased company productivity, where the average annual rate of return during the research period (i.e. 1987–2007) was about 11.4%. Moreover, Holl (2016) concluded that roads significantly positively affected the productivity of manufacturing companies in Spain. In India, Mitra, Sharma, and

Varaoudakis (2016) noted that infrastructure and technology are strongly associated with the productivity and efficiency of the manufacturing industry. Manufacturing of transport equipment, textiles, chemicals, and metal – which are more vulnerable to foreign competition – were found to be more sensitive to infrastructure support.

Indonesia is an infrastructure-deficient economy, but beginning in 2016, infrastructure development has been a focus. In 2016, the Government of Indonesia issued Presidential Regulation No. 3 of 2016 with the objective of accelerating the development of strategic infrastructure projects. These projects, known as the *Proyek Strategis Nasional* (PSN), are expected to have sizeable economic impacts. The regulation defines the PSN as projects implemented by the central government, sub-national governments, or business entities that include a strategy for increasing growth and equitable development to improve welfare and regional development. The availability of infrastructure is expected to support the movement of people, goods, and services to stimulate regional development, narrow the development gap across regions, and increase economic growth in general.

From 2016 to 2022, 153 PSN projects were completed with an investment value of Rp1,040 trillion. Completed projects include those focussed on upstream oil and gas, railways, irrigation, technology, clean water and sanitation, dams, airports, electricity, toll roads, and seaports. There have been several project-specific impact estimates, including those of the West, Central, and East Palapa Ring Package project that serve 440 cities/regencies and construction of 48 dams targeting an increase of 2.67 billion cubic metres of raw water supply, reduction of flooding potential by 10,300.74 cubic metres per second, increase of 10,990 litres per second of raw water supply, irrigation of 283,000 hectares of rice fields, and generation of 143 megawatts of electricity (Coordinating Ministry of Economic Affairs, 2022). However, studies have yet to concentrate on the impact of all PSN projects in total.

This chapter analyses the economic impact of infrastructure projects classified under the PSN from 2016 to 2022. To measure the impact of these investments on the economy at the national level and on regional development, the 2016 Input–Output (IO) Table adjusted to the 2019 economic structure – known as the IO 2019 RAS – is used, and investment value data from 153 PSN projects completed during 2016–2022 are utilised. By updating the IO Table to reflect the 2019 economic structure as the baseline year, the pre-COVID-19 economic landscape is captured. The analysis examines the relationship amongst the PSN investment value, sectoral performance, and regional outcomes to gain insights about the broader implications of the PSN projects.

To quantify the economic impact of the 153 PSN projects on the Indonesian economy, data were collected from various sources including the Komite Percepatan Penyediaan Infrastruktur Prioritas (Committee for Acceleration of Priority Infrastructure Delivery, KPPIP), sectoral ministries, state-owned enterprises, and other governmental agencies responsible for PSN implementation. As several projects span multiple years, focus group discussions with relevant stakeholders were held

to obtain information on the stimulus value, financial disbursement timeframes, and local content of the PSN projects. This collaborative approach allowed more comprehensive data and insights to be gathered on each project.

2. Multiplier Model for Economic Impacts

The economic impact multiplier model employed in this analysis is the IO Table for 2016, updated using the non-survey method for 2019. Leontief introduced the IO model in the late 1930s. According to Miller and Blair (2009), the IO model is an arrangement of numbers in a table that is essentially a system of linear equations where each equation describes the distribution of industrial products through an economy. The framework of the IO analysis is provided in Appendix 5.1.

The IO model was initially used to analyse intersectoral relationships in an economy, allowing users to find output, income, and employment multipliers from analysed sectors to uncover the output impact values of a particular shock/stimulus to the economy. Thus, the IO model can assist in estimating gross domestic products (GDPs), household incomes, and job creation for specific historical periods.

3. The RAS Method

The non-survey or RAS method utilises the technology coefficient adjustment to capture current economic conditions. Stone (1961) developed the RAS method, which estimates a transaction matrix between specific years based on a transaction matrix in the past. Based on the RAS method, this study adjusts the 2016 IO Table of 52 sectors with national Statistics Indonesia publications. The detailed process for applying the RAS methodology is in Appendix 5.1.

Several assumptions are made in the calculation of the economic impact of the PSN projects:

(i) The figures for national local content are derived from reports provided by project implementers, whenever available. If such reports are not available, import share datasets from the 2016 IO Table are used.
(ii) National local content refers to goods and services supplied domestically.
(iii) The distribution of the annual investment value is also based on the reports from project implementers. If these reports are not available, the annual investment values are proportionally distributed based on project duration.

4. Multiplier Analysis of Input–Output 2016 and Input–Output 2019 RAS Results

This section discusses a comparison between the output multiplier values in the original IO 2016 and IO 2019 RAS tables. The multipliers are higher in the IO 2019 RAS Table than in the IO 2016 Table (Table 5.1). An increase in the multiplier number indicates that there was an increase in economic activities due to an increase in added values or output in a sector. The multiplier values for the secondary and tertiary sectors exhibit a faster rate of increase compared to primary sectors. Specifically, the output multiplier values for the basic, upstream, and construction industries demonstrate significantly higher multipliers for 2019.[1]

The higher multiplier values of the IO 2019 RAS Table implies higher impacts of these sectors on economic output whenever there is a stimulus/shock to the economy. A higher multiplier is consistently observed in the base sectors (i.e. basic metal, upstream, and construction), particularly those influenced by the development of the PSN. Notably, the multiplier value of the construction sub-sector experienced a significant increase in 2019 compared to 2016. These findings underscore the positive impacts of PSN investments in the construction phase, which not only benefit the economy but also demonstrate an increasing scale of their impact year after year – emphasising the overall economic benefits derived from such investments.

Table 5.1. Output Multiplier – Input–Output 2016 and Input–Output 2019 RAS

	Sector	National	
		2016	2019
Primary Sectors	Food Crop Agriculture	1.22	1.24
	Annual Horticultural Plant Farming, Annual Horticulture, and Others	1.22	1.24
	Seasonal and Annual Plantation	1.29	1.37
	Farm	1.56	1.61
	Agricultural and Hunting Services	1.33	1.38
	Forestry and Logging	1.19	1.37

[1] Basic metal industries encompass the processing of capital goods, such as machinery and chemicals, which are then used in other industries. Upstream industries involve the production of raw materials and auxiliary materials, such as iron and sheet steel. The construction industry includes the design and construction of buildings and structures.

	Sector	National	
		2016	2019
	Fishery	1.21	1.24
	Oil, Gas, and Geothermal Mining	1.36	1.41
	Coal and Lignite Mining	1.60	1.69
	Metal Ore Mining	1.41	1.65
	Mining and Other Quarrying	1.42	1.62
Secondary Sectors	Coal Industry and Oil and Gas Refining	1.50	1.89
	Food and Beverage Industry	1.90	2.03
	Tobacco Processing Industry	1.34	1.37
	Textile and Apparel Industry	1.72	1.98
	Leather Industry, Leather Goods and Footwear	1.77	1.89
	Wood Industry; Products from Wood and Cork; and Woven Products from Bamboo, Rattan, and the Like	1.80	1.91
	Paper and Paper Products Industry, Printing and Reproduction of Recorded Media	1.87	2.02
	Chemical, Pharmaceutical, and Traditional Medicine Industries	1.72	1.87
	Rubber Industry, Rubber, and Plastic Products	1.94	2.05
	Non-Metal Minerals Industry	1.89	2.04
	Basic Metal Industry	1.84	2.01
	Metal, Computer, Electronic Goods, Optical and Electrical Equipment Industries	1.64	2.03
	Machinery and Equipment Industry (Not Included in Others)	1.64	1.98
	Transport Equipment Industry	1.61	1.76
	Furniture Industry	1.79	1.88
	Other Processing Industry, Machinery and Equipment Repair and Installation Services	1.56	1.97
	Electricity	3.06	3.68
	Gas Procurement and Ice Production	1.48	1.52
	Water Procurement, Waste Management, Waste, and Recycling	1.64	1.77
	Construction	1.82	1.94

	Sector	National	
		2016	2019
Tertiary Sectors	Car Trade, Motorcycles, and Their Repair	1.42	1.50
	Wholesale and Retail, Not Autos and Motorcycles	1.44	1.50
	Rail Transport	1.97	2.16
	Land Transport	1.69	1.82
	Sea Freight	1.92	2.08
	River Lake and Crossing Transport	1.79	1.94
	Air Freight	1.81	1.98
	Warehousing and Transport Support Services, Post and Courier	1.72	1.87
	Provision of Accommodation	1.56	1.63
	Food and Drink Provision	1.84	1.92
	Information and Communications Services	1.59	1.71
	Financial Intermediary Services other than the Central Bank	1.36	1.40
	Insurance and Pension Funds	1.42	1.46
	Other Financial Services	1.49	1.56
	Financial Support Services	1.44	1.51
	Real Estate	1.36	1.40
	Company Services	1.59	1.67
	Government Administration, Defence, and Compulsory Social Security	1.70	1.80
	Education Services	1.52	1.60
	Health Services and Social Activities	1.74	1.87
	Other Services	1.56	1.66

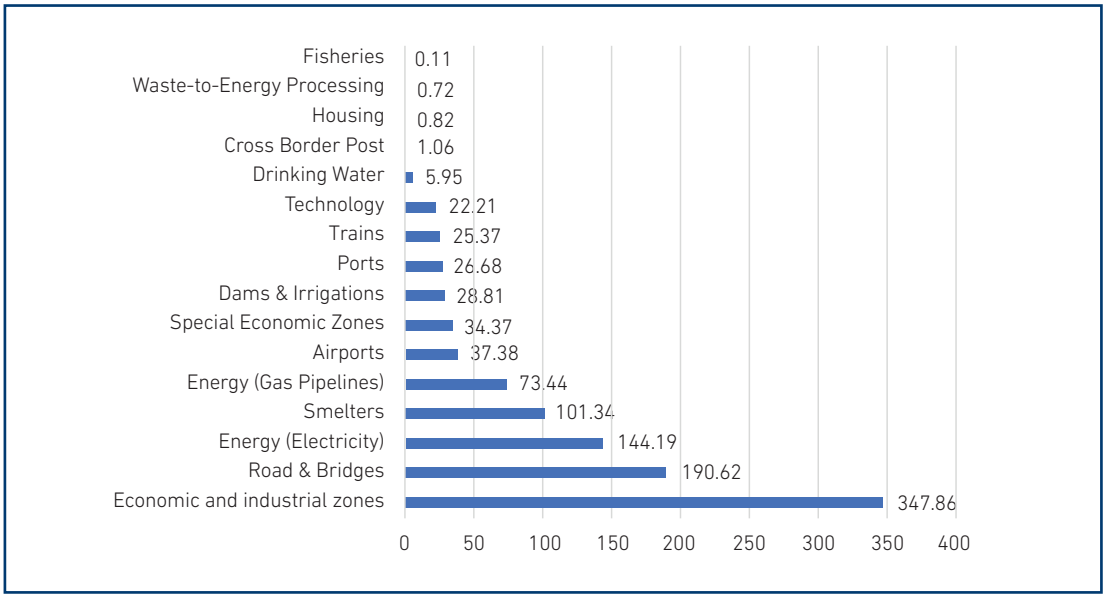
Source: Authors' calculations.

5. Proyek Strategis Nasional

The PSN has several essential elements, including national strategic interests, relevance to the long-term development plans, shared values of sectors and regions, and economic feasibility. Its projects are expected to help realise *Vision of Indonesia 2045*, especially the third pillar of equitable development. In implementing the PSNs, the government revised Presidential Regulation No. 3 of 2016 three times through Presidential Regulations No. 58 of 2017, No. 56 of 2018, and No. 109 of 2020. The latest amendment includes additional projects and changes to the scope of the PSN without any projects being removed. Based on the latest implementing regulation, there are 200 PSN projects and 12 PSN programmes comprising 14 clusters: roads, dams and irrigation, areas, plantations, railways, energy, ports, clean water and sanitation, airports, tourism, housing, education, embankment beaches, and technology (KPPIP, 2022).

As of April 2023, 153 PSN projects were completed in 2022 with an investment value of Rp1,040 trillion. Investment realisation for PSN development was highest in 2022, with an investment value of Rp320 trillion (KPPIP, 2023). Although the COVID-19 pandemic halted progress briefly in 2021, acceleration continued in 2022. Figure 5.1 shows that the special economic and industrial zones cluster had the highest investment value. Meanwhile, roads and bridges, and electricity had the next highest values.

Figure 5.1. PSN Investment Value
(Rp trillion)

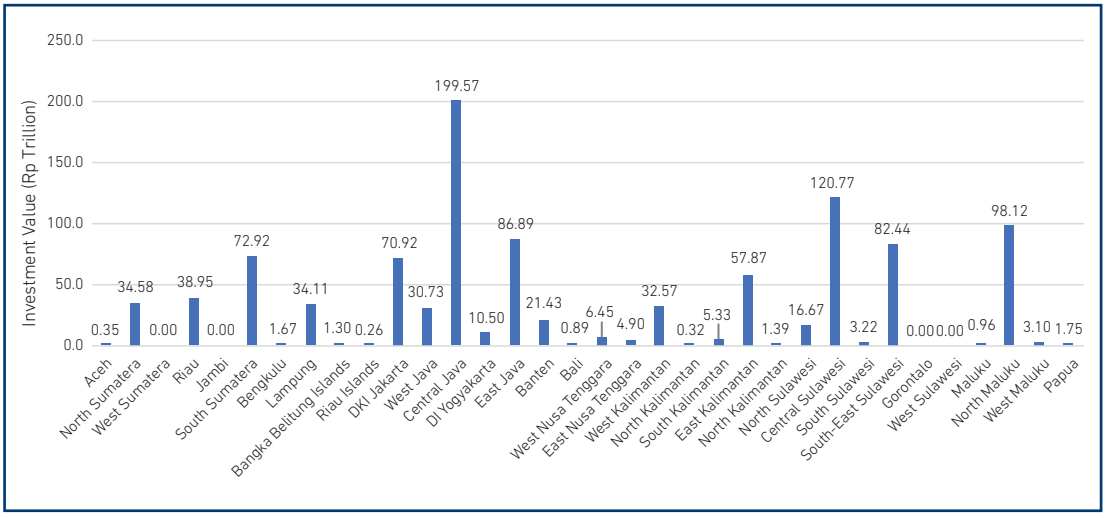


Source: KPPIP (2022) and authors.

PSN construction sites are spread across Indonesia; projects with the highest values are in Java. The top five provinces that receive the highest PSN investments are Central Java (Rp200 trillion), Central Sulawesi (Rp121 trillion), North Maluku (Rp98 trillion), East Java (Rp87 trillion), and South-East Sulawesi (Rp82 trillion).

The development of PSNs in these regions is crucial to foster new centres of economic growth and to reduce economic disparities between different parts of the country. They underscore the importance of investing in areas with robust basic infrastructure and a skilled workforce. These investments have the potential to yield significant returns, benefitting not only the leading sectors but also generating a positive impact on the surrounding areas. This aligns with the concept of a trickle-down effect (Hirschman, 1958).

Figure 5.2. PSN Investment Values by Province
(Rp trillion)



Source: KPPIP (2022) and authors.

Coordinating Minister Decree No. 21 of 2022 described that out of the Rp5,746.4 trillion investment value of the PSNs, 12.8% should be derived from the State Budget, 19.7% from state and regional government-owned enterprises, and the remaining 67.5% from the private sector. When considering the number of projects, 46% of PSN projects rely on the State Budget scheme for funding. The allocation of resources from different funding schemes reflects the goal of collaborative efforts amongst various stakeholders, including private entities, public–private partnerships, and state funding, to support the implementation and development of the PSN projects.

6. Economic Impact

The largest share of PSN investment is spent domestically, so it is treated as an economic stimulus when estimating the economic impact of PSN projects. Based on the amount of imported intermediate inputs used in each PSN project[2] and proportion of imports in the final demand available in the IO 2016 Table of 95.12%, out of the total investment of Rp1,040 trillion, it is estimated that Rp1,011 trillion was used as domestic stimulus.

Specifically, in relation to economic and industrial zones, the following approach is applied to determine the investment value. For special economic zones Sei Mangkei and Bitung, the reported actual investment values are used. For other special economic zones, it is assumed that the realisation of the investment target is approximately 50%, as the projects are not yet finished. For industrial zones, the investment target is assumed to be fully implemented – 100% – implying that the entire planned investment for these industrial zones was accomplished. By adopting these assumptions, the varying degrees of progress in investment realisation across different economic and industrial zones is captured. It is important to consider these distinctions to accurately assess the economic impact and multiplier effects associated with the economic and industrial zone sector.

The IO model analysis reveals that the completed PSN projects have yielded significant investment outcomes. Table 5.2 shows that a total stimulus of Rp1,011 trillion generated an economic output of Rp1,993 trillion, resulting in an impact multiplier value of 1.97. This means that for every unit of stimulus, the economic output nearly doubled. Additionally, the PSN projects created added value of Rp891 trillion and household income of Rp354 trillion. These projects have also contributed to the creation of up to 5.4 million new jobs.[3]

[2] The value is based on the project implementers' reporting of local content for most projects.

[3] To provide a comparative analysis and to ensure the reliability of the estimation results, the latest IO table is used – the IO 2016 Table –to calculate the economic impact. The findings indicate a production value of Rp1,859 trillion, a value added of Rp865 trillion, and a household income of Rp345 trillion. Furthermore, the assessment reveals a substantial employment potential of 5.7 million jobs.

Table 5.2. Total Estimation of the PSN Investment Impact

	Stimulus (Rp billion)	**Output** (Rp billion)	**Added Value** (Rp billion)	**Income** (Rp billion)	**Labour** (number of jobs)	**Impact Multiplier***	**Against National Producer Database 2022**** (%)	**Against National Workforce 2022** (%)
Total	1,011,156	1,993,214	891,406	354,248	5,430,734	1.97	0.23	0.19
Average	50,558	99,661	44,570	17,712	271,537			

* Output value/stimulus.

** Average percentage of value added to national gross domestic product in 2022.

Source: Authors.

The estimation results reinforce the importance of continued investment in infrastructure and implementation of strategic projects such as PSNs. By leveraging multiplier effects and creating a positive economic ripple effect, these projects contribute to Indonesia's economic growth trajectory, improve the welfare of Indonesian people, and pave the way for a more prosperous and inclusive Indonesia.

The impact of the PSN projects at the provincial level are also examined. Table 5.3 illustrates the distribution of PSN investment impact across provinces, showing that Central Java received the highest PSN investment. Meanwhile, based on the magnitude of the impact multiplier, North Sumatra and South Sulawesi have the highest impact multiplier values. PSN projects in these provinces had stronger backwards and forwards links with other sectors and produced more results for a similar amount of investment than in other provinces. The strong infrastructure built as part of these projects – tailored to the specific economic structure of each province – has had a substantial impact on other sectors. The significant investments made to the PSN, combined with the relatively smaller size of the regional economies, contributed to larger economic multiplier values in these two provinces, highlighting the effectiveness of the PSN in driving economic growth and development in these provinces and reinforcing the importance of strategic infrastructure investments in fostering regional economic expansion.

Table 5.3. Estimation of the PSN Investment Impact at the National Level from Each Province

No.	Province	Stimulus (Rp billion)	Output (Rp billion)	Added Value (Rp billion)	Income (Rp billion)	Labour (number of jobs)	Multiplier Impacts
1	Aceh	329,000	638,000	290,000	118,000	1,823	1.94
2	North Sumatra	34,456	73,629	30,790	10,920	155,328	2.14
3	West Sumatra						
4	Riau	37,479	72,605	33,016	13,417	209,302	1.94
5	Jambi						
6	South Sumatra	69,976	135,581	61,648	25,050	389,882	1.94
7	Bengkulu	1,413	2,706	1,250	512,000	7,831	1.92
8	Lampung	37,536	72,604	33,051	13,447	212,899	1.93
9	Bangka Belitung Islands	1,237	2,397	1,090	443,000	6,848	1.94
10	Riau Islands	246,000	478,000	217,000	88,000	1,364	1.94
11	DKI Jakarta	67,439	132,172	57,786	23,112	351,031	1.96
12	West Java	28,765	55,588	25,345	10,318	162,432	1.93
13	Central Java	199,155	385,817	175,460	71,304	1,110,105	1.94
14	DI Yogyakarta	8,270	15,846	7,320	2,998	45,852	1.92
15	East Java	86,139	166,853	75,880	30,840	481,506	1.94
16	Banten	23,614	45,758	20,805	8,453	131,389	1.94
17	Bali	812,000	1,573	715,000	291,000	4,496	1.94
18	West Nusa Tenggara	6,004	11,616	5,295	2,154	33,258	1.93
19	East Nusa Tenggara	4,622	8,922	4,079	1,662	25,605	1.93
20	West Kalimantan	29,684	61,718	26,421	9,764	142,104	2.08
21	North Kalimantan	273,000	522,000	241,000	99,000	1,511	1.92
22	South Kalimantan	4,819	9,297	4,254	1,734	26,700	1.93
23	East Kalimantan	55,646	107,826	49,026	19,920	309,668	1.94
24	North Kalimantan	1,174	2,249	1,039	425,000	6,507	1.92
25	North Sulawesi	17,384	33,641	15,305	6,225	98,520	1.94
26	Central Sulawesi	114,717	232,921	101,760	38,887	579,057	2.03
27	South Sulawesi	3,064	6,592	2,741	962,000	13,482	2.15
28	South-East Sulawesi	78,344	156,237	69,316	27,142	410,480	1.99
29	Gorontalo						
30	West Sulawesi						

No.	Province	Stimulus (Rp billion)	Output (Rp billion)	Added Value (Rp billion)	Income (Rp billion)	Labour (number of jobs)	Multiplier Impacts
31	Maluku	917,000	1,773	807,000	328,000	5,247	1.93
32	North Maluku	93,188	187,045	82,528	32,036	481,819	2.01
33	West Papua	2,949	5,716	2,598	1,055	16,331	1.94
34	Papua	1,508	2,894	1,333	545,000	8,357	1.92
Total		1,011,156	1,993,214	891,406	354,248	5,430,734	1.97

Note: Amongst the 34 provinces, 4 – Gorontalo, Jambi, West Sulawesi, and West Sumatra – are not directly involved in PSN projects.

Source: Authors.

The direct and indirect impacts of the PSN at the provincial level are then evaluated. Table 5.4 shows that although some provinces did not receive PSN investments, they still received positive spill-over effects thanks to the development of PSN projects in neighbouring provinces. These effects can be attributed to the interregional links established between provinces, which facilitate the flow of goods, services, and resources. Indeed, the presence of PSNs in one province can stimulate economic activities and create opportunities for collaboration with its neighbouring provinces, leading to more efficient allocation of resources, increased productivity, and enhanced competitiveness at the regional level. The interplay between provinces through interregional links and regional specialisation contributes to a more balanced and integrated economic landscape, helping reduce regional disparities by promoting economic growth in both PSN-receiving provinces and those indirectly benefiting from the interregional connections.

Table 5.4. Estimation of the Net PSN Investment Impact at the Provincial Level with Spill- Over Effects from Other Provinces

No.	Province	Output (Rp billion)	Added Value (Rp billion)	Income (Rp billion)	Labour (number of jobs)
1	Aceh	1,683	927,000	370,000	11,778
2	North Sumatra	64,911	26,511	9,966	166,285
3	West Sumatra	6,116	3,315	1,480	31,414
4	Riau	69,329	32,880	12,941	167,638
5	Jambi	6,603	3,908	1,342	23,712
6	South Sumatra	122,322	55,103	22,672	332,300
7	Bengkulu	2,709	1,301	535,000	14,319
8	Lampung	65,728	29,893	12,561	213,742
9	Bangka Belitung Islands	3,351	1,711	709,000	14,597

No.	Province	Output (Rp billion)	Added Value (Rp billion)	Income (Rp billion)	Labour (number of jobs)
10	Riau Islands	4,217	1,888	890,000	8,888
11	DKI Jakarta	183,803	84,985	37,484	259,549
12	West Java	106,856	49,971	19,937	300,102
13	Central Java	335,211	145,069	60,306	1,081,156
14	DI Yogyakarta	14,093	6,799	2,577	53,057
15	East Java	195,719	91,673	39,469	584,053
16	Banten	60,482	26,528	9,187	165,353
17	Bali	2,722	1,402	627,000	12,149
18	West Nusa Tenggara	9,981	4,595	2,017	35,769
19	East Nusa Tenggara	6,906	3,141	1,377	28,394
20	West Kalimantan	50,013	19,588	7,711	139,348
21	North Kalimantan	2,537	1,384	504,000	25,154
22	South Kalimantan	9,118	4,201	1,596	32,068
23	East Kalimantan	109,107	50,129	18,475	212,601
24	North Kalimantan	5,849	3,266	1,652	13,258
25	North Sulawesi	37,741	18,907	10,558	109,692
26	Central Sulawesi	178,512	73,737	24,835	443,651
27	South Sulawesi	20,334	10,249	3,229	61,824
28	South-East Sulawesi	138,663	62,658	24,387	392,698
29	Gorontalo	210,000	117,000	54,000	2,679
30	West Sulawesi	507,000	325,000	157,000	5,418
31	Maluku	2,270	1,163	218,000	10,737
32	North Maluku	162,491	67,147	22,413	451,188
33	West Papua	7,964	3,968	1,305	15,577
34	Papua	5,157	2,967	705,000	10,585
Total		**1,993,214**	**891,406**	**354,248**	**5,430,734**

Note: The spill-over effects are estimated using the 2016 Interregional Input–Output Table (IRIO). Each province could be contributing to and receiving from other provinces.

Source: Authors.

Then, whether the economic and employment impacts differed across clusters of PSN projects is evaluated. Table 5.5 shows that the PSN clusters that received the highest investments – economic and industrial zones, bridges and roads, and electricity – had the most substantial economic and employment impact. This indicates the critical role played by these sectors in driving economic growth and creating job opportunities. Investments in these clusters should thus be prioritised to maximise their positive impacts on the overall economy.

Table 5.5. Estimation of PSN Investment Impact by Cluster

Sector	Stimulus (Rp billion)	Output (Rp billion)	Added Value (Rp billion)	Income (Rp billion)	Labour (number of jobs)	Multiplier Impacts
Roads and bridges	209,324	404,922	184,252	74,961	1,192,610	1.93
Airports	31,177	59,737	27,592	11,299	172,847	1.92
Ports	22,784	44,164	20,077	8,156	126,183	1.94
Energy (gas pipelines)	69,858	135,411	61,559	25,006	386,891	1.94
Cross-border post	1,005	1,949	886	360	5,568	1.94
Dams and Irrigation	27,401	53,113	24,146	9,808	151,753	1.94
Energy (electricity)	137,151	265,850	120,858	49,094	759,575	1.94
Trains	24,133	46,778	21,266	8,638	133,652	1.94
Special economic zones	32,693	63,372	28,809	11,703	181,063	1.94
Industrial zones	330,884	641,379	291,576	118,441	1,832,518	1.94
Smelters	96,391	219,957	87,030	27,680	357,210	2.28
Fisheries	101	195	89	36	558	1.94
Technology	21,129	42,586	16,985	6,514	90,842	2.02
Drinking water	5,658	10,955	4,987	2,027	31,336	1.94
Housing	784	1,520	691	281	4,343	1.94
Waste-to-energy processing	683	1,324	602	244	3,782	1.94
Total with economic and industrial zones	1,011,156	1,993,214	891,406	354,248	5,430,734	1.97
Total without economic and industrial zones	647,579	1,288,463	571,020	224,104	3,417,153	1.99

Source: Authors.

When considering the impact multiplier value, the smelter and technology clusters exhibit the highest multiplier values of 2.28 and 2.02, respectively. These clusters stand out as high-skilled projects as they can generate output, value added, and income with more efficient utilisation of the workforce. The higher impact multiplier values in these clusters can be attributed to their reliance on knowledge-intensive processes and advanced technologies. Thus, the sectors receiving the highest investments have played a vital role in driving economic growth and employment generation. Their higher impact multiplier values highlight their efficiency in utilising resources and generating economic and labour impacts. By focussing on these sectors and promoting knowledge-intensive activities, policymakers can further enhance the positive effects of investments and foster sustainable economic development.

7. Conclusions and Policy Implications

Using the IO 2016 Table, which has been updated with the RAS method to incorporate 2019 economic conditions, this analysis reveals that the PSN projects implemented between 2016 and 2023 have had significant economic impacts on Indonesia. The PSN projects contributed to a total economic output of Rp1,993 trillion, generating an economic value added of Rp891 trillion, and creating total household income of Rp354 trillion. Moreover, approximately 5.4 million man-years of employment opportunities were created over the same period. Annually, the economic value added and job opportunities associated with the PSN accounted for 0.23% of Indonesia's GDP and 0.19% of national workforce in 2022. The analysis also highlights that North Sumatra and South Sulawesi provinces have the highest multiplier values, indicating the potential large economic impact of the stimulus. Evaluating the different impacts across PSN projects, economic and industrial zones, bridges and roads, and electricity projects had the greatest economic and labour impacts.

Several conclusion can thus be drawn.

(i) There is an overall increase in the output multiplier values for the sub-sectors in secondary and tertiary sectors, particularly basic metals, upstream, and construction, from 2016 to 2019. This indicates that the influence of the sector on the economy is ultimately larger.

(ii) Economic and employment impacts of the PSN projects were different across provinces and sectors. This indicates that the various nature of project requirements and objectives resulted in different economic and welfare impacts. Interregional linkages amongst provinces also affect outcomes of the PSN projects.

(iii) Broader economic impact should be measured in terms of the impact of construction and operational activities on the economy. The analysis in this chapter focusses only on the former, however, as it is not possible to capture the operational activities of all projects. Thus, the effect of post-construction impacts may be higher, particularly if the operational stage is optimal.
(iv) PSN projects had different economic impacts depending on the sectoral multiplier at the provincial level. Economic and industrial zones may also have a considerable economic impact when their investment potential is realised.

The results suggest some policy implications. First, there is a need for continued support and prioritisation of PSN projects, particularly in sectors such as economic and industrial zones, bridges and roads, and electric power, which demonstrated the highest economic and labour impacts. These sectors should receive adequate funding and resources to maximise their potential for driving economic growth and job creation. Second, the findings emphasise the importance of interregional linkages and sectoral variations in determining economic impacts of the PSN projects. Policymakers should consider these factors when designing and implementing future projects to ensure a balanced distribution of benefits across provinces and sectors. This could involve identifying and promoting sectors with high multiplier effects and leveraging interregional synergies for optimal outcomes.

Furthermore, the analysis underscores the need to expand beyond the construction phase and to focus on optimising the operational aspects of a PSN project. By enhancing post-construction activities and leveraging the full potential of the projects, long-term economic impacts can be maximised, resulting in sustained economic benefits and job creation. Lastly, policymakers should prioritise investment in regions with good basic infrastructure and strong human resources, as these factors contribute to higher multiplier values and greater economic impacts. This highlights the importance of strategic planning and resource allocation to ensure that investments are directed towards areas with the potential for significant economic growth and development.

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Appendix 5.1. Input–Output Table Framework

Table 5A.1. Input–Output Model

Input–Output		Intermediate Demand (Quadrant I)				Final Demand (Quadrant II)	Total Output
		Production Sectors					
		1	2	...	N		
Production Sectors	1	X11	X12	...	X1n	F1	X1
	2	X21	X22	...	X2n	F2	X2
	...	...	...	...	...	...	...
	N	Xn1	Xn2	...	Xnn	Fn	Xn
Gross Added Value (Quadrant III)		V1	V2		Vn		
Total Input		X1	X2	...	Xn		

Source: Statistics Indonesia (2021).

where X_{ij} are inputs originating from sector i that are used to generate sector j output, Vj is the gross added value of sector j, X_j is the total input of sector j, X_i is the total output of sector i, and Fi is the final demand of sector i.

To calculate the sectoral and regional output impact of a certain intervention (i.e. output multiplier), first, the intermediate input coefficient matrix (A) is prepared. From the symbols in Table 4A.1, matrix A is constructed, which is the intermediate input coefficient containing $[a_{ij}]$, which is the proportion of production inputs from sector j originating from the output of sector i (Miller and Blair, 2009) with the formula:

$$A = [a_{ij}], a_{ij} = \frac{x_{ij}}{X_j} \quad (1)$$

The formula for finding the output multiplier matrix from matrix A is:

$$a_{ij}X_j + F_i = X_i$$
$$AX + F = X$$
$$(I - A)X = F$$
$$X = (I - A)^{-1}F$$

where $(I-A)^{-1}$ is Leontief's inverse matrix, nxn. The stimulus vector, $nx1$, contains the final demand vector. The final demand vector includes investment or capital expenditures (CAPEX) and sales.

The formula for finding the total output multiplier per sector backwards and forwards is:

$$M_B = u'(I - A)^{-1} \quad (2)$$
$$M_F = u'(I - \vec{A})^{-1} \quad (3)$$

where M_B is the backwards output-multiplier per sector, 1xn; M_F is the forward output-multiplier per sector, 1xn; $(I - A)^{-1}$ is Leontief's inverse matrix, n×n; $(I - \vec{A})^{-1}$ is Ghosian's inverse matrix, n×n; u' is the unit vector, containing number one, 1xn; A is the intermediate input coefficient matrix; and I is the identity matrix of size nxn.

After obtaining the multiplier matrix, the impact of creating output is measured with:

$$X_B = (I - A)^{-1}F \quad (4)$$
$$X_F = (I - \vec{A})^{-1}F \quad (5)$$
$$\text{GDP} = \widehat{C_g}\,(I - A)^{-1}F \quad (6)$$
$$\text{HHI} = \widehat{C_h}\,(I - A)^{-1}F \quad (7)$$
$$L = \widehat{C_l}\,(I - A)^{-1}\widehat{C_l}^{-1}Li \quad (8)$$

where X_B, X_F are the vectors of sectoral output impact values, nx1; $(I - A)^{-1}$ is Leontief's inverse matrix, nxn; $(I - \vec{A})^{-1}$ is Ghosian's inverse matrix, nxn; F is the stimulus vector, nx1, which can mean CAPEX or export sales or domestic sales; GDP is the gross domestic product (GDP) vector, nx1; $\widehat{C_g}$ is the GDP coefficient matrix, diagonal, nxn; HHI is the household income (HHI) vector, nx1; $\widehat{C_h}$ is the HHI coefficient matrix, diagonal, nxn; L is the labour impact vector, nx1; $\widehat{C_l}$ is the labour coefficient matrix, diagonal, nxn; and L_i is the labour stimulus vector, nx1.

Basic Concept of Economic Indicators in the Input–Output Model

Employment. This indicator illustrates the additional jobs created by economic growth due to increased final demand from consumption, investment, government spending, or exports. This indicator is the most popular measure of economic impact because it is easier to understand than monetary figures. However, the employment addition has two limitations: (i) it does not reflect the quality of workers, and (ii) it only sometimes reflects the 'physical' addition of people entering the labour market.

Aggregate personal income. The aggregate income of a person increases in line with the increasing salary or wages and increasing number of employees. Both factors emerge because of the escalating business or business revenue. This measure is underestimated from the actual impact, considering business profits are paid as personal dividends. Dividends or personal incomes are then spent on final goods and services, reinvestment in buildings, capital goods, and tools. This transaction enables businesses to expand and to improve their productions and services, which generates new resources for production because of the earned salary and profit dividends.

Gross value added. This amount is equivalen t to the GDP or gross regional domestic product and is an extension of the impact measurement on aggregate personal income. This amount describes the sum of (i) workers' wages or salaries, (ii) profits of the companies operating at a project site, (iii) government revenue from taxes and non-taxes, (iv) depreciation expenditure on capital goods, and (v) subsidies from the government as a deduction for value added. In short, gross value added is the sum of the income received by all actors in an economy, embracing businesspersons (entrepreneurs), workers (labourers), factors of production (investors), and the government (regulators). In a global economic environment characterised by interregional or intercountry mobility of labour, capital goods, and capital owners, value added is an economic impact measurement that is overestimated for a given area. Part of the workers' income or profits generated at a project site will not stay in this area, as the workers and owners of capital will send them outside of the area or abroad. Therefore, an increase in added value in an area does not yet reflect an increase in the welfare levels of the population. Nonetheless, value added is a more comprehensive impact indicator and is most frequently used by governments and regional macroeconomic observers.

Business output. The business output differs from value added or gross value added. Business output is the gross business revenue or sales value from the activities producing goods or services. Some gross revenues pay materials, services, and labour costs, while some are for business income or profit. Value added is a certain fraction of business output, so the figure is more minor than business output. The amount of business output is misleading if it measures economic impact or benefits for economic development. Business output needs to differentiate between activities that produce high value added and those generating low value added (i.e. produce relatively small profits and wages or salaries from the same sales scale).

The RAS Method

An existing method used to update the National Input–Output (IO) Table is a mathematical method for finding the diagonal matrices r and s employing output data, intersectoral sales, and sectoral added value in a given year and matrix A for the previous year. After the matrices r and s are found, matrix A for a particular year is then found using the following formula:

$$\mathbf{A_t = rAs}$$

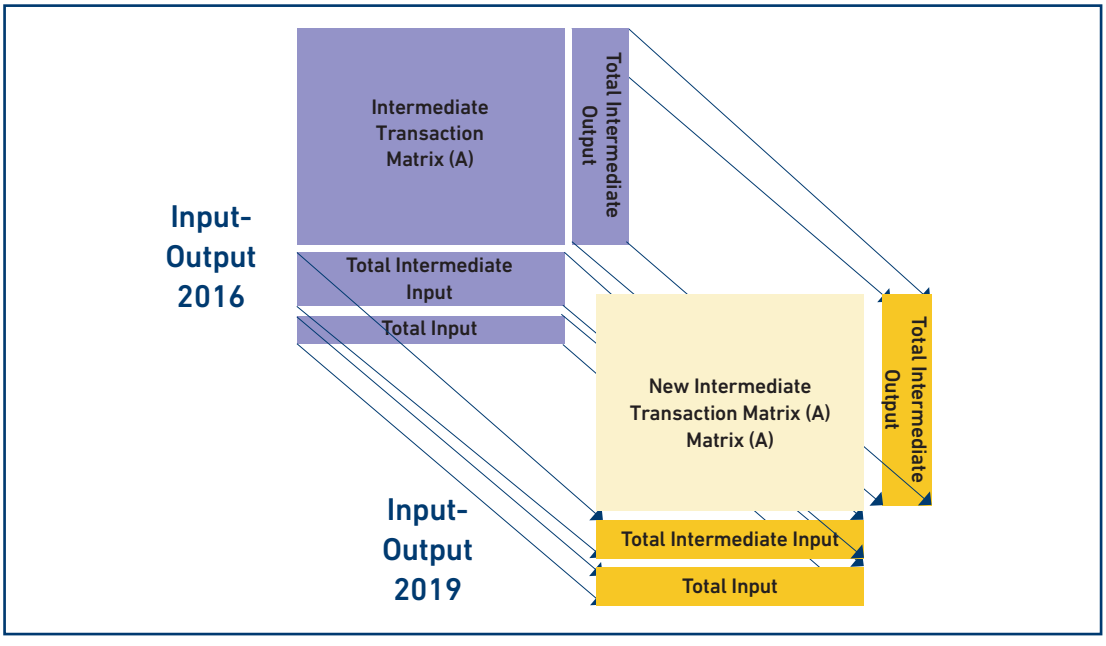
The factor r in the diagonal of the matrix is a substitution factor, which causes a change in the proportion of input use through a substitution effect. Because a different r value is used for each coefficient in a particular column, each coefficient experiences different changes. If r1 = 0.5 and r2 = 2.0 and the value of s is equal to 1.0, then the proportion of input 1 in year t is half the use of the same input in the base year, while input 2 is doubled.

The s factor in the diagonal matrix above shows changes in the proportion of the use of intermediate and primary inputs in the production of specific sectors. If s equals 0.5 for any column, then the number of intermediate inputs becomes half the amount shown in the base year, and thus the number of primary inputs must be changed to keep the sum of the two proportions equal to 1.

The update method using the current survey method to update the National IO Table is too expensive for making IO transaction matrices. Besides, the questions that the business sector must answer are very detailed and challenging, causing the update process to be costly. However, the non-survey or RAS method is often considered too simple to capture regional economic conditions. Nevertheless, this method serves as an alternative to updating the National IO Table.

Figure 4A.1 shows the methods to estimate new intermediate transaction matrix from 2016 to 2019, estimating the 2019 coefficients of the technology matrix from the existing coefficients in the IO 2016 Table. The IO Table is updated using the RAS method by considering last year's sectoral and national data, 2019 data, including GDP, national employment survey (Sakernas), large and medium-sized industries survey, investment and export data, and import data. The RAS method is a sequential adjustment process on the technology matrix A(0) to create the latest technology matrix A(1). The iterative process will pause for a moment to reach the specified convergence criteria.

Figure 5A.1. Basic Principles of the RAS Method



Source: Authors.


INDORAMA

Chapter 6

The Socio-Economic Impact of Massive Infrastructure Development in Indonesia

Rullan Rinaldi
Della Temenggung
Gema Satria Mayang Sedyadi

As a response to Indonesia's infrastructure gap, the Widodo Administration initiated the *Proyek Strategis Nasional* (PSN). Today, many projects under the PSN have been completed, providing an opportunity for an ex-post evaluation of their performance in accomplishing the objectives of providing equitable access to infrastructure and promoting welfare. This chapter selected a few case studies to examine, including a toll-road project and two water projects. It also highlights how the Widodo Administration leveraged limited direct public spending to improve socio-economic outcomes by prioritising State Budget contributions for projects with high socio-economic impact albeit limited financial feasibility. Nonetheless, State Budget contributions for financially feasible projects remain substantial, and thus the private sector should be more involved.

1. Background

Infrastructure development is crucial to Indonesia's structural reform and competitiveness. Prior to the initiation of the *Proyek Strategis Nasional* (PSN) in 2016, Indonesia's infrastructure suffered from prolonged underinvestment (Kim, 2023; Ray and Ing, 2016), resulting in a substantial infrastructure gap that impeded the country's overall development objectives. Joko Widodo's administration responded to the growing need for infrastructure development by launching numerous projects under the PSN. The aim of the PSN, as laid out in Presidential Regulation No. 3 of 2016, is to fulfil basic infrastructure needs. The regulation also established that projects eligible under the PSN should be characterised by their strategic value in stimulating economic growth and promoting equitability and welfare, as well as development at the sub-national level.

After almost 8 years since the initiation of the PSN, many projects have been completed and are operational, providing the opportunity for an ex-post evaluation of how their objectives – of promoting equitable access to infrastructure and improving welfare – are being met. This chapter attempts to empirically assess the impact of PSN projects completed during 2016–2020 on socio-economic outcomes that are relevant to the objectives stated in the Presidential Regulation. Limiting observations to infrastructure projects completed as of 2020 allows for adequate post-completion assessment. More specifically, a pragmatic approach is used to assess the impact of the PSN on observable and readily available measures of socio-economic outcomes, such as the equitability of access to basic infrastructure. Relevant household-level data were sourced from the national socio-economic survey and project-specific information from technical documents. An empirical estimation of the impacts of PSN projects on wider, aggregate-level socio-economic outcomes is also conducted, such as economic growth, poverty incidence, and income inequality as measured by the Gini coefficient. Due to the relatively localised nature of infrastructure benefits, the aggregate-level estimation is conducted at the sub-national level (i.e. districts and municipalities).

As the PSN consists of hundreds of different projects – 200 as of 2022 – a comprehensive and holistic evaluation is unfeasible. Instead, a more practical approach is taken by selecting a few case studies; sections of the chapter are based on the cluster subjected to evaluation.

In the next section, the impacts of PSN projects are estimated on aggregate socio-economic outcomes by examining a toll-road development case study. In the third section, the socio-economic impact of the PSN on equitable access to basic services is detailed by reviewing two water projects. The fourth section highlights how the Widodo Administration leveraged limited public spending through alternative financing modalities and focussed direct contribution of public spending through the State Budget on infrastructure, which has had significant socio-economic impact. The last section summarises the findings of the previous sections and offers concluding remarks.[1]

2. Aggregate Socio-Economic Impact of the PSN: Toll-Road Case Study

For this section, an empirical estimation is conducted on the impact of 28 completed toll roads under the PSN on socio-economic outcomes. In total, there are at least 71 toll-road projects in the PSN, amounting to the addition of 5,315 kilometres. As a means of connecting Indonesia's regions, road infrastructure can have far-reaching direct and indirect economic benefits. A vast body of literature has shown that one channel through which road infrastructure benefits the economy is its productivity-enhancing effect resulting from the agglomeration of economies (Yusupov, 2020; Graham, 2007; Gibbons and Overman, 2009; Fedderke and Bogetić, 2009). Moreover, the development of significant new lengths of toll roads in Indonesia can help alleviate the congestion that currently suffocates the national economy. Indeed, decades of underinvestment have left Indonesia's existing road infrastructure under immense pressure, leading to the deterioration of logistics systems performance, declining quality of life, and constrained overall growth (World Bank, 2014; Ray and Ing, 2016).

The impacts of road infrastructure on productivity, logistics performance, and enablement of agglomeration economies are relatively direct and observable. Another socio-economic benefit of road infrastructure is its ability to alleviate isolation, allowing households to access

[1] Showcasing the impact of a toll road is based on the consideration of its potentially far-reaching impact on aggregate socio-economic outcomes because of its productivity-enhancing characteristics, as well as its ability to improve access and connectivity. The other technical consideration for using the toll road is that many have been completed and operational for several years, allowing for a preliminary empirical assessment. The water supply projects were chosen because they have a direct impact on the population; many have been completed, allowing for a more straightforward assessment.

more expansive economic activity centres and essential public services, which, in turn, drive improvement in household income and reduce the incidence of poverty (Chambers, 2014; Minot, Baulch, Epprecht, 2006; Hensley et al., 2018; Loo and Banister, 2016; Olsson, 2009; Šťastná, Vaishar, Stonawská, 2015). Warr (2010) showed that road development increases the livelihoods of people under the poverty line by improving their capacity to access markets. Taking the case of the Lao People's Democratic Republic, Warr conducted a counterfactual microsimulation analysis to examine how access to road infrastructure impacts the real consumption of households, finding that it decreased the incidence of poverty by 3.32 percentage points (from a baseline of 33%).

The other channel through which road construction may have an impact on an aggregate socio-economic indicator is through the intermediary impact on broader economic growth that, in turn, can reduce the incidence of poverty. This is evident in China, where the increase of road density has led to falling poverty rates, with the magnitude of the impact proportional to the grade of the constructed road (Zhou, Tong, Wang, 2022).

Despite the unequivocal impact of road infrastructure development on poverty alleviation, there are still risks. One study in Cameroon found that the overall efficiency of road infrastructure development in reducing poverty depends on appropriate design according to the needs and governance capacity of communities (Gachassin, Najman, Raballand, 2010), for instance.

Estimating the impact of toll roads built under the PSN on the economy and broader socio-economic indicators is constrained by the limited availability of observations on the state of outcomes after the start of operation of the PSN toll roads. Despite this limitation, an ex-post assessment of the impact of the PSN toll roads through a more rudimentary analysis of the operation of the trans-Java segment in Central Java suggested a positive impact on aggregate economic indicators, including economic growth (Ahmad, 2022). A similar preliminary conclusion can be drawn in the case of the Trans-Sumatra network, where the road operation has been shown to have coincided with an improvement in several headline indicators, such as number of firms, unemployment, and housing development (Lubis and Silviana, 2023).

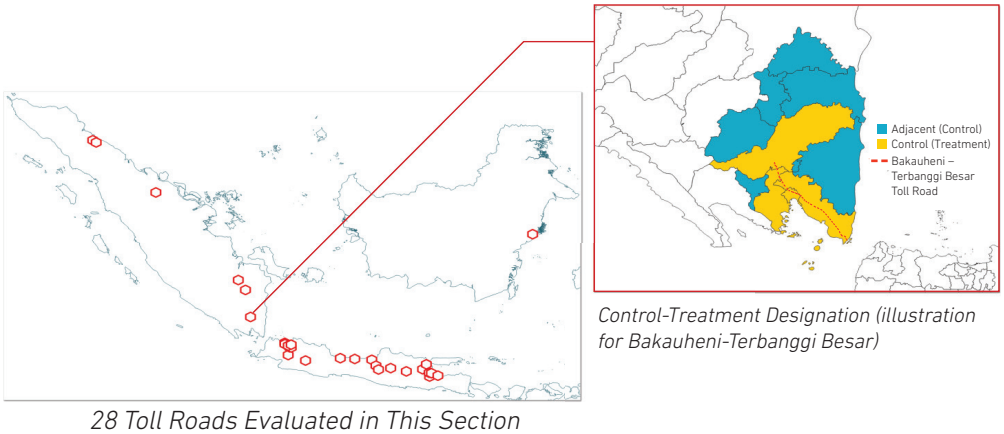
While the aforementioned studies provide insight into how toll roads have had a positive impact on growth, further investigation requires an empirical approach that allows for a more controlled natural experimental setting. A previous study by Prospera (2018) estimated the impact of the Trans-Java Toll Road on economic growth using a quasi-experimental setting. It showed that road network development through the addition of toll roads has had a positive impact on regional growth and competitiveness. From a longitudinal observation at the sub-national level, Prospera constructed a dataset of control and treatment groups of districts and municipalities centred on the time of commissioning of various toll roads built since 2004. From the resulting dataset, an impact assessment – using a difference-in-differences approach – was conducted, finding an

increase of 0.6 percentage point of economic growth in districts with a new toll road compared to adjacent districts without a toll road. A similar approach, using village-level data, also showed that villages connected by the Trans-Java Toll Road witnessed significantly higher growth of modern retail compared to the control group (Putra, 2023).

Using the same empirical strategy, this chapter aims to broaden the estimation of the impact of the PSN through the development of toll roads on broader socio-economic indicators, including the impact of toll road development on poverty incidence and the Gini coefficient (a measure of inequality). In implementing the framework, the most significant challenge is that an implicit assumption of the difference-in-differences model is the need for a reasonable number of observable data points before and after the operation of a PSN project to be able to make any inference about its impact.

The empirical strategy employed in this chapter, which can be traced back to Card and Krueger (1994), is to create a quasi-experimental setting that sets the operational phase of each PSN toll-road project as a treatment in regions along its route as illustrated in Figure 6.1 for the Bakauheni–Terbanggi Besar Toll Road. The control group consists of regions adjacent to the core regions that had considerable similarities in outcome achievements before the PSN project. The strategy of setting adjacent regions as a control group is based on the consideration that neighbouring regions share the same baseline characteristics due to the homogeneity of the population, level of economic development, and geographical properties. Control and treatment groups are designated to districts and municipalities around the 28 segments of toll road in the dataset.

Figure 6.1. A Quasi-Experimental Setting: Illustration from the Bakauheni–Terbanggi Besar Toll Road

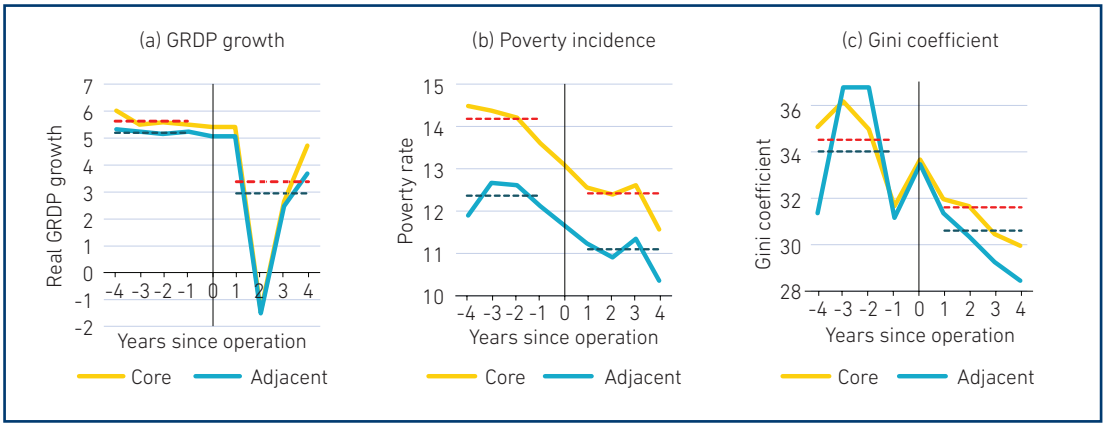


Source: Author's identification based on lists of PSN toll roads from Committee for the Acceleration of Priority Infrastructure Provision (KPPIP).

Another challenge in empirically estimating the impact of PSN projects is the limited observation period, as most PSN projects have been completed recently. To ensure adequate data points before and after the treatment (i.e. the operational phase of the project), the time variable in the dataset is recentred to the distance-to-operation period for each treatment and control group as the pre- and post-treatment period, and the estimation is conducted as a pooled cross-section regression. The outcomes evaluated when assessing the impact of the PSN toll road are gross regional domestic product (GRDP) growth, poverty rate, and inequality (i.e. the Gini coefficient).

Figure 6.2 illustrates the re-centring of the time variable in the dataset to capture the periods before and after the start of operations of the Bakauheni–Terbanggi Besar Toll Road. The road went into operation in 2018, so this year is at the centre, thus becoming t = 0. As can be seen in the figure, the condition of outcomes on either side of t = 0 can be compared. The same re-centring strategy is applied to the rest of the toll roads in the dataset.

Figure 6.2. Before and After Differences in Socio-Economic Outcomes for Core and Adjacent Regions of the Bakauheni–Terbanggi Besar Toll Road



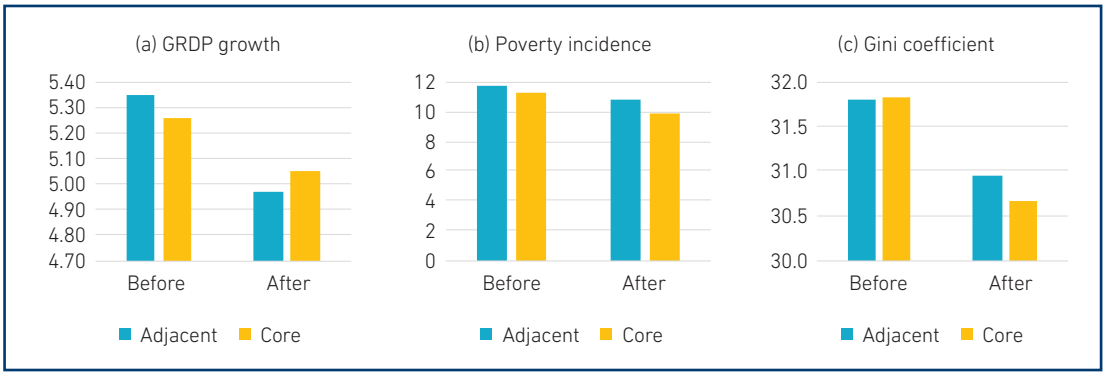
GRDP = gross regional domestic product.

Source: Author's calculation based on data from Statistics Indonesia (BPS).

From the resulting re-centred dataset – which consists of 1,629 observations – 73 treatment groups and 120 control groups are associated with 28 unique toll roads. Figure 6.3 shows the in-sample average of socio-economic outcomes in the control and treatment groups before and after the beginning of operation of the corresponding toll road.

Regarding GRDP growth, prior to the treatment period, growth in the control group was higher by 0.095 percentage point than in the treatment group. This gap then narrows in the post-treatment period, with the treatment group experiencing higher GRDP growth, on average, than the control group. Yet overall growth rates for both groups were considerably lower in the post-treatment period, which can largely be attributed to the economic slowdown induced by the COVID-19 pandemic. Assuming homogeneity in the characteristics of the control and treatment groups, the fact that the treatment group shows a more moderate decline indicates that the operation of the PSN toll road provided an edge for regions in the treatment group by dampening the economic impact of the pandemic. For both poverty incidence and the Gini coefficient, a marked improvement (i.e. reduction) is noted in the treatment group compared to the control group.

Figure 6.3. Before and After Differences in Socio-Economic Outcomes for Sampled PSN Toll Road Core and Adjacent Regions in the Difference-in-Differences Analysis



GRDP = gross regional domestic product.

Source: Author's calculation based on data from Statistics Indonesia.

More detailed results can be seen in Table 6.1. The operation of the PSN toll road had a significant positive impact on regional economic growth, leading to an estimated improvement in GRDP growth of 0.173 percentage point. Operation contributed to reducing poverty by 0.320 percentage point for regions along the route compared to adjacent areas. Inequality, as measured by the Gini coefficient in areas along the route, decreased. However, the magnitude is relatively limited at only 0.324 units for a Gini coefficient on a scale of 0 to 100. Although limited, the impact of this reduction is statistically significant and consistent with the impact of increased economic growth, which is accompanied by a reduction in poverty.

Table 6.1. Difference-in-Differences Estimation of the Socio-Economic Impact of the PSN Toll Road

Outcome Var.	GRDP Growth		Poverty		Inequality	
Before						
Adjacent	5.348		11.780		31.787	
Core	5.253		11.190		31.832	
Difference	–0.095	***	–0.590		0.045	
	(0.034)		(0.138)	***	(0.180)	
After						
Adjacent	4.967		10.820		30.941	
Core	5.045		9.910		30.662	
Difference	0.078		–0.910	***	–0.279	*
	(0.062)		(0.136)		(0.153)	
Diff-in-Diff.	0.173	***	–0.320	*	–0.324	***
	(0.029)		(0.180)		(0.117)	
R-square	0.690		0.340		0.190	
Obs.	1,629		1,629		1,629	

GRDP = gross regional domestic product.

Notes:

1. Means and standard errors are estimated by linear regression.
2. A clustered robust standard errors calculation is used.
3. Covariates are used, comprising a COVID-19 dummy, time fixed effect, island fixed effect, and urban characteristics.
4. Inference: *** p<0.01; ** p<0.05; * p<0.1.

Source: Authors.

Despite the encouraging result, the impact of the toll road on sub-national economic growth, poverty, and inequality in this chapter must be treated as an indicative result at best with several limitations. The first limitation is the inability of the estimated model to explicitly take into account the spill-over effects of the toll road on neighbouring regions; addressing this limitation requires a more sophisticated approach, which may include a spatial analysis and a non-discrete treatment assignment for the treated group. This calls for more thorough future research. The other limitation is on the narrow observation period, particularly for the post-operational phase of the toll road, recognising that most of the toll road has only been operational for a short time, which potentially undermines benefits that may only materialise in the medium to long term.

3. Role of the PSN in Providing Equitable Access to Basic Services: Water Supply Project Case Study

3.1. Strategic Importance of Water Supply Projects

One of the goals of the PSN is to ensure the provision of infrastructure needed to fulfil basic needs, including access to clean water. Clean water is water used for daily purposes and can be drunk after being boiled.[2] Recognising the importance of clean water, the government – under the PSN – initiated at least eight clean water supply projects across Indonesia, with an estimated cost of Rp13.9 trillion.[3]

Lack of access to clean water and adequate sanitation is a serious impediment to inclusive growth because of its repercussions on public health and the environment (Fawell and Stanfield, 2001). Diarrheal and digestive diseases are the most common health consequences of unsafe drinking water consumption, ranking amongst the top 10 causes of death in 2019 globally (Ritchie, Spooner, Roser, 2019). For example, a cholera outbreak that began in Peru in January 1991 and later spread to South and Central America resulted in 1.2 million cases and nearly 12,000 deaths (Cotruvo, Hearne, Craun, 1999).

Figure 6.4 shows that from 2011 to 2016, access to clean water in Indonesia increased only marginally, with low-income households consistently lagging. After the PSN, a significant improvement in access to clean water is observed, particularly for the lowest-income group. The percentage of households in the lowest income decile having access to clean water increased from around 72% in 2016 to over 85% in 2022, meaning that about 13 households out of 100 in the lowest decile gained access to clean water in that period.

Figure 6.4 also shows that access to clean water improved from 2016 to 2021 across all income levels. However, high-income groups benefited disproportionately. Only 4.4% of members of the highest-income decile lacked access to clean water in 2021, whereas over 12.0% of people in the first decile – with the lowest income – lacked access. Thus, the equitability of access to clean water still needs to be improved.

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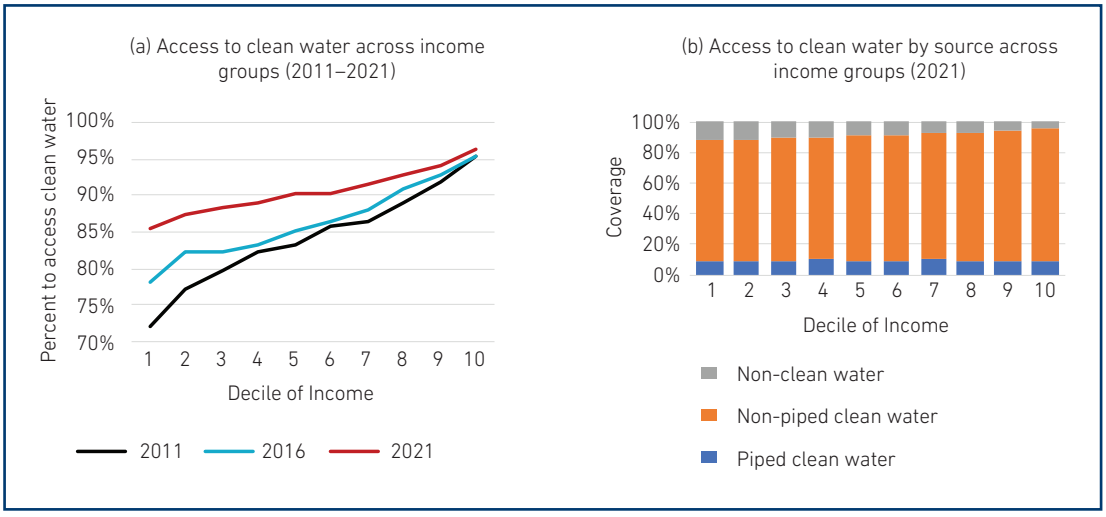
[2] Minister of Health, Decree No. 1405/MENKES/SK/XI/2002.

[3] SPAM West Semarang, Regional Jatigede, Umbulan, Bandar Lampung, Regional Mamminasata, Regional Jatiluhur, Regional Wasusokas, and Regional Mebidang (later excluded from the PSN list).

Figure 6.4. Access to Clean Water at the Household Level in Indonesia



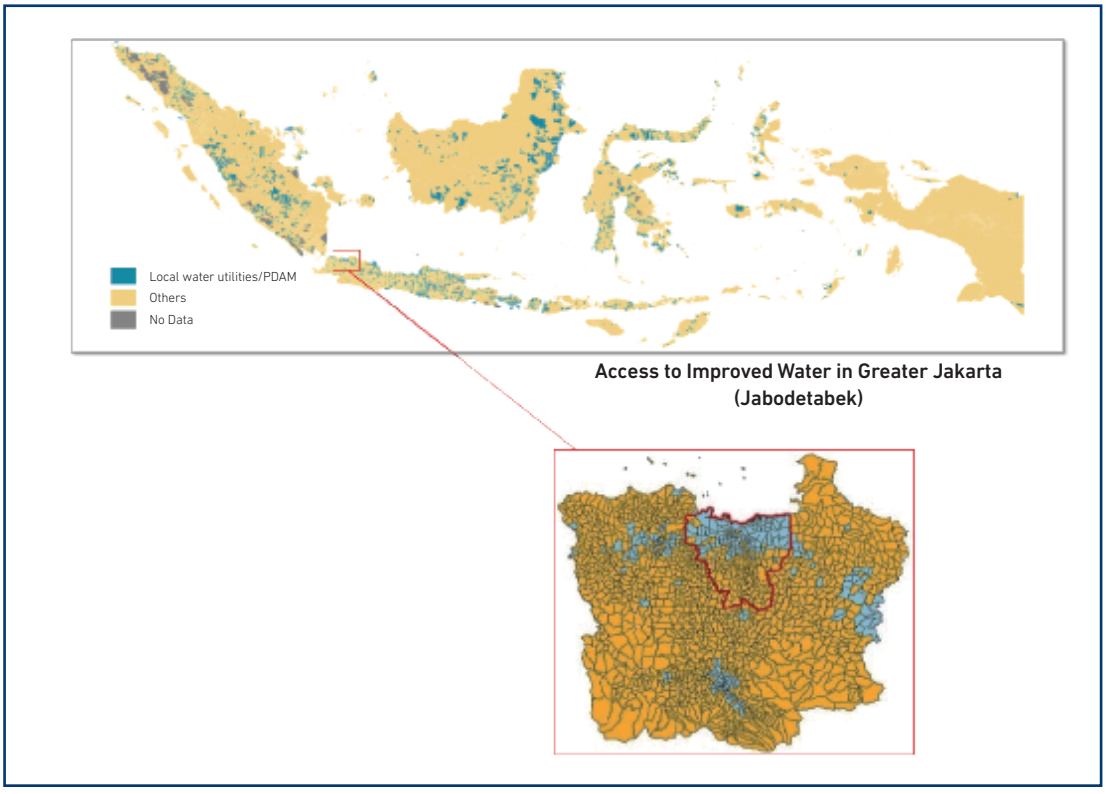
Source: Author's calculations based on *Susenas* data.

Looking at the different types of clean water sources by household, sources other than piped water are more prevalent. Using the same dataset, Figure 6.4 shows that the use of non-piped clean water is extensive, ranging from 79% to almost 88% across income groups in 2022. This means that most Indonesians are drinking from artesian wells, covered wells, covered springs, or rainwater catchment – sources of clean water based on a definition set by Statistics Indonesia. This situation is not necessarily bad, as self-sourced drinking water implies self-reliance, lessening the burden of public efforts to provide water resources as shown by Fustec (2019) for the Tuamotu Archipelago.

However, this finding also points to a threat to sustainability; water is a scarce resource, and without proper control, the overuse of groundwater poses an environmental challenge. Cotruvo, Hearne, and Craun (1999) warned that by the middle of this century, the number of people residing in water-stressed areas would increase three to fivefold due to the misuse and overuse of groundwater. Therefore, PSN projects to enhance the drinking water supply system – known as *sistem penyedian air minum* (SPAM) projects – can play a strategic role in overcoming lack of access to clean water and alleviating environmental problems caused by the overuse of groundwater.

Access to clean water is an even more complex issue in highly populated urban areas, as urbanisation puts pressure on water access and distribution (Cotruvo, Hearne, Craun, 1999). Major urban areas such as 'Jabodetabek', which serves as the economic powerhouse of Indonesia and spans three provinces, have limited tap water. Even in Jakarta – the wealthiest city in Indonesia – only some neighbourhoods have good, piped water infrastructure, mostly in the central and northern parts of the city (Figure 6.5).

Figure 6.5. Access to Improved Water at the Village Level by Source



Source: Author's calculations based on 2019 Village Potential Data.

Another considerable challenge in the provision of clean water is the complexities of governance, as there are multiple levels of governments sharing responsibilities in Indonesia, with each operating under various legal frameworks that do not necessarily conform. There are at least two regulations regarding water supply governance. One regulates extraction of the water supply to utilities, and another regulates pricing mechanisms for the end-user. On the former, Rachman and Syamsumardian (2020) showed that such arrangements have undergone several changes, starting from Law No. 11 of 1974 on Irrigation, Law No. 7 of 2004 on Water Resources, to Law No. 17 of 2019 on Water Resources. The latest law stipulates that each level of government may charge water resource management service fees – known as *biaya jasa pengelolaan sumber daya air* (BJPSDA) – to water utilities.

In the regulations previously mentioned, higher-level governments oversee interregional water resources and management. However, any lower-level government can relinquish its management, and this becomes mandatory if the absence of capability harms the public interest or sparks disputes between local governments (Law No. 7 of 2004). Complexities have arisen when responsibilities became intertwined between different entities.

Another law specifically regulates clean water pricing through the Minister of Home Affairs (MOHA) Regulation No. 21 of 2020 on amendments to MOHA Regulation No. 71 of 2016 on the Determination of Drinking[4] Water Tariffs. The law mentions that tariffs should be (i) based on full cost recovery (FCR) principles, (ii) subsidised from the local budget if lower than the FCR, (iii) not exceed 4% of average income, and (iv) determined by the regional government head with the possibility of delegating authority to local water utility directors. As shown by the experience of Lamongan Regency – the best regional model for an FCR-adjusted tariff (Yusuf, 2023) – BJPSDA are included in the formula as the cost of purchasing bulk water (Istichori, Wiguna, Masduqi, 2018). Moreover, the government of Lamongan Regency participated in funding the construction of pipeline infrastructure that connects the water supply to homes. Therefore, in the context of SPAM projects, local governments must also play a significant role in advanced stages.

In the following sub-section, two PSN SPAM projects in Umbulan and Bandar Lampung are examined.

3.2. Case Studies from the Umbulan and Bandar Lampung SPAM Projects

3.2.1. Potential Benefits and Coverage of Service

The Umbulan SPAM was built to distribute spring water in Umbulan, a village in Pasuruan Regency, East Java. Because of its high capacity – estimated at 5,000 litres per second in 1980 – Umbulan's spring was seen as a potential primary source of drinking water for a large part of East Java, including the cities of Pasuruan and Surabaya. However, attempts to build a drinking water treatment facility in 1988, 1996, and 2005 failed due to asynchronous general and technical regulations regarding public–private partnerships (PPPs) and limited local fiscal capacity (Sofi, 2022). The lack of guaranteed capital from the local government dissuaded any potential local water companies – *perusahaan daerah air minum* (PDAM) – from connecting the water source to customers. Eventually, after nearly 30 years of planning, the Umbulan SPAM project began its construction phase in 2017. Once fully operational, the facility was expected to serve 310,000 households, equivalent to 1.3 million people (Simantu, 2021). The project was finally completed in 2020.

[4] Note that the use of 'drinking water' is often misleading as it is not potable without extra treatment like boiling. From this point on, the term is still used but should only be understood as clean water.

Another SPAM project is in Bandar Lampung, a municipality in Lampung. The municipality has worked to develop its drinking water infrastructure, including under this project. It taps the Sekampung River – which flows through the city – as its primary source of water. The project will produce 750 litres of treated water per second and serve 60,000 new connections, equivalent to 300,000 people (GOI, Commission V, 2022). These efforts aim to meet the increasing demand for water due to population growth and urbanisation in the area.

A reliable drinking water supply system offers numerous benefits to individuals and communities, such as (i) savings in annual expenditure for water access, (ii) savings related to time efficiency, and (iii) savings related to public health (EJPG, 2013). Other benefits include the opportunity to develop new businesses associated with water treatment, such as refillable water stations and laundries and carwashes (PDAM Way Rilau, 2017). As limited information is available, especially for the Bandar Lampung SPAM project, the following discussion is based primarily on the Umbulan SPAM project's feasibility study (EJPG, 2013). The benefits of all drinking water supply system projects are similar.

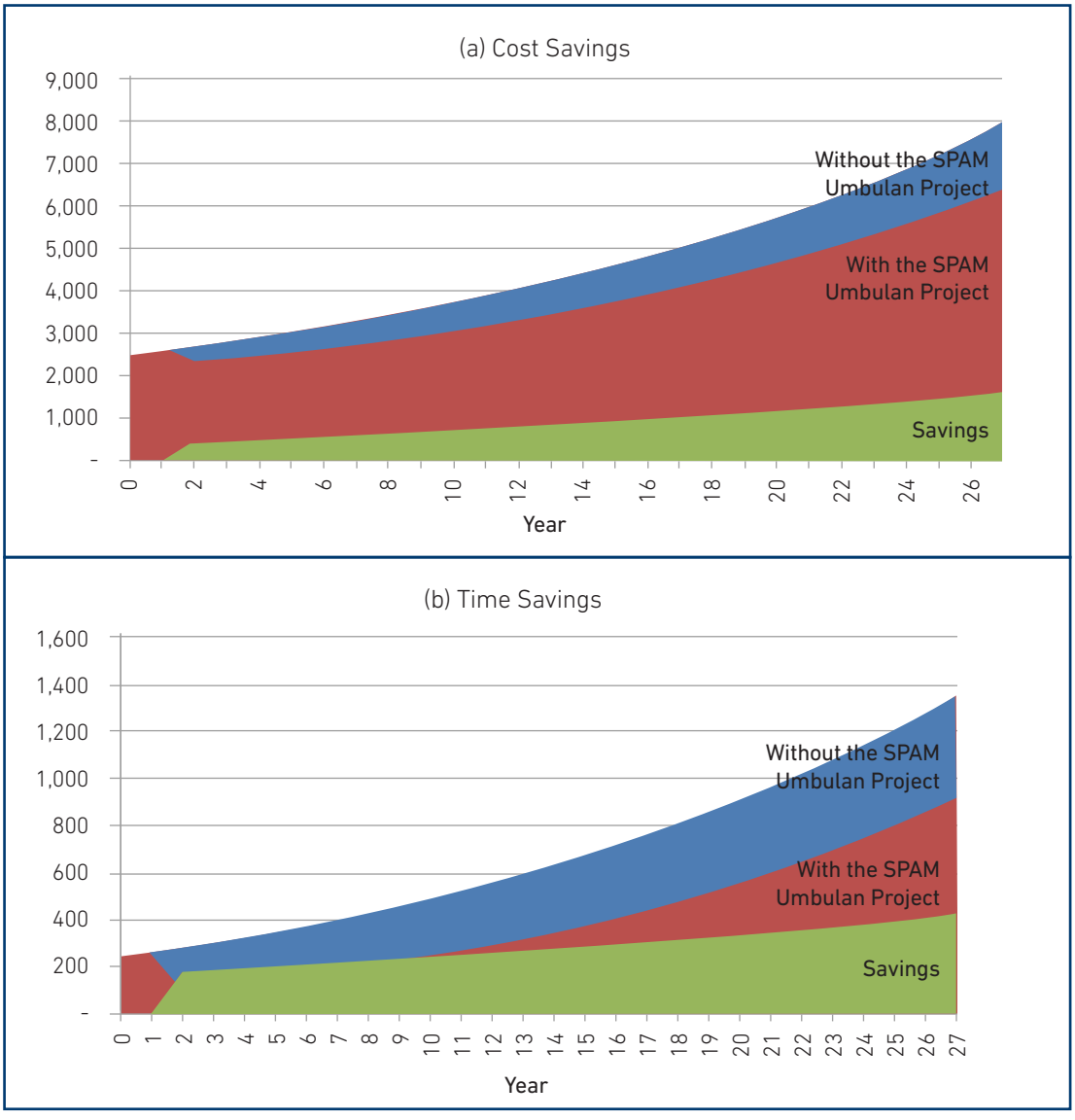
First, water provided by a SPAM is expected to substitute other sources of water used by households if the project were not developed. The identified expenditures for other sources of water include (i) costs of digging shallow wells and purchasing digging equipment or services, (ii) installation and maintenance costs of boreholes equipped with either electric or hand pumps, (iii) cost of electricity to operate pumps, (iv) cost of purchasing water in refillable containers from individual sellers or PDAM, and (v) cost of fuel to boil water.

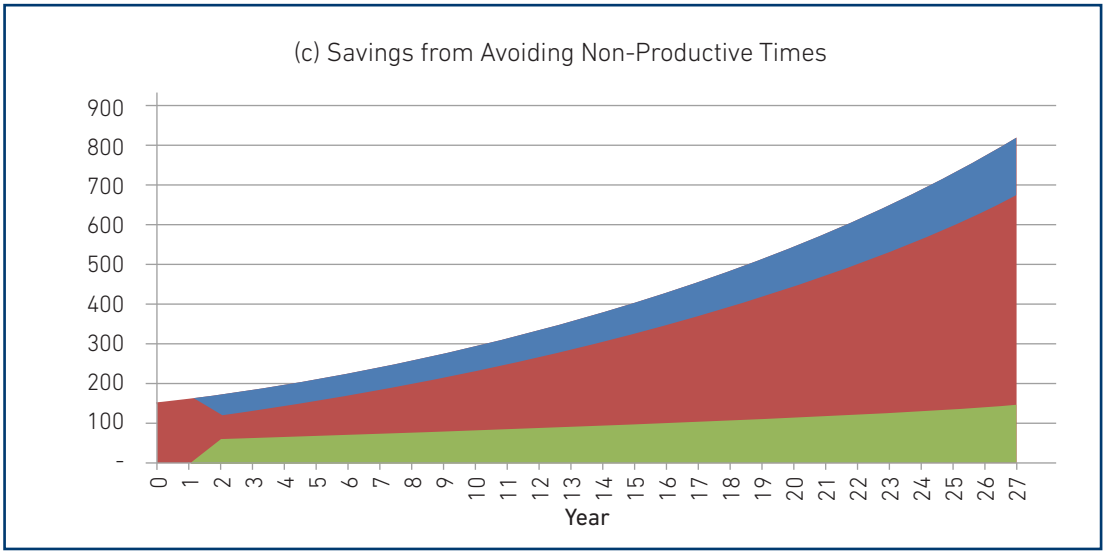
Second, a SPAM may reduce the time required to access clean water. Based on the opportunity cost of time principle, users may reduce the time taken to procure clean water; the additional time made available by this change can, in theory, be used to earn additional income. Opportunity costs were computed by measuring the time spent to source water from shallow wells and wells with electric/hand pumps, purchase water from water sellers, or boil water, and then multiplying it by the value of the regional minimum wage for each jurisdiction. In the end, this cost is considered a time-savings measure.

Third, the main criterion used to define the goals of a SPAM is savings in health expenditures. The greater the availability of clean water, the greater the reduction in the incidence of waterborne diseases. The monetary savings can be achieved through two channels: (i) reduction in disease treatment costs, and (ii) avoidance of lost wages based on the number of days that workers are absent from work due to illness.

The benefit projections made by EJPG (2013) for the Umbulan SPAM project showed that substantial savings began to emerge after the first year of the facility's operation (Figure 6.6). The amount of savings increased year by year, keeping the cost of accessing water through PDAM to be below the cost in the scenario if there were no such infrastructure. The increases were steep during the initial ramp-up period (i.e. years 0–2) when the number of new PDAM service connections grew quickly. Starting in the second year, however, the growth of those benefits was more gradual.

Figure 6.6. Potential Savings Generated by Drinking Water Supply System Projects
(Rp billion)





Source: SPAM Umbulan feasibility document (EJPG, 2013).

For the Bandar Lampung SPAM project, the only discussion found about its benefit projection touched upon an indirect one. According to the results of the environmental impact analysis, the project could generate new businesses and thus create new jobs (PDAM Way Rilau, 2017). Unfortunately, this impact is weak, as the project was estimated to create only 135 new job openings in a total population of 600,000.

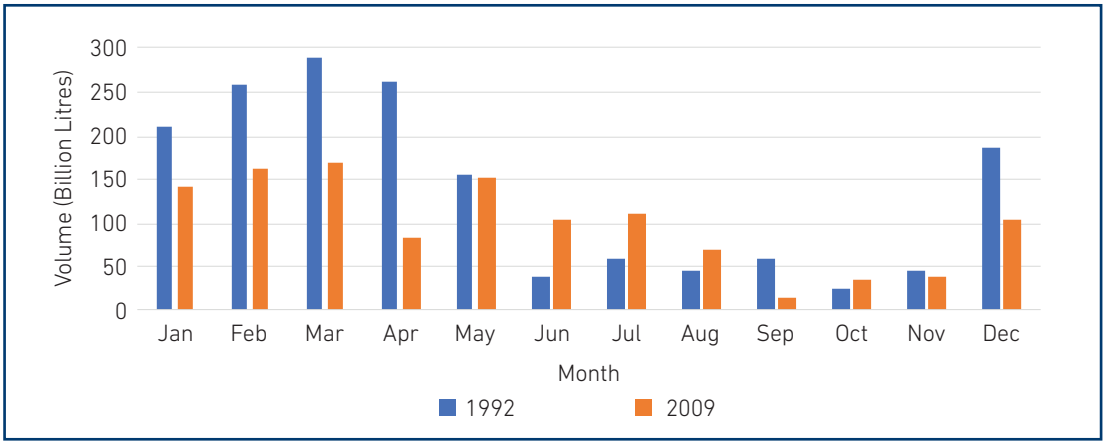
3.2.2. Benefits and Challenges of SPAM Operations

In evaluating the benefit and impact of SPAM projects, a framework from Van Engelenburg (2020) is borrowed that identifies three criteria for assessing water projects: (i) availability of drinking water, which can be approximated by quantifying the percentage of households connected to the drinking water supply; (ii) water governance, which must be assessed using institutional capacity in service delivery; and (iii) local land and water use, which comprises activities carried out by economic actors at both the surface and sub-surface levels that impact the availability and quality of water.

Both the Umbulan and Bandar Lampung SPAM projects face water stock availability issues and distribution network challenges, which, in turn, impact their production capacity. As determined by EJPG (2013), Umbulan Spring was able to provide 5,000 litres of water per second in 1980. However, its capacity decreased to 4,000 litres per second by the time of the feasibility analysis (2013). More recently, a study by Rengganis and Seizarwati (2017) found that the stock has decreased further to 3,278 litres per second.

The Bandar Lampung SPAM project's water source is still relatively abundant, despite signs of decreasing supply. Based on Balitbangda Lampung Province (2018), the Sekampung River's debit is still 10,000 litres per second or 16.01 billion litres in the driest month of September 2009. However, the monitored volume of water in 1992 was more than three times the latter measurement. The river's water capacity dropped by 50%, on average, between 1992 and 2009 (Figure 6.7). Based on that rate, it is much likely to continue. For both the Umbulan and Bandar Lampung SPAM projects, continuous control and monitoring over water catchment regions should go hand in hand with the maintenance of water supply facilities (Apriadi, 2008).

Figure 6.7. Monthly Water Volume at Pujorahayu Way Sekampung Monitoring Station in Lampung Province
(billion litres)



Source: Balitbangda Lampung Province (2018).

Another impediment to achieving the projected benefits is the incompleteness of the pipe network. Commission V (2022) reported that the Bandar Lampung SPAM project's realised water network connection is 'far from [the] target'. Meanwhile, Aryono (2022) indicated that the number of new connections did not change significantly, as there were only 4,934 new home connections (i.e. 35% of the 14,000 target).

A well-functioning institution is vital for managing a reliable drinking water supply system with minimum disruption. However, Sofi (2022) found that in the case of the Umbulan SPAM project, PDAMs in five regencies/cities are not ready to distribute water due to limited funding for the construction of new distribution networks, undermining the overall socio-economic impact of the project. Even the provincial-level water utility, Perusahaan Daerah Air Bersih Jawa Timur, admitted that it does not have the financial capacity to expand the existing capacity of distribution pipes to the five municipalities to be served by the SPAM (Ginanjar, 2023).

Moreover, there are many instances of service disruption resulting in a sub-standard level of water delivery:

(i) 'The water doesn't flow [from the pipe]. [Because of that,] I've been buying water from a seller twice a week, [so in] a month I spent around Rp320,000. [To make matters worse,] I am still billed for monthly subscription payments' (Anam, 2021).
(ii) 'People in several areas in Surabaya complain that water from PDAM has stopped flowing for at least 2 days' (Hasana, 2021).
(iii) 'The situation within PDAM Pasuruan City is getting out of control. Complaints have been coming, primarily problems of no water at all reaching customers' homes, even for a matter of months. This has further worsened the current image of PDAM Pasuruan City' (Rahmawati, 2023).

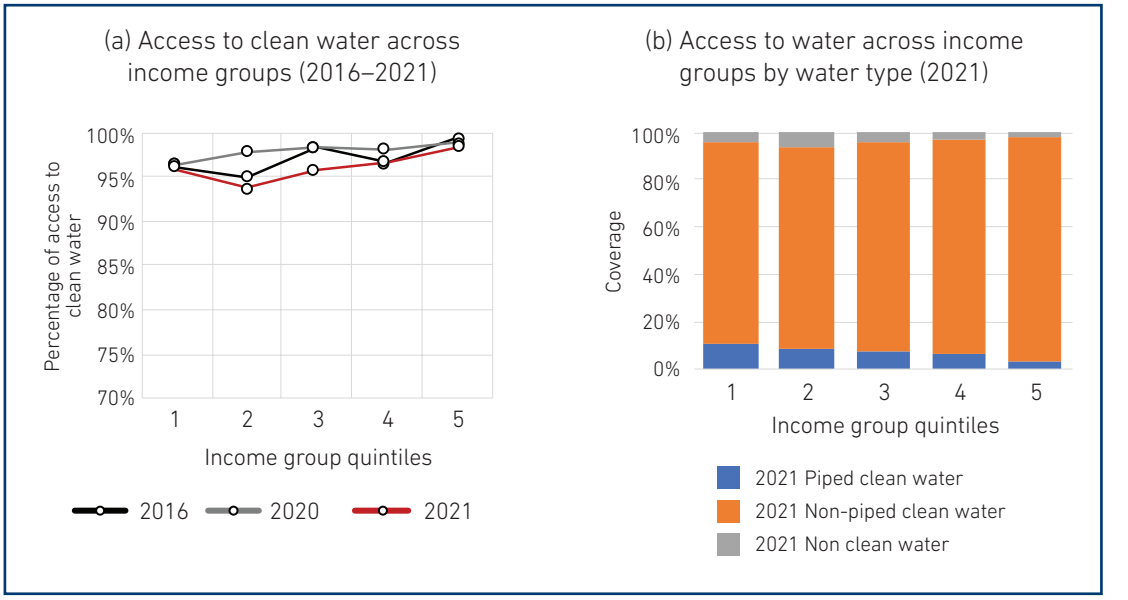
Similar problems were found in Bandar Lampung. Construction of pipelines financed by the regional government stopped due to budget refocussing to address the COVID-19 pandemic, resulting in a utilisation rate of only 20% (Aryono, 2022). As a result, some customers chose to cancel their subscriptions, causing even greater losses for PDAMs, putting PDAM Way Rilau under more financial pressure since charges for the water supply and other operational costs continue despite declining revenue.

Moreover, the areas around both SPAM projects are facing pressure from environmental change. Seizarwati (2017) found that there were massive reductions in forest coverage in water catchment areas within 100 kilometres of Umbulan Spring. Based on satellite images, these were estimated at 75.21% between 1990 and 2003, and another 2.14% between 2003 and 2006. In Lampung, significant land-use change has been detected in Wan Abdurrahman Community Forest Park, which is the water catchment area for the Sekampung River (ACCCRN, 2010). The situation requires significant attention from central or local authorities as well as the public, as the sustainability of the drinking water supply system in both locations is under threat.

The challenges faced by both SPAM projects have hindered the effort to close the access inequity gap. Meanwhile, the benefits projected at the start of the two projects will only materialise if the above criteria are fulfilled. As a result, the benefits achieved by both the Umbulan and Bandar Lampung SPAM projects are not easily discernible.

In the five service areas of the Umbulan SPAM project, access to clean water deteriorated from 2020 to 2021 for all income groups except the fourth quintile (Figure 6.8). One of the reasons for this pattern is the coincidence of the data timeframe with the pandemic, which may have lowered customer incomes and induced customers to stop using metered water from PDAM. Another reason is that people in these service areas have managed to access clean water. More than 90% of users across all groups have access to clean drinking water. Movement of data around particular averages between periods is reasonable, especially when their collection was always randomised like in the national socio-economic surveys.

Figure 6.8. Water Access across Income Groups: Umbulan SPAM Project Service Area

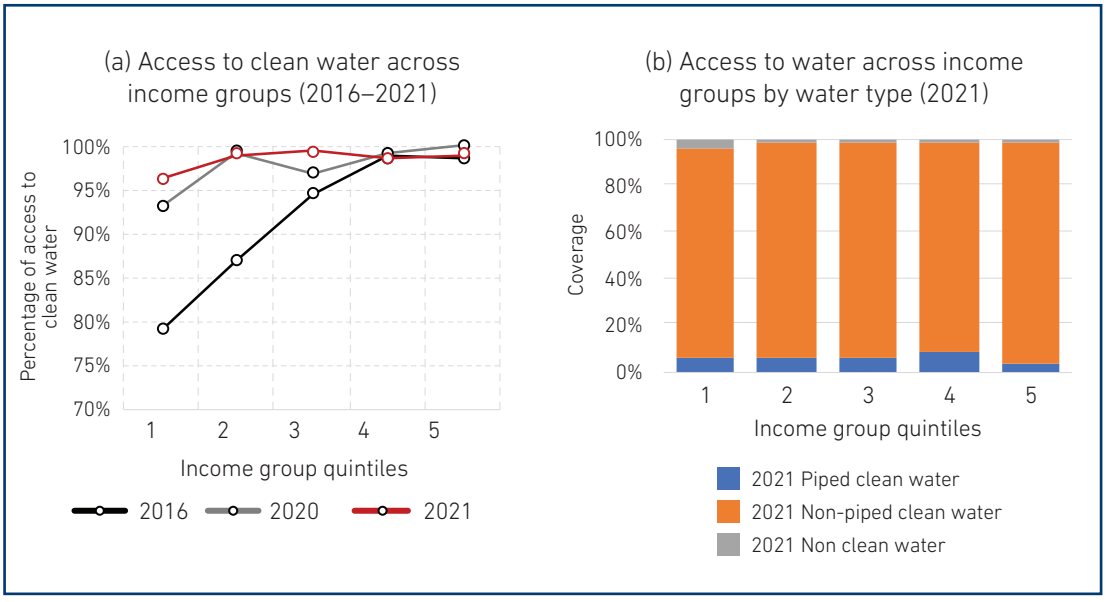


Source: Author's calculations based on *Susenas* data.

By 2021, the largest proportion of access to piped clean water was observed in the poorest communities. This could be an indication that piped clean water is important for low-income groups, as the upfront cost of obtaining clean water individually is too high. Therefore, conversion to piped networks should continue to be pursued to lower the cost of access to clean water.

The change in access to clean drinking water in Bandar Lampung is significant (Figure 6.9). Access to clean water in the first, second, and third income groups increased significantly, with the lowest quintile rising from just below 80% in 2016 to over 96% in 2021. This could be due to the government's efforts to provide a drinking water supply system as well as the community's efforts to improve access independently.

Figure 6.9. Water Access across Income Groups: Bandar Lampung SPAM Project Service Area



Source: Author's calculations based on *Susenas* data.

The latest data for 2021 show an unclear pattern of access to piped clean water in Bandar Lampung. The group with the most extensive access to piped clean water (7.9%) is the fourth quintile. Meanwhile, only 5.8% of people in the lowest income group accessed piped clean water. This disparity suggests that policies to equalise access to clean water are not sufficiently targeted.

4. Leveraging Public Spending to Optimise the Socio-Economic Impacts of Infrastructure

Limited availability of public spending has always been a challenge in infrastructure development in Indonesia. Realising the challenges of constrained public spending, former President Susilo Bambang Yudhoyono rolled out an ambitious plan for infrastructure investment, with several high-profile infrastructure summits held to attract private investment, but the outcomes of these summits were not according to expectation (McCawley, 2015). The impetus for massive infrastructure investment gained more traction and translated into more concrete projects and outcomes under the PSN during the Widodo Administration, as it moved away from energy subsidies and reallocated fiscal space for infrastructure development (Salim and Negara, 2018). Although in the later term of Widodo's presidency the increasing price of commodities – including fuel – forced the administration to increase energy subsidies, his decisiveness early in his term on subsidies played a consequential role in creating momentum for massive infrastructure investment.

To further leverage the contribution of the State Budget, the Widodo Administration also capitalised on innovative fiscal policies such as availability payments and government guarantees. To increase financial viability, the government could directly contribute to specific projects through viability gap financing (VGF) for those that are not necessarily meeting financial viability criteria (Salim and Negara, 2018). An example of the implementation of VGF is the Bandar Lampung SPAM project, to which the government contributed Rp258.8 billion (GOI, Coordinating Ministry of Economic Affairs, 2020). The Widodo Administration understands the underlying impediments to private sector investment, using innovative solutions to signal strong commitment while minimising direct public spending; this has translated well into increasing the private sector appetite to undertake projects under the PSN.

From a socio-economic impact standpoint, this section assesses how well the Widodo Administration has optimised the available financing mechanisms to leverage the limited public spending to maximise PSN socio-economic impact, recognising that the State Budget still holds an essential role for high socio-economic impact projects that may not be commercially feasible.

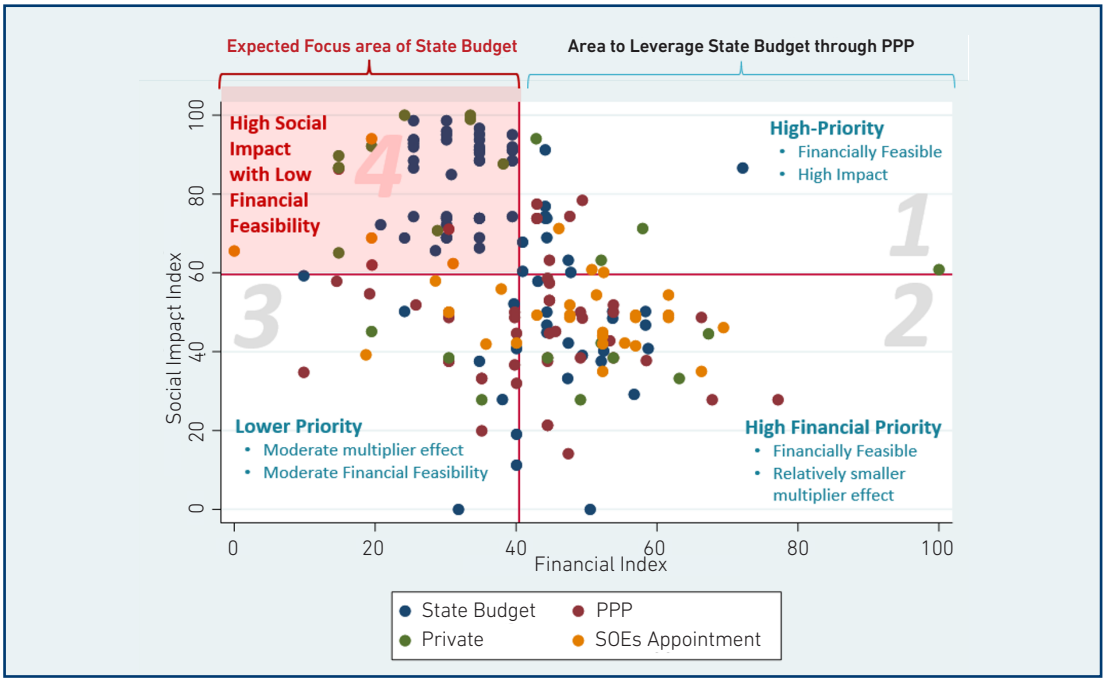
Conducting a socio-economic impact assessment of an infrastructure project ideally involves the estimation of the direct and indirect impacts of each project through a robust mixed method of qualitative and quantitative assessment. An example of such an assessment can be seen in Purwoto et al. (2019), which evaluated the socio-economic impact of four PPPs.[5] Scaling up the robust analysis in Purwoto et al. (2019) to cover broader PSN projects is challenging due to the fragmentation of detailed information on PSN projects across different sources, which prevents a more elaborate assessment using traditional cost–benefit analysis for all PSN projects. To overcome the challenges in conducting the assessment, the infrastructure financing prioritisation framework (IPF) is borrowed from Prospera (2022), which was developed as a stylised version of a more comprehensive framework from Marcelo et al. (2016). The stylised IPF is a multicriteria assessment tool used to evaluate the socio-economic impact and financial feasibility properties of a project and to assess the appropriateness of State Budget contribution in financing infrastructure.

The IPF has two criteria for assessing a PSN project. The first is the Socio-Economic Index, a composite index comprising (i) the economic multiplier impact extracted from Indonesia's 2016 Interregional Input–Output Table; and (ii) a strategic alignment factor that provides a favourable score for projects that are based on affirmative regional selection and type of infrastructure to address the basic infrastructure gap (e.g. infrastructure that is developed in regions outside of Java, particularly in remote areas, is scored higher compared to project in a more developed area). The second is the Financial Index, a composite index that is constructed from two components: (i) the internal rate of return (IRR) if a project has the ex-ante information of such a rate; in the event that there is no information on the IRR of a specific project, the IRR is set with similar projects in similar localities; and (ii) the multi-year commitment of the infrastructure project, with a shorter project prioritised over a longer-term project.

One immediate benefit of the stylised IPF is that it allows for a quick assessment based on limited project-level information. For the construction of an IPF for Indonesia, information was gathered, and assessments were conducted on a sample of 186 PSN projects. Inference is drawn from a quadrant analysis to compare socio-economic impact and financial feasibility across the 186 PSN projects. The resulting socio-economic impact and financial feasibility indexes are plotted together, and the average values of each index are then set as the cut-off points at each axis of the indexes to group the PSN projects by four quadrants of priority level (Figure 6.10).

[5] Railroad Project Makassar-Parepare, Preservation of Sumatra's East Sumatra National Road, Murhum Baubau Port Development Project, and Tower Project in Dharmais Cancer Hospital.

Figure 6.10. Stylised Infrastructure Financing Prioritisation Framework for 186 PSN Projects



PPP = public–private partnership.

Source: Source: Author's calculation from KPPIP lists of PSN Projects.

The first quadrant contains high-priority projects with high social impact and high financial feasibility. Most of these projects consist of strategic projects addressing connectivity needs from a growing region, such as the toll road from Balikpapan to Samarinda, and the toll road from Manado to Bitung. Other high-profile projects include the Indonesia Deepwater Development Project, a massive liquified natural gas exploration project.

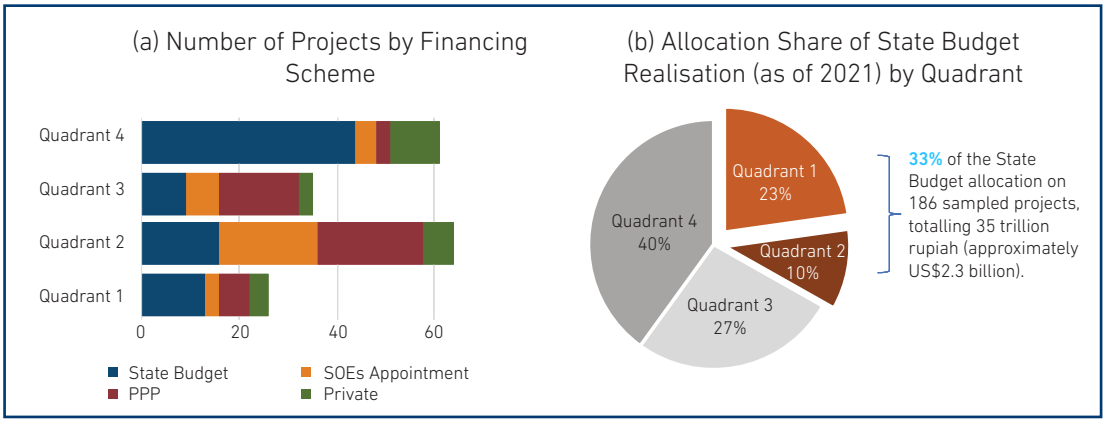
The second quadrant features projects with high financial feasibility but a rather moderate socio-economic impact. Projects consist of an inner-city toll road in Jabodetabek, some segments of the Trans-Java and Trans-Sumatra toll roads, and the Jakarta–Bandung high-speed train.

The third quadrant is the lower-priority quadrant, consisting of projects that on average have lower financial feasibility and moderate social impact. Projects range from those that have current limited benefits due to scalability issues, such as the Light Rail Transit (LRT) in Palembang and Jakarta. These projects were built to support the last Asian Games and are currently operating on a limited scale. Expansion of the route of the two LRT projects to connect with the larger LRT

network, serving more areas, may lead to a more favourable socio-economic impact.
The fourth quadrant captures projects with high social economic impact but low financial feasibility. Most of the projects respond to the need for basic infrastructure, such as dams and irrigation.

As the figure shows, most are either financially feasible (quadrants 1 and 2) or not financially feasible but have significant social impact (quadrant 4). A complete list of all projects by quadrant can be seen in Appendix 5.1.

Figure 6.11. Projects in Each Infrastructure Financing Prioritisation Framework Quadrant by Financing Scheme



PPP = public–private partnership, SOE = state-owned enterprise.

Notes:

1. Quadrant 1: High priority due to high socio-economic impact and high financial feasibility.
2. Quadrant 2: High financial priority, albeit moderate socio-economic impact.
3. Quadrant 3: Lower priority.
4. Quadrant 4: High social impact with limited financial feasibility.
5. Sample of 186 projects.

Source: Author's calculation from KPPIP lists of PSN Projects.

Figure 6.10 and Figure 6.11 reveal an encouraging finding – only a handful of the sampled projects are in the lower-priority quadrant, that is, have below-average social impact and financial feasibility compared to the rest of the PSN projects. The State Budget contribution in this quadrant is contained to a limited number of projects.

From an equitability standpoint, projects in the fourth quadrant are highly desirable due to their significant socio-economic impact, but State Budget financing is necessary because these projects are not appealing to the private sector. The contribution of the State Budget in this quadrant is already in line with the IPF; it directly financed 44 out of 61 projects in this quadrant, and most involve irrigation and water supply. This prioritisation is also observed by evaluating the complete list of PSN project clusters based on State Budget contributions, as clusters that received exclusive public funding are essential basic services that have substantial potential socio-economic impacts but may not be commercially feasible (Table 6.2).

Table 6.2. PSN Projects Based on State Budget Contribution

No.	Sectors	Number of Planned Projects under the PSN	
		Without State Budget Contribution	With State Budget Contribution
1	Roads (inc. toll) and bridges	11	43
2	Harbours	3	10
3	Airports	6	2
4	Railways	5	10
5	Industrial and economic zones	9	9
6	**Housing**		**2**
7	**Dams and irrigation**		**57**
8	**Clean water and sanitation**		**12**
9	**Sea embankment**		**1**
10	Energy	11	4
11	**Technology**		**5**
12	**Education**		**1**

Source: Author's calculation from KPPIP's lists of PSN Projects.

However, when projects that receive support from the State Budget are evaluated in all quadrants, projects that are financially viable (i.e. quadrants 1 and 2) are still receiving support from the State Budget either through direct financing, contribution through PPPs, or support from state-owned enterprises (SOEs). The amount of this support is substantial, with 33% of the State Budget allocation for the PSN allocated to these financially viable projects, amounting to about Rp35 trillion (Figure 6.11).

While State Budget funding is still expected for these projects, the sizeable number of projects receiving this contribution indicates that there is still room to invite the private sector to this area to better leverage the direct contribution of public spending and to avoid the crowding out of private investment in otherwise financially viable projects. Some good examples where the government has invited private investors to finance PSN projects include the Jakarta–Bandung high-speed train (quadrant 2), which is a joint venture between Indonesian SOEs through PT Pilar Sinergi BUMN and a consortium of Chinese railroad companies through Beijing Yawan HSR. However, unprecedented cost overruns in the end did require additional support from the State Budget.

In other instances, government support is instrumental to a project's overall feasibility. Complicated land acquisition issues, like that for the Semarang–Demak Toll Road (quadrant 2), necessitated direct support from the State Budget for the first segment of Rp10 trillion. As the first segment was also designed as multi-functional infrastructure to control floods in the area, this further complicated the technical arrangement and added to the State Budget need. The land acquisition issues and technical difficulties have been less imminent in the second segment, and the private sector (i.e. SOEs and private sector syndication) is involved in the construction of this segment through a build–operate–transfer arrangement.

Scaling up the targeted use of the State Budget to improve financial feasibility and to mitigate technical risk and challenges is crucial to allow for a more conducive environment for private sector involvement, as can be seen in the case of the Jakarta–Bandung high-speed train and Semarang–Demak Toll Road to broader PSN projects. However, the planning and implementing process of PPPs is more complicated than direct spending from the State Budget. Furthermore, the limited capacity of the government contracting agency is often a challenge in the preparation and procurement of PPPs (ADB, 2020). Addressing this fundamental constraint is essential to ensure that the State Budget contribution can be better leveraged to improve socio-economic outcomes through private sector involvement.

5. Summary and Conclusion

In response to Indonesia's massive infrastructure gap, the government rolled out the PSN. Its objectives are clear – to fulfil basic infrastructure needs and to improve citizens' welfare. This chapter assessed how effective PSN projects are in meeting these objectives.

The positive impact of PSN projects can be observed in the improvement of broader aggregate-level socio-economic indicators. On average, sub-national economic growth accelerated in regions traversed by a PSN toll road, poverty incidence declined, and income distribution improved, albeit modestly. This result is reflective of the findings in various project-level evaluations that showed positive impacts of toll roads on growth in the number of retail businesses, number of firms, and headline labour market indicators.

Drawing an inference from household-level data and selected project technical documents, PSN projects have contributed to more equitable access to basic infrastructure. In the specific case of two water projects, the ex-post evaluation found that household access to piped water in the project areas is improving, particularly for households in the lowest income decile. Challenges remain, however, particularly in capacity optimisation and maintaining the quality of services. As the last-mile deliverers of piped water, local governments are struggling to secure adequate post-construction operational funding to install pipelines from water treatment facilities to end-users. The fact that tariffs are often set not solely on economic and financial considerations exacerbates the issue. The lack of adequate operational funding has led to lacklustre service coverage increases and less-than-ideal service disruption management. This finding highlights the importance of coordination between the central and local governments on the construction and operation of PSN projects. This is particularly important for basic infrastructure projects where, in most cases, the local government has a significant role in handling operational technicalities.

For a massive undertaking such as the PSN – with different clusters of infrastructure types competing for allocation of public spending – optimising socio-economic impacts requires a prioritisation of public spending contributions based on multiple criteria (i.e. the magnitude of socio-economic impacts and financial feasibility). In evaluating the contribution of the State Budget to PSN projects, the Widodo Administration has managed to limit public spending on projects that are commercially feasible and instead focus on projects with a high socio-economic impact that may not be as feasible commercially. Still, the substantial number of projects that are financially viable and receiving support from the State Budget cannot be discounted. Further optimisation of the State Budget can still be achieved through more intensive involvement from the private sector to better leverage the contribution of public spending.

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Appendix

Appendix 6.1. Projects by Stylised Infrastructure Financing Prioritisation Framework Quadrant

PSN Project	Financial Index	Socio-Economic Index	Quadrant
Rail-Based Mass Transport for the Badung Region – Buleleng	44.7	63.2	1
Bendo Dam	44.1	74.3	1
Gongseng Dam	44.1	74.3	1
Karalloe Dam	44.1	91.2	1
Karian Dam	44.1	76.9	1
Brass Dam	44.1	73.9	1
Marangkayu Dam	72.2	86.6	1
Tukul Dam	44.1	74.3	1
Balikpapan-Samarinda toll road	42.9	73.8	1
Makassar–Maros–Sungguminasa–Takalar (Mamminasata) Toll Road	42.9	77.5	1
Manado–Bitung Toll Road	47.6	74.3	1
Makassar–Parepare Train (Phase 1)	47.4	63.2	1
Purukcahu–Batanjung Train via Bangkuang	52.1	63.2	1
Bantaeng Industrial Area	42.8	94.0	1
Bontang Oil Refinery	50.7	60.8	1
Tuban Oil Refinery (Expansion)	46.1	71.3	1
Construction of New Nabire Airport	40.9	67.8	1
Construction of Siboru Fak Fak Airport	40.9	60.4	1
Construction of Samarinda–Bontang Toll Road	42.9	73.8	1
Development of Kupang Port	52.4	60.1	1
Development of Gendalo, Maha, Gendang, Gehem, and Bangka Fields (Indonesia Deepwater Development Project)	100.0	60.8	1
Development of the Jambaran Gas Unitisation Field – Tiung Biru	58.0	71.3	1
Glapan Irrigation Network Rehabilitation	44.4	68.9	1
Rehabilitation of Range Irrigation Networks	44.4	73.9	1
Labuan Bajo Multipurpose Terminal	47.8	60.1	1
Karian–Serpong Regional Drinking Water Supply System (SPAM)	49.4	78.4	1

PSN Project	Financial Index	Socio-Economic Index	Quadrant
Kediri Airport	45.6	45.1	2
Coal Gasification in Tanjung Enim	53.3	42.8	2
Jaian Toll Duri–Pulo–Kampung Melayu – part of the 6 DKI Jakarta toll roads	49.1	38.5	2
Jakarta MRT North–South (HI Roundabout–City–West Ancol)	58.7	40.8	2
Bukittinggi–Padang Panjang–Lubuk Alung–Padang Toll Road – part of the Trans-Sumatra	47.6	51.9	2
Kisaran Toll Road–Tebing Tinggi – part of the Trans-Sumatra	42.9	49.3	2
Pekanbaru–Kandis–Dumai Toll Road – part of the Trans-Sumatra	51.4	54.4	2
Ciaw–Sukabum–Ciranjang–Padalarang Toll Road	67.8	27.8	2
Cimanggis–Cibitung Toll Road	49.1	27.8	2
Kayu Agung Toll Road–Palembang–Betung	66.3	48.7	2
Kemayoran–Kampung Melayu Toll Road – part of the 6 DKI Jakarta toll roads	53.8	38.5	2
Langsa–Lhokseumawe Toll Road – part of the Trans-Sumatra	52.3	44.1	2
Lhokseumawe–Sigli Toll Road – part of the Trans-Sumatra	52.3	44.1	2
Medan–Binjai Toll Road – part of the 8 sections of the Trans-Sumatra	61.6	49.3	2
Muara Enim–Lubuk Linggau–Lahat Toll Road – part of the Trans-Sumatra	61.6	48.7	2
Probolinggo–Banyuwangi Toll Road	53.8	50.0	2
Rantau Prapat Toll Road–Kisaran – part of the Trans-Sumatra	57.0	49.3	2
Rengat Toll Road–Pekanbaru – part of the Trans-Sumatra	61.6	54.4	2
Semanan–Sunter Toll Road – part of the 6 DKI Jakarta toll roads	53.8	38.5	2
Semarang–Demak Toll Road	53.8	51.9	2
Serang–Panimbang Toll Road	44.5	58.6	2
Serpong–Balaraja Toll Road	58.5	37.8	2
Sigli–Banda Aceh Toll Road – part of the Trans-Sumatra	52.3	44.1	2
Indralaya–Muara Enim Simpang Toll Road – part of the Trans-Sumatra	57.0	48.7	2
Sunter–Pulo Gebang Toll Road – part of the 6 DKI Jakarta toll roads	44.5	38.5	2
Tebing Tinggi Toll Road – Pematang Siantar–Prapat–Tarutung–Sibolga – part of the Trans-Sumatra	47.6	49.3	2
Ulujami–Tanah Abang Toll Road – part of the 6 DKI Jakarta toll roads	44.5	38.5	2

PSN Project	Financial Index	Socio-Economic Index	Quadrant
Jambo Aye Kanan Irrigation Network	53.7	50.2	2
Lematang Irrigation Network	58.4	46.8	2
Lempuing Irrigation Network	44.4	46.8	2
Lhok Guci Irrigation Network	58.4	50.2	2
Swamp Telake Irrigation Network	44.4	44.9	2
Tebing Tinggi Train–Kuala Tanjung	56.7	29.2	2
Likupang Port	43.1	57.9	2
Port of Sanur–Nusa Ceningan/Lembogan	52.4	40.2	2
Development of Self-Help Home Assistance	50.5	0.0	2
Additional Scope of Bogor Ring Road Toll Road	77.2	27.8	2
Additional Scope of the Ngawi–Kertosono–Kediri Toll Road	49.1	50.0	2
Tangguh LNG Train 3 Project	67.3	44.5	2
Gumbasa Irrigation Network Rehabilitation	53.7	48.5	2
Karian Raw Water Facilities and Infrastructure	44.4	50.1	2
Benteng-Kobema Regional Drinking Water Supply System (SPAM) (Central Bengkulu, Bengkulu City, and Seluma)	49.4	39.1	2
Jatigede Regional Drinking Water Supply System (SPAM)	44.7	53.0	2
Jatiluhur Regional Drinking Water Supply System (SPAM)	44.7	53.0	2
Kamijoro Regional Drinking Water Supply System (SPAM) (Bantul, Kulon Progo)	49.4	48.5	2
Wasusokas Regional Drinking Water Supply System (SPAM).	44.7	44.7	2
Umbulan Drinking Water Supply System (SPAM)	44.7	57.4	2
Upgrading the Existing Refinery and the Balongan Petrochemical Industry	55.4	42.2	2
Jakarta–Bandung High-Speed Railway	52.1	42.2	2
Inland Waterways Cikarang–Bekasi–Sea	47.3	33.2	2
Bekasi–Cawang–Kampung Melayu Toll Road	44.5	21.3	2
Betung Toll Road (Sp Sekayu)–Tempino–Jambi – part of the Trans-Sumatra	52.3	35.0	2
Binjai–Langsa Toll Road – part of the Trans-Sumatra	52.3	42.0	2
Cibitung–Cilincing Toll Road	44.5	21.3	2
Cinere–Jagorawi Toll Road	63.1	33.2	2
Dumai Toll Road–Sp. Sigambal–Rantau Prapat – part of the Trans-Sumatra	47.6	48.7	2
Jambi–Rengat Toll Road – part of the Trans-Sumatra	52.3	44.9	2

PSN Project	Financial Index	Socio-Economic Index	Quadrant
Lubuk Linggau–Curup–Bengkulu Toll Road – part of the Trans-Sumatra	66.3	35.0	2
Pekanbaru–Bangkinan–Payakumbuh–Bukittinggi Toll Road – part of the Trans-Sumatra	57.0	41.5	2
Yogyakarta–Bawen Toll Road	44.5	37.6	2
Logistics Train Lahat–Muara Enim–Prabumulih–Tarahan/ Lampung and Prabumulih–Kertapait/Palembang	47.4	14.1	2
South Java Double Track	47.4	42.2	2
Jakarta–Surabaya Train	52.1	37.6	2
Upgrading Existing Refineries/Refinery Development Master Plan	69.4	46.1	2
Yogyakarta New Airport–Kulon Progo	18.7	39.2	3
Elevated Inner Loop Line Jatinegara–Tanah Abang Kemayoran	35.1	19.9	3
Pasar Minggu–Casablanca Toll Road – part of the 6 DKI Jakarta toll roads	30.4	38.5	3
Patimban Port Access Toll Road	30.4	48.7	3
Cileunyi–Sumedang–Dawuan Toll Road	39.8	48.7	3
Krian–Legundi–Bunder–Manyar Toll Road	30.4	50.0	3
Pandaan Toll Road–Malang	39.8	50.0	3
Pasuruan–Probolinggo Toll Road	30.4	50.0	3
Semarang Harbor Toll Road	25.8	51.9	3
Yogyakarta–Kulon Progo New Airport Access Train	40.1	19.1	3
Batang Integrated Industrial Estate	24.2	50.2	3
Wilmar Serang Industrial Area	19.5	45.1	3
LRT Jakarta International Stadium–Kelapa Gading and Velodrome–Manggarai	40.1	40.8	3
LRT South Sumatra (Metro Palembang)	40.1	11.2	3
Construction of flyover from and to Teluk Lamong Terminal	30.4	50.0	3
Additional Scope of Depok–Antasari Toll Road	35.1	27.8	3
Development of Adi Soemarmo Airport	35.7	41.9	3
Development of Bitung International Hub Port	14.5	57.9	3
Development of Kuala Tanjung International Hub Port	19.2	54.7	3
Development of Patimban Port	9.9	34.8	3
Development of the Existing Sorong and Arar Ports	28.5	58.0	3
Development of Palu Bay Port	9.9	59.3	3

PSN Project	Financial Index	Socio-Economic Index	Quadrant
Kijing Terminal Port Development	37.9	55.9	3
Technopark Development Acceleration	31.8	0.0	3
Sidan Dam Raw Water Supply System	39.7	52.1	3
Bandar Lampung Drinking Water Supply System (SPAM)	40.1	32.0	3
West Semarang Drinking Water Supply System (SPAM)	40.1	44.7	3
Real Dam	34.8	37.6	3
Cengkareng–Batu Ceper–Kunciran Toll Road	35.1	33.2	3
Gedebage–Tasikmalaya–Cilacap toll road	30.4	37.6	3
Jakarta–Cikampek II Toll Road South Side	35.1	33.2	3
Serpong–Cinere Toll Road	39.8	36.7	3
Prapat–Duri–Pekanbaru Railway	38.1	27.9	3
Integrated LRT Jakarta, Bogor, Depok, and Bekasi	40.1	42.2	3
Additional Scope of the Solo–Yogyakarta–Kulon Progo Toll Road	30.4	37.6	3
Komodo Airport–Labuan Bajo	19.5	62.0	4
Baliase Weir and Irrigation	39.5	91.2	4
Ameroro Dam	25.4	98.6	4
Bagong Dam	25.4	74.3	4
Banyan Sila Dam	25.4	93.8	4
Bano Star Dam	34.8	93.8	4
Budong-Budong Dam	25.4	92.8	4
Bulango Ulu Dam	34.8	96.7	4
Ciawi Dam	30.1	73.9	4
Cipanas Dam	34.8	73.9	4
Jlantah Dam	30.1	68.9	4
Jragung Dam	30.1	68.9	4
Keureuto Dam	34.8	91.9	4
Kuwil Kawangkoan Dam	30.1	95.1	4
Ladongi Dam	30.1	98.6	4
Lausimeme Dam	34.8	90.4	4
Leuwikeris Dam	34.8	73.9	4
Lolak Dam	39.5	95.1	4
Manikin Dam	25.4	88.5	4

PSN Project	Financial Index	Socio-Economic Index	Quadrant
Marga Tiga Dam	30.1	95.9	4
Mbay Dam	39.5	88.5	4
Meninting Dam	25.4	93.8	4
Napungete Dam	34.8	88.5	4
Pamukkulu Dam	34.8	91.2	4
Passeloreng Dam	34.8	91.2	4
Pidekso Dam	34.8	68.9	4
Randugunting Dam	30.1	68.9	4
Rukoh Dam	39.5	91.9	4
Sadawarna Dam	30.1	73.9	4
Semantok Dam	30.1	74.3	4
Seku Semoi Dam	25.4	86.6	4
Sidan Dam	30.1	72.2	4
Sukamahi Dam	34.8	73.9	4
Tamblang Dam	20.8	72.2	4
Tapin Dam	34.8	95.2	4
Temef Dam	39.5	88.5	4
Tiga Dihaji Dam	34.8	88.5	4
Tiro Dam	25.4	91.9	4
Tiu Suntuk Dam	30.1	93.8	4
Monument Dam	39.5	74.3	4
Way Apu Dam	39.5	91.1	4
Jakarta Sewage System (JSS)	30.8	84.9	4
Tanjung Api-Api Special Economic Zone	24.2	68.9	4
Jorong Industrial Area	19.5	92.2	4
Ketapang Industrial Area	14.8	86.7	4
Konawe Industrial Area	33.5	99.0	4
Kuala Tanjung Industrial Area	14.8	65.1	4
Hedgehog Industrial Area	14.8	86.7	4
Morowali Industrial Area	38.2	87.6	4
Obi Island Industrial Area	33.5	100.0	4
Takalar Industrial Area	19.5	94.0	4
Tanah Kuning Industrial Area	14.8	89.7	4

PSN Project	Financial Index	Socio-Economic Index	Quadrant
Tanggamus Industrial Area	28.8	70.7	4
Tanjung Enim Industrial Area	19.5	68.9	4
Bintuni Bay Industrial Area	14.8	86.3	4
Weda Bay Industrial Area	24.2	100.0	4
Makassar New Port	0.0	65.6	4
Harbor Special Economic Zone Maloy	28.5	65.6	4
Simpang Lima Underground Development	30.4	71.1	4
Development of Lombok Praya International Airport	31.1	62.4	4
Way Sekampung Dam	34.8	66.3	4

LRT = light-rail transit, SPAM = *sistem penyedian air minum* (drinking water supply system).

Notes:

1. The financial index and socio-economic index score are standardised using the minimum–maximum normalisation formula $\left(\frac{X-X_{min}}{X_{max}-X_{min}}\right)$ with X being the unstandardised financial index and socio-economic index.
2. The relative highest score for each index will receive a maximum standardised score of 100.
3. The relative lowest score will receive a minimum standardised score of 0.

Source: Authors.


INDORAMA

Chapter 7

Regional Dimensions of Infrastructure Development in Indonesia

Candra Fajri Ananda
I Kadek Dian Sutrisna Artha
Wilmar Salim

The disparity between Java and other regions in Indonesia remains a persistent challenge despite 2 decades of regional autonomy. Economic development continues to be concentrated in Java, while other regions – particularly in eastern Indonesia – experience slower growth and limited access to quality public services. To address this issue, the government has prioritised infrastructure development to promote balanced regional development, primarily through the *Proyek Strategis Nasional* (PSN). This chapter aims to assess the extent to which the PSN has addressed regional disparity and explores the role of local governments in its implementation. It examines ongoing infrastructure development, including the challenges faced by the PSN, and discusses innovative policies in financing, institutions, and the role of local governments. Two case studies of PSN projects – one from Java and another from outside of Java – are presented. The chapter concludes with recommendations to address regional disparities and to foster inclusive and sustainable development across Indonesia. It emphasises the need for integrated regional development, taking into account economic diversification, commodity downstreaming, development linkages, and human resources development. Additionally, it highlights the importance of innovative financing schemes, including public–private partnerships, to meet the substantial infrastructure investment required. Specialised institutions, such as PT Sarana Multi Infrastruktur and PT Penjaminan Infrastruktur Indonesia, are key to facilitating infrastructure financing. Overall, it underscores the significance of infrastructure-driven development in reducing regional disparities and promoting equitable growth in Indonesia.

1. Background

1.1. Fiscal Decentralisation

Regional autonomy is the delegation of authority from the national government to regional governments to carry out and be responsible for development in various regions. The delegation of authority is a consequence of the implementation of regional autonomy by prioritising the principles of decentralisation, deconcentration, and co-administration. Therefore, the division of authority into provinces, regencies, and cities – and the division of governmental affairs between levels of government – creates a relationship of authority and financial relations that include public services as well as utilisation of both natural and other resources.

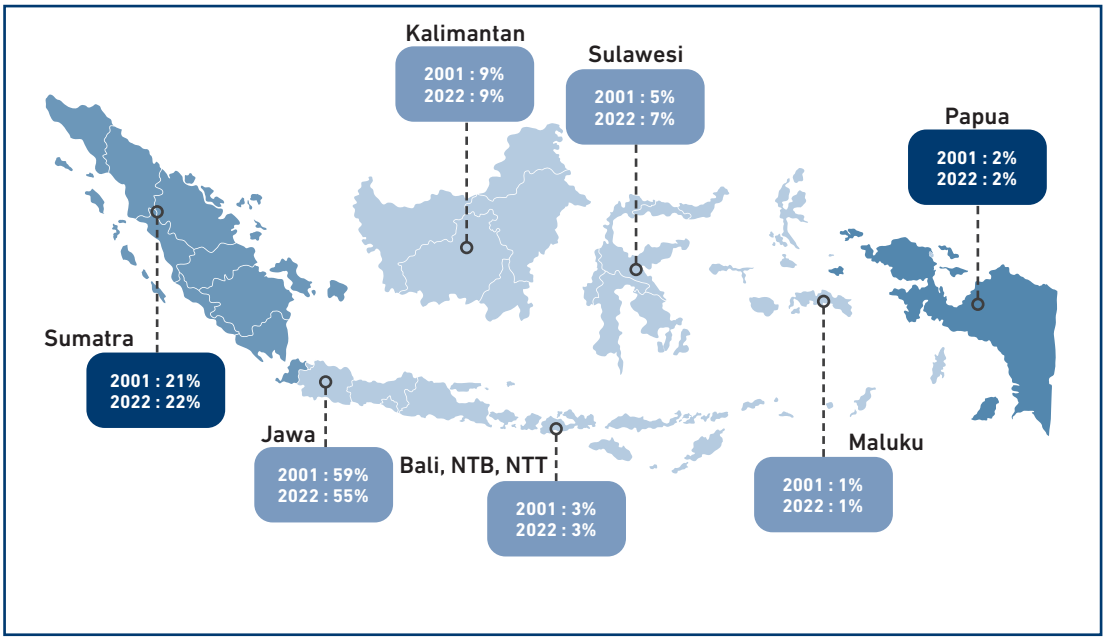
The justification for decentralisation is to lessen reliance on the central government through regional empowerment activities in the context of managing development in the regions based on independence, creativity, and innovation owned by each region. Decentralisation is supposed to increase the quality of services supplied by the government to the public, both directly (i.e. service goods) and indirectly (i.e. public goods), because local governments are closer to their constituents. Decentralisation, in conjunction with democracy, is projected to improve the efficiency, effectiveness, and accountability of the public sector.

However, decentralisation can both benefit and regress regional development. Decentralisation can be a driving force for development – if local governments can measure and fulfil the needs of their people in achieving prosperity and if transaction costs are lower compared to when directly handled by the central government. Based on this perspective, decentralisation works to increase public sector efficiency, good governance, and government accountability. In contrast, decentralisation is an impediment to development when implemented in regions with inadequate governance capacity. Due to the dearth of information and the poor quality of government human resources, there is no assurance that the available budget will be utilised optimally for regional development. Low government capacity tends to increase costs and opportunities for corruption and abuse, inefficient government services, economic distortions, and disparity between communities and regions.

1.2. Regional Disparity

Decentralisation has been unable to deliver fair and equitable economic development for the people of Indonesia, especially in improving welfare. Out of 34 provinces (before proliferation of administrative regions of Papua), the provinces in Java still dominate the Indonesian economy, however (Figure 7.1). The dominant contribution of these regions has persisted since the beginning of fiscal decentralisation implementation in 2001. Yet Java's share in gross domestic product (GDP) has been declining, from 59% in 2001 to 55% in 2022. Some of the challenges to regional development in Indonesia include the country's vast territory, differences in the quality of human resources, and a limited ability of the government to distribute development simultaneously. The impact of such conditions is that rapid development has only occurred in Java, while development in non-Java regions is slow.

Figure 7.1. Contribution of Regions in Each Island to the Economy



Source: Statistics Indonesia, Produk Domestik Regional Bruto, https://www.bps.go.id/subject/52/produk-domestik-regional-bruto--lapangan-usaha-.html#subjekViewTab3

The development inequality between Java and non-Java has had a negative impact on both parties. The rapid development of Java encourages high urbanisation of the population there, which makes Java the most populous island in Indonesia. High population growth, the slowing growth of new jobs, and poor regional planning have also had negative impacts, creating slum settlements and new pockets of poverty, especially in urban areas. Non-Java regions with slow development tend not to receive the same quality of public services as those in Java. As an example, the quality of education received by those in Maluku and Papua is different from that received by those in Java, both in terms of knowledge as well as facilities and infrastructure.

Recognising the need to reduce regional disparities, the government has prioritised infrastructure development as part of its development goals, particularly through the *Proyek Strategis Nasional* (PSN). This chapter aims to understand to what extent the PSN has addressed regional disparity and explores the role of local governments in the implementation of the PSN. After the introduction, ongoing infrastructure development is described, particularly through the PSN and its challenges. This is followed by a discussion of innovative policies to support infrastructure development that include finance, institutions, and local government in PSN implementation. Two study cases under the PSN are then outlined, one from Java and another one from outside of Java. The chapter then concludes and provides some recommendations.

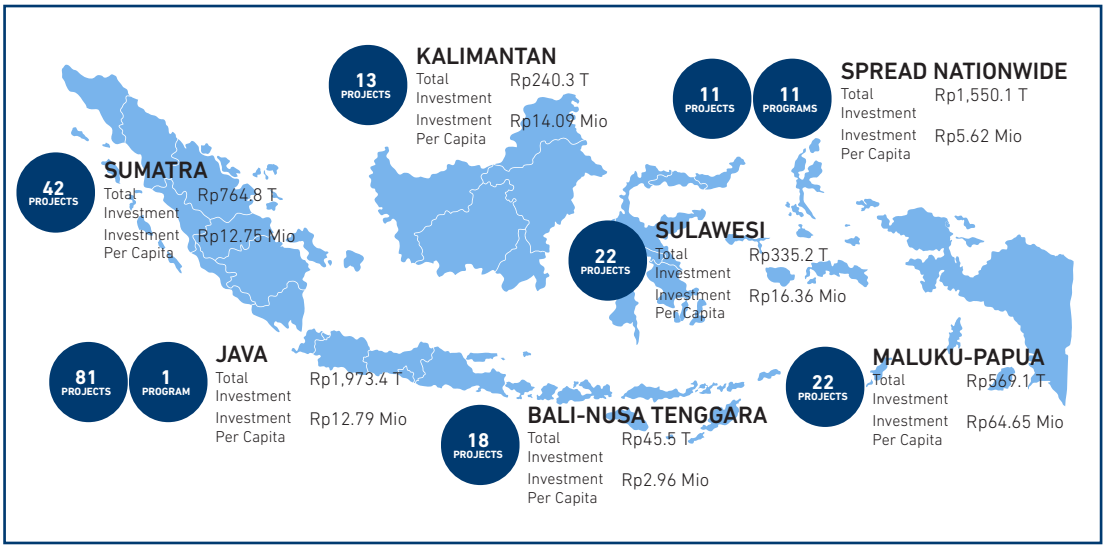
2. Developing Infrastructure

2.1. *Proyek Strategis Nasional* (PSN)

A strong economic structure – based on competitive advantages in various regions – is supported by qualified and competitive human resources. Regional development is a national priority aimed at resolving key strategic issues, including inequality between regions with the aim of increasing interregional equity; increasing the competitive advantage of regional growth centres; improving the quality of and access to basic services, competitiveness, and regional self-reliance; and increasing synergies in the use of regional space. To carry out this development agenda, the government created the PSN. This initiative is structured to make medium- and long-term development more concrete and measurable in resolving development issues – and its benefits more understandable and tangible. The PSN is considered to have strategic value and high leverage to achieve development priority targets.

The PSN project list was first stipulated through Presidential Regulation No. 3 of 2016, which then underwent four changes. Based on Presidential Regulation No. 9 of 2022, there are 200 projects and 12 programmes under the PSN, with a total investment value of Rp5,481.4 trillion. Projects are concentrated in Java and Sumatra in Western Indonesia. However, in terms of investment value per capita (using 2020 census data), the number for Maluku and Papua region is the highest. The number for Java equals that of Sumatra, is slightly lower than those in Kalimantan and Sulawesi, and is higher than those in Bali and Nusa Tenggara.

Figure 7.2. Distribution of PSN Projects



Source: KPPIP, Proyek Strategis Nasional, https://kppip.go.id/proyek-strategis-nasional/

2.2. Development Challenges

Decentralisation still raises many issues, including the lack of harmony between implementing regulations and other sector laws and regulations; high dependence of local governments on the national government, especially in financing development; limited apparatus and institutional capacity; and political dynamics that are obstacles to development. Regional development must be carried out in an integrated manner by taking into account overall development capacity; regional economic development on a local, national, and international scale; commodity development; and commodity downstreaming through the development of strategic areas based on natural resources and non-natural resources. In addition, regional development needs to improve linkages between urban and rural areas; revitalise transmigration areas; develop border areas and underdeveloped areas; and foster human resources development through fulfillment of basic services, increased productivity, and competitiveness.

To achieve the goals of decentralisation such as increasing equity between regions and reducing poverty, accelerating infrastructure development is important. Three issues pose challenges to accelerating infrastructure development: land acquisition, project planning and preparation, and funding (KPPIP, 2017). Land acquisition is still the biggest inhibiting factor in infrastructure development, accounting for 30% of problems. As land acquisition is the first step in development, issues must be addressed immediately in a project (Salim and Negara, 2018). Before the authority was given to the State Asset Management Agency, financing for land acquisition was spread across ministries and local governments, making the land acquisition process ineffective and inefficient.

The second obstacle relates to project planning and preparation in terms of coordination amongst project stakeholders as well as the quality of project documents. Infrastructure development involves many parties, which tends to slow down an agreement as each party has its own goal. The solution in this case is an institution that has a coordinating function to reduce and to overcome such a friction of viewpoints. Moreover, weak coordination and high sectoral egos – coupled with poor project design – can be a boomerang on PSN funding. The lengthy process of planning and preparation can reduce the interest and participation of the private sector, as the PSN is designed to minimise the contribution of the State Budget.

The third biggest obstacle is funding. PSN financing can be sourced from the State Budget, regional budgets, and/or other legal financing in accordance with statutory provisions. Funding that comes from governments must consider the national development planning system, while other financing needs to consider the financial capacity of business entities in financing the PSN. If PSN financing is obtained from a combination of sources, the integration of planning, budget allocation, as well as plans for project completion and operation are crucial.

Funding through government sources as well as financing originating from state-owned enterprises (SOEs) may be in line with the 'Money Follow Program' principle, which aims to allocate funds for priority projects and to increase efficiency for spending on priority projects. This principle is implemented by focussing on priority projectproposals, integrating various funding sources as well as detailed discussions for project preparation. In addition, the government can use public–private partnerships (PPPs) as well as other innovative financing schemes. As for regions, governments there can use regional debt financing instruments and carry out regional funding synergies both from regional budget and non-regional budget sources. Regional debt financing sources consist of regional loans, regional bonds, and regional *sukuk*.

3. Infrastructure Development Policy

3.1. Financing Needs and Innovation

Under the *Rencana Pembangunan Jangka Menengah Nasional, 2020–2024* (*National Medium-Term Development Plan*, RPJMN), the need for national infrastructure investment will reach Rp6,445 trillion. The budget from the state only comprises 37%, while SOEs are predicted to contribute up to 21%. Thus, the state can sustain around 58% of the total funding target or around Rp3,738 trillion. The funding contribution from SOEs has the risk of meeting the market share of the private sector and recycling assets. The government can also utilise PPPs.

PPPs have various advantages, including improving the quality of government infrastructure spending due to the rigid and accountable requirements. Therefore, they have the advantage of minimising the possibility of cost overruns and completion time of infrastructure projects. PPPs still need to be improved, however, as they have only contributed 0.19% to the total GDP in Indonesia, well below contributions in neighbouring countries, including in Malaysia (0.21%), Thailand (0.31%), Viet Nam (0.48%), and the Philippines (0.50%) (Zen, 2019).

Various efforts have been made by the government through the establishment of the Sovereign Wealth Fund (SWF). The SWF provides investment opportunities by collecting funds from investors to distribute to various strategic projects in Indonesia, including those concerning infrastructure. Investors receive legal certainty as well as clarity in making investments. Through the SWF, the government can increase credibility, accountability, and potential interest from potential investors.

As of 2022, the SWF raised Rp400 trillion and has completed various infrastructure projects including toll roads, airports, and digital infrastructure.[1] To attract investors, the SWF has also implemented sustainable economic principles in accordance with the Sustainable Development Goals (SDGs), including those set forth in Indonesia's net-zero emissions target and Energy Transition Mechanism (GOI, 2022).

In line with the increasing interest in green financing, Indonesia has participated in the issuance of global green *sukuk*. Green financing has various advantages, including more competitive loan interest rates, and supports the concept of sustainability in the selection of financing projects (Fankhauser et al., 2022). Indonesia needs at least $74 billion per year to meet green infrastructure needs, increasing investor interest, through various green infrastructure ecosystems that are included in the RPJMN (ADB, 2022).

In summary, Indonesia has succeeded in obtaining various financing not only from multi-national banking institutions but also from various private fundraising institutions. It also has shown its commitment to maintaining the resilience and sustainability of infrastructure against climate change. However, blended finance still faces challenges, such as a lack of eligible projects and institutional capacity to connect projects and investors. Consequently, a financing gap in infrastructure development still exists.

3.2. Role of the Special Mission Vehicle

The Ministry of Finance is working to implement a financing ecosystem specifically engaged in financing the infrastructure sector through the establishment of a special mission vehicle that includes PT Sarana Multi Infrastruktur (PT SMI) and PT Penjaminan Infrastruktur Indonesia (PT PII). PT SMI and PT PII are a way for the government to expand both hard infrastructure and soft infrastructure. PT SMI is working to help achieve SDGs through financing environmentally sound green infrastructure while continuing to support the goal of improving basic services, connectivity, and access to quality infrastructure in various regions. During the COVID-19 pandemic, to help local governments recover, PT SMI signed loan agreements, known as PEN Pemda, with 50 local governments, with a total commitment of Rp30 trillion and a total outstanding commitment of Rp10 trillion.[2] As part of PT SMI's transformation plan to a development financial institution, it is designing programme loans for local governments that are integrated into existing project loans.

[1] Indonesia Investment Authority, Laporan Keuangan Teraudit. https://www.ina.go.id/id/financial-statement.

[2] PT SMI, Kilas Infra, https://ptsmi.co.id/id/kilas-infra.

PT PII was formed to mitigate risk, increase access to bank financing, and increase the creditworthiness of infrastructure investment.[3] Enabling PT PII to give guarantees is a strategic step for infrastructure development in Indonesia; this is illustrated by the increased interest of investors in Indonesia. Furthermore, various efforts have also been made to increase infrastructure guarantees through the addition of infrastructure projects that are guaranteed and have the participation of private insurance companies, both local and multi-national.

For infrastructure financing by regional governments, the central government has various qualified instruments, where regional governments can take advantage of regional debt financing and synergise regional funding. Regional debt financing sources consist of regional loans, regional bonds, and regional sukuk. One source of regional loans has been provided by PT SMI since 2015 to support acceleration infrastructure development in regions of Indonesia. Furthermore, through the HKPD Act, the regional financing mechanism was strengthened through simplification of procedures, increasing access to Sharia financing, and increasing synergy with the central government by synchronising development targets.

3.3. Role and Responsibilities of Regional Governments in the PSN

Infrastructure-driven development has been a focus of Joko Widodo's administration, including the creation of the PSN. Given the concept of decentralisation in Indonesia, the PSN also ensures that the distribution of authority and responsibilities from the central government to sub-national governments is fairly delegated to produce reliable public goods.

The role and responsibilities of regional governments in the PSN is outlined in Presidential Regulation No. 3 of 2016. Several strategic infrastructure projects have been included on the list of the PSN, encompassing those deemed strategic in contributing to economic growth, social welfare, and regional development. Presidential Regulation No. 3 of 2016 (including its several amendments, Presidential Regulation No. 58 of 2017, Presidential Regulation No. 56 of 2018, and Presidential Regulation No. 109 of 2020) stipulates the roles and responsibilities of regional governments.

Roles and responsibilities were once limited to being a project implementer (bottom-up projects), determining project sites, acquiring land, licensing, non-licensing, spatial planning, and accelerating goods/services procurement. Since regional governments have always been the PSN implementers, their roles and responsibilities are well defined across stages and regulations (Table 7.1). Due to the amendments, however, regional governments are now required to perform works beyond these mentioned duties, such as prioritising projects with job opportunities and overseeing monitoring and evaluation tasks.

[3] PT PII, Jejak Langkah PT PII (Persero), https://ptpii.co.id/jejak-langkah

Table 7.1. Role of Regional Governments in PSN Projects

Preparation	1. The regional government is a PSN implementer, along with the central government and/or business entity.
	2. The regional government provides licenses and non-licenses, i.e. site/land determination, environmental permits, and building permits. The provision is in accordance with online single submission.
	3. The regional government considers the environmental impact when issuing licenses and non-licenses (i.e. building permits, disturbance permits, and technical plans).
	4. For multi-regency/city national strategic projects, licensing and non-licensing is granted once. This also applies to multi-regency/city projects in a single province.
	5. The regional government finalises provincial spatial plans, regency/municipal spatial plans, and/or coastal area and small island zoning plans.
	6. The regional government can support business entities in land provision.
	7. The regional government can provide funding for land acquisition for the PSN after the land has been acquired.
Implementation	1. The regional government that cooperates with the business entity can obtain central government guarantees by first providing guarantees for implementation of the PSN project.
	2. The regional government can expedite the procurement of goods and services through direct procurement or direct appointment.
Monitoring and Evaluation	1. The regional government and other supporting stakeholders are required to submit data and information related to PSN development to KPPIP, both in physical and digital form every 3 months or whenever needed.

KPPIP = Komite Percepatan Penyediaan Infrastruktur Prioritas.

Sources: Presidential Regulation No. 3 of 2016 and its amendments (i.e. Presidential Regulation No. 58 of 2017, Presidential Regulation No. 56 of 2018, and Presidential Regulation No. 109 of 2020).

4. Case Studies

4.1. SPAM Semarang Barat Project

Although drinking water is a basic need, limited access to drinking water services and minimum coverage of piped water remain. Therefore, drinking water supply system – known as *sistem penyedian air minum* (SPAM) – projects are deemed key and can be carried out through various schemes, including PPPs. The Semarang Barat SPAM Project spans Ngaliyan Subdistrict, Tugu Subdistrict, West Semarang Subdistrict, and West Semarang City in Semarang, Central Java.

The project is under the PSN because it satisfies a strategic project's requirements to improve access to clean water (Table 7.2). Before the project, most residents in the three subdistricts relied on groundwater for domestic use. Moreover, the project is viewed as strategic as it was the first PPP for a SPAM.

Table 7.2. SPAM Semarang Barat Project

Category	Detail
Location	Semarang City, covering Ngaliyan Subdistrict, Tugu Subdistrict, and West Semarang Subdistrict
Capex	Rp1,19 trillion
Government Contracting Agency	Chief executive officer of PDAM Tirta Moedal Semarang
Project Theme	• PSN • Collaboration and support from various stakeholders, including the Ministry of Finance, Ministry of Public Works and Housing, and regional government
Objectives	• Provide access to clean water for 350,000 residents. • Increase coverage of drinking water services from 41% in 2017 to 84% of the total population in 2030 • Increase the number of customers to 60,000 households with a total PDAM production capacity of 1,000 litres per second.
Scope	Project Scope: • Intake construction and operation • Development and operation of water treatment plant with an output capacity of 1,000 litres per second • Development and operation of transmission network construction and operation of three reservoirs • Development and operation of the main, secondary, and tertiary distribution networks PPP Scope: • Intake operation • Development and operation of water treatment plant with an output capacity of 1,000 litres per second • Development and operation of the transmission network • Construction and operation of three reservoirs
Timeline	PPP Agreement: 23 November 2018 Financial Close: 22 May 2019 Construction: 22 May 2019 – 22 May 2021 Operation: 22 May 2021
Winning Consortium	PT Aetra Air Jakarta–PT Medco Gas Indonesia Consortium

PPP = public–private partnership.

Source: KPBU Kemenkeu, Informasi Umum, https://kpbu.kemenkeu.go.id/proyek/detail/18-proyek-kpbu-spam-semarang-barat#pdt_1

The World Bank (2016) noted that for society to access the full benefits of a PPP, the government must play a pivotal role in fulfilling several conditions, such as commercial feasibility, affordability, and contract suitability. In the context of the PSN and this project, it is interesting to explore the capacity of the regional government to produce public goods and to observe the role and responsibilities of the regional government in completing the project in a timely manner.

The role and responsibilities of the regional government are stated in Local Government Regulation of Semarang City No. 8 of 2018. Although a definitive measurement is not yet available, Ameyaw and Chan (2016) explained that determinant factors to successful water supply PPPs include the commitment of partners, strength of the consortium, asset quality and social support, political environment, and the national PPP unit.

Ameyaw and Chan (2016) also argued that internal coordination and risk allocations within parties are essential, which is in line with Article 8 of the above regulation that sets out the coordination structure within the regional government domain. Article 26 details risk management and mitigation between the regional government and the government contracting agency (GCA). In the project, the mayor complied with Article 19:1a-b concerning financial support for land acquisition and distribution unit network construction by granting Rp100 billion and Rp150 billion, respectively (Adiyanti and Faturrahman, 2021). In expressing its commitment, Article 26 ensured that the regional government with the GCA is willing to put maximal efforts into controlling, managing, preventing, and mitigating infrastructure risks based on equitable allocations. Moreover, PDAM Tirta Moedal Semarang as GCA committed to bear the financial risks.

The success of a PPP is also highly dependent on local government commitment. One political risk is when the timeframe of the PPP is longer than the administration of the local government head. When the head is replaced, it must be ensured that the new head will issue the same support. In the case of this SPAM project, there was no change in the head of local government during the project period.

In terms of good governance, Central Java Province was awarded best performance at the national level, and Semarang was the best-performing city in the province (VOI, 2023). This attainment is not the first for Semarang; in 2017 and 2018, the Semarang city government was named the best-performing city government due to its transparency and public participation in the policymaking process (Kompas, 2018). While good governance reduces political risk and uncertainty, these records will also encourage more investments in the province and Semarang.

Competitive tendering is another important prerequisite for the success of a PPP. During the pre-qualification phase of this PPP, at least 10 prominent and experienced consortiums submitted their documents, with 4 having successfully passed the phase. Through a competitive and transparent tender process, PT Aetra Air Jakarta–PT Medco Energi Consortium won after proposing the lowest

bid while still being compliant to other requirements. The consortium also committed to providing a tariff discount (Raznak, 2018). The role of local government was essential to attract the private sector to participate; Article 13 of Local Government Regulation No. 8 of 2018 stipulated that the mayor is responsible for arranging a PPP regional working unit (i.e. Simpul KPBU) for policy formulation and coordination purposes.

According to Adiyanti and Faturrahman (2020), Badan Peningkatan Penyelenggaraan Sistem Penyediaan Air Minum (Water Supply Development Supporting Agency, BPPSPAM) set some criteria for PDAM Tirta Moedal Semarang to be considered healthy, including creating a full-cost recovery tariff to appraise its ability to purchase bulk water supplies, setting the average tariff at a minimum rate of Rp3,000 per cubic metre, placing non-revenue water below 40% to reduce system risk, and linking bankability to capability to create a return on investment. The study also revealed that in 2018, PDAM Tirta Moedal was considered healthy since it had covered the full cost recovery tariff requirement, set the average tariff at Rp3,870 per cubic metre, and scored 38.73% for non-revenue water with a debt–equity ratio of 0.111.

To assess the potential profitability of the Semarang Barat SPAM Project, Adiyanti and Faturrahman (2020) measured the project against some indicators listed in ADB (2002). It was determined that for the project to be deemed profitable, it should cost at least Rp1 trillion with a minimum tariff of Rp3,000, have a production capacity of 1,000 litres/second, and possess a minimum financial internal rate of return of 12%. The cost of the project was Rp1.19 trillion, with a tariff of Rp5,841, financial internal rate of return of 16%, and a production capacity of 1,000 litres per second. Thus, it is deemed profitable. The local government also committed to increasing the tariff to ensure that the project remains profitable and attractive for the private sector. For the new water tariff, PDAM Tirta Moedal Semarang is relying on direct interaction with the public and the use of social media (PDAM Kota Semarang, 2021).

The capacity of the local government is important for any PPP. The assignment of PT SMI by the Ministry of Finance to conduct capacity building on the Project Development Fund has equipped the local government with the knowledge of project preparation and transaction. The sufficient capacity of the local government and PDAM Tirta Moedal Semarang as the GCA in project preparation also determined success. In addition, local government capacity can also be measured by the bureaucracy of delivering services such as licensing and simplifying procedures. In the Semarang Barat SPAM Project, the local government was fully supportive in accelerating the implementation of the project by providing licensing and non-licensing services. Due to local government support, the Semarang Barat SPAM Project became the fastest PPP completed in Indonesia.

Ameyaw and Chan (2016) argued that the duties of a national PPP unit include coordinating and supervising nationwide PPPs, encouraging the transparency and accountability of PPP practices, handling conflicts, and linking private investors and subnational governments. In Indonesia, this unit is the Indonesia PPP Joint Office, which consists of Badan Perencanaan Pembangunan Nasional (Ministry of National Development Planning, BAPPENAS), the Coordinating Ministry for Economic Affairs, Coordinating Ministry for Maritime and Investment Affairs, Investment Coordinating Board, Ministry of Finance, Ministry of Home Affairs, , and National Public Procurement Agency.

5. The Bitung Special Economic Zone Project

The Bitung Special Economic Zone (SEZ) demonstrates a national government intervention to promote a growth centre in East Indonesia to address regional disparity, supported by the PSN. The central government established the Bitung SEZ through Government Regulation No. 32 of 2014 to accelerate economic development, especially in North Sulawesi Province. The Bitung SEZ has a strategic location as a growth centre, distribution centre, and logistics hub with an international port. It consists of an industrial zone, logistics zone, and export-processing zone. Its main activities are the coconut-processing industry, fisheries management, and logistics. The Bitung SEZ is expected to attract an investment of Rp32.89 trillion and to absorb as many as 34,710 workers until 2025 (Sari, 2016).

In addition to the designation of the Bitung SEZ on the initial list of the PSN, two projects are listed that support the establishment of the Bitung SEZ: the Manado–Bitung Toll Road, which was constructed in 2016 and completed 2021, at an estimated cost of Rp8,935 trillion; and the Bitung International Hub Port, which was constructed in 2017 and partially completed in 2019, at an estimated cost of Rp34,65 trillion. The 39-kilometre Manado–Bitung Toll Road is another PPP, where the national government (i.e. Ministry of Public Works and Housing) partnered with a toll road enterprise, PT Jasamarga Manado Bitung, to build and to operate the toll road. Although the construction was completed and the toll road inaugurated in 2022, land disputes still need to be addressed (Berita Manado.com, 2023). Meanwhile, the Bitung International Hub Port will increase the capacity of the port from 1.5 million 20-foot-equivalent units (TEUs) to 2.7 million TEUs.

The Bitung SEZ has faced some obstacles, including land acquisition, inability to function as a direct port for exports, and other problems regarding supporting infrastructure (Elena, 2021). Moreover, due to the COVID-19 pandemic that halted construction, many investors were unable to repay. A policy also requires fish caught to be sent to Jakarta before being exported to destination countries. However, PT Membangun Sulut Hebat, as the business entity for the management and development of the Bitung SEZ, is confident that many industries will start to operate in the Bitung SEZ despite these obstacles, based on the memoranda of understanding and letters of intent that were signed.

In terms of the local government commitment to the project, several local regulations were issued anticipating the establishment of the Bitung SEZ, including Government Regulation No. 32 of 2014. Between 2008 and 2013, several local policies were undertaken by the Bitung city government to support the establishment of the Bitung SEZ, such as the Bitung Spatial Plan, *Bitung Medium-Term Development Plan*, or procedures for domestic and foreign direct investment, followed by Bitung mayoral regulations to provide facilities for the private sector to invest in Bitung (Pramoda and Apriliani, 2016).

According to Government Regulation No. 32 of 2014, the Bitung SEZ has an area of 534 hectares in Matuari District. A land management rights decree was issued for an area of 92.79 hectares, while the remaining 441.21 hectares remain in the consultation phase (BAPPENAS, 2021; Purboyo, 2019; Hutapea, 2019). According to the head of the North Sulawesi Province National Land Agency Regional Office, the consultation is regarding whether building or land-use rights will be granted (Bappenas, 2021; Hutapea, 2019). Moreover, during the development process, some conflicts have occurred over an area of approximately 92 hectares related to cultivation rights (Bappenas, 2021; Sari, 2019).

Based on an analysis of socio-economic readiness, the leading sector that can be developed in the Bitung SEZ is the pharmaceutical/herbal industry. Meanwhile, to increase the socio-economic impacts of the Bitung SEZ, other supporting sectors – such as warehousing and transport (i.e. rail, land, sea, air, river, and ferry) –are needed to support the Bitung SEZ. To increase the employment impact of the SEZ, improving the quality of the local human resources is crucial. Although employment opportunities in the SEZ have increased, population growth is high, and the low level of education is a factor in low absorption of labour in the SEZ (Setiawan, Prasetyawati, Salim, 2022).

6. Concluding Remarks

Regional disparity between Java and outside of Java is a persistent situation. Although decentralisation has been in place for more than 2 decades, economic development is still concentrated in Java, in particular around its major metropolitan areas. Thus, the government is trying to speed up infrastructure development to promote economic growth and more balanced development through the PSN. However, this is inevitably biased towards Java and Sumatra in Western Indonesia, in terms of the number and value of the projects. It will take more time to see the impact of the PSN on the development of other regions, especially in Eastern Indonesia.

The implementation of the PSN has faced many challenges, such as land acquisition, planning, preparation, as well as financing. Despite innovative policies introduced by the national government to overcome those challenges, some persist. Two cases studies leave a few lessons learned about the regional dimension of infrastructure development in Indonesia. The Bitung SEZ demonstrates that although the Manado–Bitung Toll Road was constructed and in operation, land acquisition disputes remain and need to be settled by the government, especially the provincial land agency, as the project traverses three local government administrations in North Sulawesi. A land acquisition issue also hinders the progress of Bitung SEZ development, as the private sector is still waiting to invest despite facilities provided by the mayor of Bitung to ease the procedure of doing business in the city.

The Semarang Barat SPAM Project demonstrates the commitment of the mayor through policy, regulations, and finances for land acquisition as well as the involvement of a city-owned enterprise (i.e. PDAM Tirta Moedal). It seems that a project that provides a basic need, such as water, receives more commitment from the local government than one to promote economic growth. In addition, a project that involves fewer land parcels to acquire seems more successful than one that involves many land parcels, such as a transport network project.

Nonetheless, to promote balanced regional development between the eastern and western portions of the country, future interventions should be directed towards promoting economic activities in Eastern Indonesia, as development potential is still abundant. Meanwhile, for Western Indonesia, infrastructure development should focus on improving basic services.

Competitive advantages in various regions can be realised through a regional development approach, not only regarding economic growth but also equitable distribution of development to all regions and communities. The growth approach is carried out to spur national economic growth by accelerating the development of growth areas such as SEZs or urban agglomeration areas in growth loci. The equity approach is taken to fulfil basic services more evenly through the development of regional activity centres or local activity centres to form new basic service centres that reach a wider service area.

Regional development – by combining growth and equity approaches – must be based on evidence of good, accurate, and complete data, information, and knowledge; development scenarios; and location determination in accordance with spatial planning and environmental carrying capacity. In addition, regional development should also be carried out in a holistic and thematic manner based on overall handling and focussing on development priorities and relevant locations. Regional development also requires cooperation and integration of programmes and activities amongst ministries, regional agencies, and regional governments. Integration and synergy amongst stakeholders are crucial in planning, funding and financing, implementing, controlling, and evaluating development processes.

In addition to programme synergy and integration, development optimisation also needs to pay attention to funding through government sources and SOEs in line with the 'Money Follow Program'. The government can use funding sources from the public and the private sector through innovative financing schemes, including PPPs. As for financing for the regions, government can utilise regional debt financing instruments and carry out regional funding synergies both from regional budget and non-regional budget sources.

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INDORAMA

Chapter 8

Enhancing Climate-Resilient Infrastructure Development in Indonesia

Fauziah Zen
Wempi Saputra

Indonesia faces significant climate-change risks, which have led to disasters, numerous fatalities, and significant economic losses. To address these threats, Indonesia has pledged to reduce its greenhouse gas (GHG) emissions by 29% from business-as-usual levels by 2030 under an unconditional mitigation scenario and by 41% under a conditional mitigation scenario. To achieve these goals, Indonesia has focussed on two sectors that contribute the most to GHG emissions: land-use change and forestry (LUCF) and energy. Due to a lack of resources, funding initiatives to meet GHG reduction targets is difficult, but the government has mobilised various financial resources, including public–private partnerships (PPPs), private financing, charitable foundations, and development partners. To develop climate-resilient infrastructure, Indonesia can establish appropriate incentives for key stakeholders, expand the financial market through regional and global cooperation, and integrate climate considerations into sub-national infrastructure. This requires comprehensive technical guidance and capacity development, emphasising critical sectors like transport, energy, and LUCF.

1. Background

Climate change is a part of global development challenges; if unmanaged, it will exacerbate confluent shocks, creating further obstacles to ending poverty and inequality. Climate change has been making a devastating impact – especially on vulnerable and less-prepared countries (World Bank and ADB, 2021). Governments are trying to balance the need to expedite development with that to become climate resilient. Studies have shown that infrastructure plays an essential role in building resilience to climate-change impacts (OECD, 2018).

In terms of economic performance, Indonesia has been managing robust economic growth over the past 2 decades, setting an ambitious target in *Rencana Pembangunan Jangka Menengah Nasional* (*National Mid-Term Development Plan*, RPJMN), 2020–2024. Recent data from Statistics Indonesia (2023) show that gross domestic product (GDP) grew by 5.3% in 2022, exceeding the forecast of 5.2%. Further, strong growth was contributed by domestic consumption (2.6% of the total growth) and robust commodity-driven exports (0.8% of the total growth). Lifted COVID-19 pandemic mobility restrictions, potential pent-up demand, rising public investment, a revival in tourism, rapid digitalisation, and lower inflation have been supporting the country's robust economic growth. Moreover, Indonesia has also relatively low debt per GDP – 39.9% at the end of 2022.[1] Growth rates are projected to stabilise at around 5% until 2027 contingent on effective reform implementation, COVID-19 control, and global headwinds.

[1] IMF, General Government Gross Debt, https://www.imf.org/external/datamapper/GGXWDG_NGDP@WEO/IDN?zoom=IDN&highlight=IDN (accessed 31 August 2023)

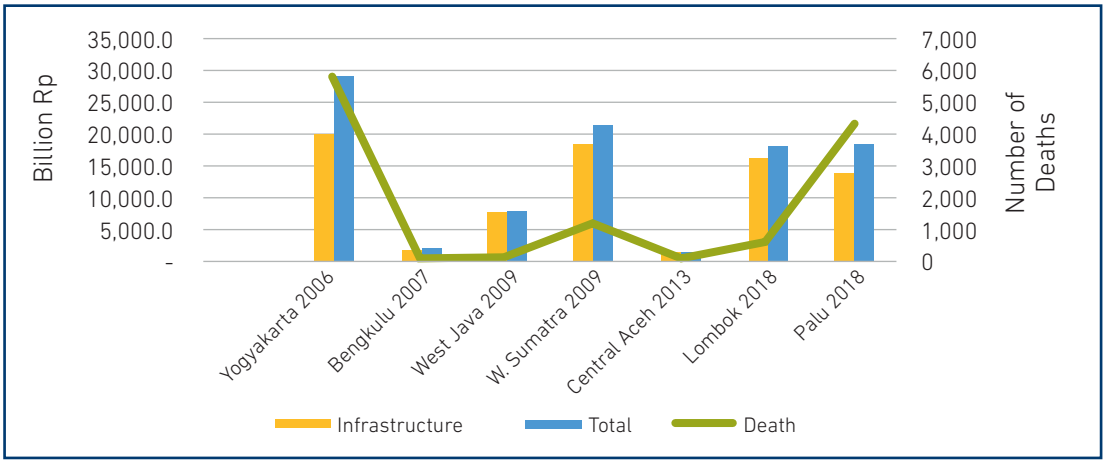
Based on this background, this chapter analyses climate risk considerations in infrastructure development in Indonesia. Guidelines are proposed for climate-resilient infrastructure and developing climate risk considerations in project preparation. Financing is also explored, focussing on the roles of public–private partnership (PPP) and blended financing schemes in developing climate-resilient infrastructure. This issue requires a multidisciplinary approach, which considers the interplay amongst climate risk, infrastructure development, and low-carbon development. By understanding and adopting a comprehensive approach, policymakers can help build infrastructure that is resilient to climate change while promoting sustainable economic growth and social development.

2. Climate Risk in Indonesia

2.1. Exposure and Risks

Indonesia is very vulnerable to climate change impacts, as it is ranked in the top one-third of countries in terms of climate risks, particularly all types of flooding and extreme heat.[2] Climate change-associated disasters have frequently occurred, leaving many social and ecological impacts. Some notable disasters were due to earthquakes, which have caused a significant number of deaths and infrastructure damage over the past 2 decades (Figure 8.1).

Figure 8.1. Economic Losses and Deaths due to Earthquakes in Indonesia, 2006–2018



Source: Pribadi et al. (2021).

[2] Climate risks in Indonesia have been comprehensively analysed for a country risk profile towards climate change. This effort is jointly managed by the World Bank and Asian Development Bank. See World Bank and ADB (2021).

Other examples of climate change-related disasters have occurred on several islands in Indonesia, such as prolonged flooding due to extreme rainfall (Kalimantan), intensive forest and land fires (Sumatra), sea-level rise on the north coast (Java), and failure of food crops in across provinces (MEF, 2023).

Moreover, Indonesia is very vulnerable to natural hazards, including tsunamis, earthquakes, epidemics, floods, cyclones, and droughts.[3] Despite this high exposure to natural hazards, Indonesia ranks moderately in terms of its coping capacity and vulnerability (Table 8.1).

Table 8.1. Selected Country Risk Profiles towards Climate Change

	Selected Country								
	Indonesia	India	China	Thailand	Malaysia	Mexico	South Africa	Brazil	Philippines
Dimension									
Hazardous exposure	Natural (droughts, cyclones, earthquakes, floods, tsunamis, epidemics) Human (projected conflict risks, current highly violent conflict intensity)								
Natural	7.7	7.7	7.5	6.1	4.9	6.8	5.1	4.0	8.4
Human	5.3	7.0	0.8	5.0	0.4	7.0	8.0	7.0	7.0
Vulnerability	Socio-economic (aid dependency, development and deprivation, inequality) Vulnerable groups (uprooted people, other vulnerable groups)								
Socio-economic	3.2	4.6	2.6	2.1	1.8	3.3	4.2	3.3	3.8
Vulnerable groups	3.3	4.9	3.3	3.8	4.1	5.1	6.4	4.3	4.9
Lack of coping capacity	Institutional (governance, disaster risk reduction) Infrastructure (physical infrastructure, access to health care, communications)								
Institutional	4.3	3.5	3.6	5.1	3.4	5.6	4.5	5.2	4.7
Infrastructure	4.4	4.8	3.0	2.5	2.6	3.0	3.4	3.2	3.4
Overall rank (InformRisk)	**48 (medium)**	**31 (high)**	**87 (medium)**	**75 (medium)**	**119 (low)**	**35 (high)**	**31 (high)**	**55 (medium)**	**34 (high)**

Source: EC, DKMKC, Country Risk Profile, https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Risk/Country-Risk-Profile

The goal of climate-resilient infrastructure is to lessen the risk of climate-related disruptions. The severity of the risks is determined by the combination of changing climate hazards with exposure (i.e. asset location) and vulnerability (i.e. propensity to be adversely affected) (Agard et al., 2014). To reduce risks, infrastructure should be in low-risk locations, and the design and construction of facilities should fulfil the technical capacity to deal with potential catastrophic threats. Infrastructure development should evaluate the effects on risks elsewhere, such as flood risks from increased paved surfaces.

[3] EC, DKMKC, Country Risk Profile, https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Risk/Country-Risk-Profile

Badan Perencanaan Pembangunan Nasional (Ministry of National Development Planning, BAPPENAS) (2021) estimated that Indonesia will suffer a loss of approximately Rp544 trillion during 2020–2024 from climate-change effects without adaptation efforts (Table 8.2). It also demonstrated that spontaneous adaptation measures – relating to sector-specific adaptation initiatives – can reduce the losses up to Rp95.7 trillion or 15%. If planned climate-resilience development initiatives are implemented, the losses could be reduced to Rp58.3 trillion or almost 50%.

Table 8.2. Economic Losses due to Disasters in Indonesia, 2020–2024
(Rp trillion)

Sector	2020	2021	2022	2023	2024
Ocean and coastal	81.3	81.4	81.6	81.7	81.8
Water	3.8	4.7	5.6	6.5	7.3
Agriculture	11.2	13.4	15.6	17.8	19.9
Health	6.0	6.2	6.3	6.4	6.5
Total	**102.4**	**105.7**	**109.0**	**112.3**	**115.5**

Source: BAPPENAS (2021).

2.2. Climate Risk Considerations in Infrastructure Development

Efforts to respond to climate change can be divided into two categories: adaptation and mitigation. Adaptation refers to efforts to adjust to current or anticipated future climate circumstances, reduce negative impacts, and capitalise on potential advantages. Mitigation refers to efforts to slow the rate of climate change, such as by reducing carbon emissions. Mitigation also tries to reduce the impact of human intervention on the climate system.[4]

Creating climate-resilient infrastructure aims to reduce vulnerability to climatic change and unpredictability, limiting their detrimental effects. The net benefit of adaptation is harm reduction at the expense of climate resilience. As additional upfront expenses for more resilient assets become necessary, the costs associated with adaptation grow more complex. However, additional expenses for enhancing resilience are projected to account for only 3% of total investment needs (Hallegatte, Rentschler, Rozenberg, 2019). In addition, these costs may be offset by reduced spending on upkeep and repairs.

[4] www.eea.europa.eu/help/faq/what-is-the-difference-between (accessed on August 20, 2023)

The types of infrastructure adaptation can be divided into two groups (EUFIWACC, 2016):

(i) **Structural adaptation measures**. This first type distinguishes climate-resilient infrastructure from ordinary infrastructure by changing its structure (e.g. changing the composition of road surfaces so that they do not warp in high temperatures).

(ii) **Management adaptation measures**. This type of adaptation does not require any structural changes to the infrastructure being built. The difference is in the way it is managed (e.g. enhancing the monitoring of existing infrastructure to reduce the risk of failure as climate conditions change).

While structural adaptation measures may be costly due to increased technological adoption, management adaptation measures may be less costly while offering protection and safety. Climate-resilient infrastructure management may be adopted earlier and more efficiently as long as core climate-adjustment infrastructure is constructed. In infrastructure construction and operation, the economic advantages of technology that enhances analytical functionality, data management, connection, and automation are substantial. The same is true for management adaptability.

In its nationally determined contribution (Enhanced NDC), Indonesia aims to reduce greenhouse gas (GHG) emissions from business-as-usual (BAU) levels by 2030, with an unconditional target of 31.89% and a conditional target (i.e. with international assistance) of up to 43.20% . Indonesia considered four types of mitigation measures as part of its efforts to meet its NDC: fuel switching, clean coal technology, renewable energy, and energy-efficiency measures (Table 8.3). Under the unconditional and conditional targets, 11% or 14%, respectively, of all GHG emissions are attributable to the energy industry. Land-use change and forestry (LUCF) are responsible for 24% and 28%, respectively, under the unconditional and conditional targets of all GHG emissions (MEF, 2021). Indonesia's mitigation efforts are therefore focussed on LUCF and energy to have a substantial impact on lowering GHG emissions

Table 8.3. Mitigation Technology Needs of Indonesia's Energy Sector

Sub-sector	Technology
Transport	Improvement of public transport, compressed natural gas, intelligent transport system
Power Generation	Photovoltaic and pump storage, geothermal power plant, advanced coal power plant, landfill gas power plant, biomass-fuelled power plant, wind power, biofuel, biogas palm oil mill effluent
Industry	Efficient electric motors, combined heat and power, pump and fan system, waste heat boiler, alternative fuel, green boiler, green chiller, advanced furnace
Buildings (Residential and Commercial)	Combined heat and power, waste heat boiler, efficient lighting, green building, green boiler, green chiller, efficient electric motors, gas pipeline network, solar photovoltaic

Source: MEF (2021).

So far, there are few climate-adaptive projects listed on the *Proyek Strategis Nasional* (PSN). One, however, is the construction of green energy-producing facilities in South Sumatra, West Java, and Central Java. The Hydropower Mentarang Induk Project, located in North Kalimantan Province and operated jointly by Indonesia and Malaysia, and the Karian Water Supply Project, which reduces reliance on groundwater extraction as a supply of domestic and industrial water and mitigates land subsidence in the Jakarta suburbs, are others.

Table 8.4 outlines infrastructure projects around the globe that have incorporated climate considerations. Various climate issues are considered, such as protecting communities from potential disasters, enhancing current climate phenomena, transforming black infrastructure into green, and meeting human needs through climate-friendly compliance. Depending on the objectives and circumstances, technology options are also diverse.

Table 8.4. Climate-Resilience Considerations in Selected Infrastructure Projects

No.	Sub-sector	Technology
1	Australia (Eyre Peninsula Project)	High-voltage electricity transmission project **Climate-resilience focus**: Address climate impacts, including increasingly frequent inundation of coastal infrastructure. Adapt to increasing risk, participatory decision-making with management involvement and structural measures was developed, involving community surveys, engaging with many fora across the Eyre Peninsula.
2.	Japan (Japanese Railway)	Railway project **Climate-resilience focus:** Maintain maximum performance temperature of railroads from 60°C to 65°C, and achieve no accidents due to track buckling. **Major risk:** Extreme heat. Standards for estimated maximum performance have been raised, and a plan for maintenance vehicles that detect potential joint openings has been developed.
3	Hong Kong, China (Sponge City)	Modern stormwater management project **Climate-resilience focus:** Implement a nature-based drainage system to build up flood resilience and improve public spaces instead of constructing flood-resistant infrastructure. **Major risk:** Tropical cyclones and severe rainfall.
4	United States (Hurricane Sandy Rebuilding Strategy)	Hurricane recovery project **Climate-resilience focus:** Build back smarter and stronger infrastructure by aligning federal funding with local rebuilding visions; reduce excessive regulation; coordinate efforts of federal, state, and local governments, with a region-wide approach to rebuilding; and ensure the region's climate-change and disaster-resilient rebuilding. **Major risk:** Storms and sea-level rise.
5.	South Africa (Komati Coal-Fired Power Plant)	Decommission and repurpose a coal-fired power plant using renewables and batteries. **Climate-resilience focus:** Manage the social challenges of the transition by partnering with the government, civil society, and unions to create economic opportunities for affected workers and communities. **Major risks:** Consistency of energy policy, stranded assets, and societal impacts.

No.	Sub-sector	Technology
6.	Indonesia (Karian Water Supply)	Water supply project **Climate-resilience focus:** Provide reliable access to safe drinking water, reduce reliance on groundwater extraction as a source of domestic and industrial water, and mitigate land subsidence in one of the world's fastest-sinking cities.

Sources: OECD (2014, 2018); World Bank (2022b, 2023); South Australia Government, Eyre Peninsula Link, https://www.rdaep.org.au/eyre-peninsula-link/; Government of Hong Kong, Drainage Services Department Sponge City: Adapting to Climate Change, https://www.dsd.gov.hk/Documents/SustainabilityReports/1617/en/sponge_city.html; and IFC, Karian Water Supply Project, IFC Project Information and Data Portal, https://disclosures.ifc.org/project-detail/SII/44588/karian-water-supply-project

3. Requirements for Developing Climate-Resilient Infrastructure

3.1. Policy and Institutional Setting

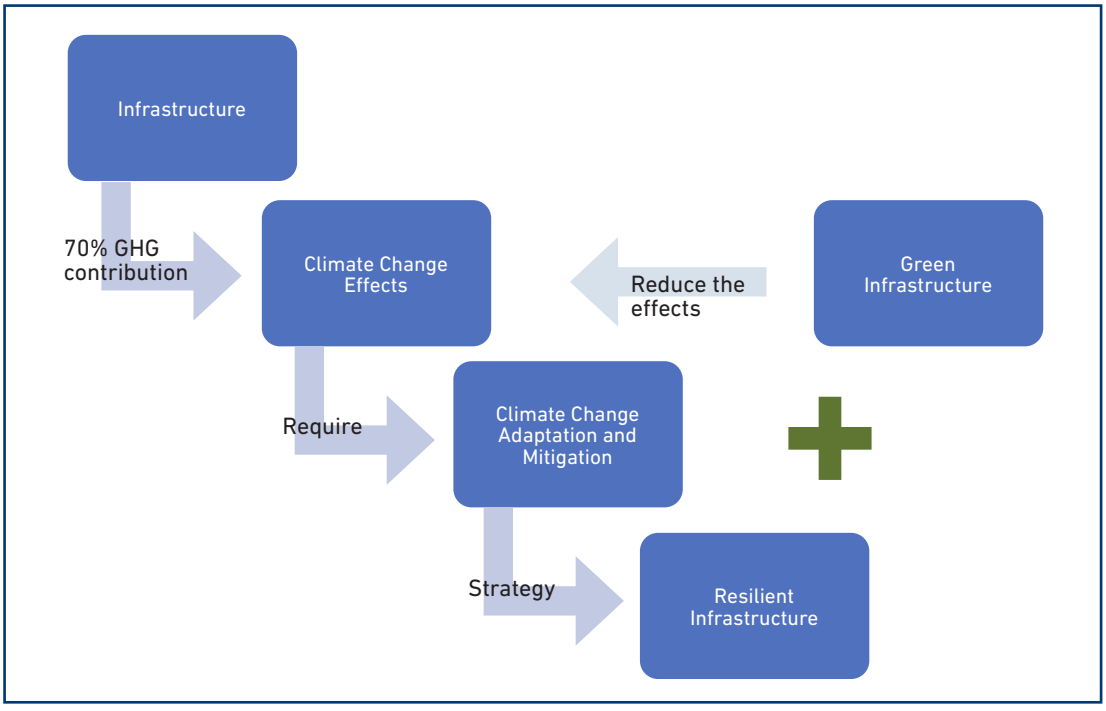
Disasters and the COVID-19 pandemic have demonstrated the fragility of global ecosystems. Resilient and sustainable infrastructure – climate-resilient infrastructure – is thus vital for mitigating impacts and supporting adaptation. Climate-resilient infrastructure is infrastructure that anticipates, prepares for, and adapts to changing climate conditions (OECD, 2018). It is also expected to withstand, adapt to, and recover rapidly from disruptions caused by climate change.

Climate-resilient infrastructure begins with the definition of objectives, targets, suitable technology, budget, system strategies, and execution. While most climate-resilient infrastructure may necessitate more expensive construction techniques, others – such as the re-naturalisation of riverbeds and banks to minimise erosion and to restore biodiversity – may not (NWRM, 2013).

Infrastructure accounts for more than 79% of global GHG emissions (Thacker et al., 2021). Therefore, not just climate-resilient infrastructure – but also green infrastructure – is required to lessen its environmental impact (Figure 8.2). Green infrastructure is a network of (semi-) natural areas that are protected and enhanced to deliver ecosystem services while also benefiting biodiversity and society more widely (EC, 2020). Examples include mangroves, wetlands, oyster reefs, and sand dunes; permeable pavement and driveways; green roofs; forests and parks; and natural areas incorporated into city designs. Such interventions can be deployed at different scales, such as at a site (e.g. green facades or roofs on a building), city-wide (e.g. parks), or landscape (e.g. green hubs and corridors).[4]

[4] Green infrastructure is not discussed in detail in this chapter, as it is not yet included in infrastructure projects in Indonesia. This issue is, however, noted, as it increases the positive impacts of climate-resilient infrastructure through structural and management adaptation measures.

Figure 8.2. Interaction between Infrastructure and Climate Change



GHG = greenhouse gas.

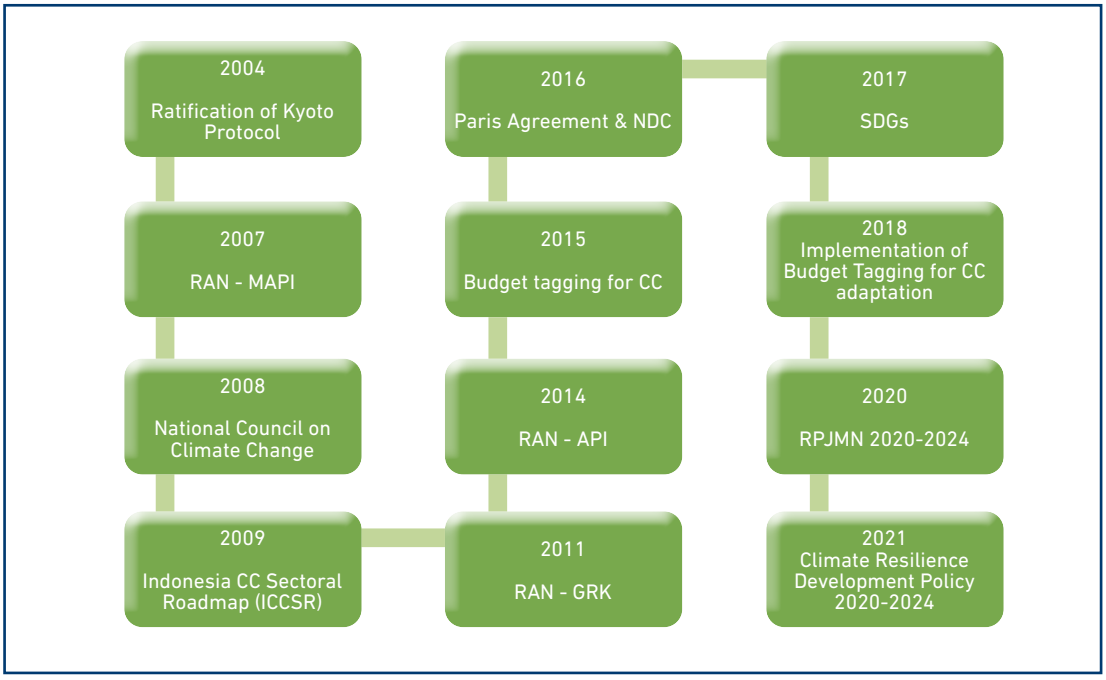
Source: Authors.

Considering that 96% of cases have a cost–benefit ratio larger than 1, 77% have a cost–benefit ratio larger than 2, and 25% have a cost–benefit ratio greater than 6, strengthening infrastructure assets susceptible to disasters is beneficial (Hallegatte, Rentschler, Rozenberg, 2019). When infrastructure is robust as well as environmentally friendly, fewer GHG emissions must be accounted for, reducing environmental expenses. However, transforming these benefits into real project finance is challenging. Obstacles include the quantification of these intangible benefits and the different domains of costs and benefits. Although communities reap the benefits of investments, investors still bear the costs. These 'unrealised benefits' for investors and mismatched cost–benefit implications must be addressed to demonstrate the significance of green and resilient infrastructure.

3.2. Financing

Indonesia has established national-level guidance for climate-change adaptation, which includes climate-resilient infrastructure development (Figure 8.3). Important guidance includes the 2014 *Rencana Aksi National – Perubahan Iklim* (*National Action Plan for Climate Change Adaption*, RAN-API); 2012 *Rencana Aksi Nasional Mitigasi dan Adaptasi Perubahan Iklim* (*National Action Plan for Climate Change Mitigation and Adaptation*, RAN-MAPI); *Rencana Aksi Daerah Penurunan Emisi Gas Rumah Kaca* (*National Action Plan for Greenhouse Gas Emission Reduction*, RAN-GRK); one of the priorities of RPJMN, 2020–2024, and the *Climate Resilience Development Policy*, 2020–2045 prepared by BAPPENAS. RAN-MAPI directs the Ministry of Public Works and Housing to develop infrastructure, including roads, bridges, and water and sewerage systems throughout Indonesia.

Figure 8.3. Regulatory Milestones for Climate-Resilient Infrastructure in Indonesia



CC = climate change, NDC = nationally determined contribution, RAN-API = *National Action Plan for Climate Change Adaption*, RAN-GRK = *National Action Plan for Greenhouse Gas Emission Reduction*, RAN-MAPI = *National Action Plan for Climate Change Mitigation and Adaptation*, SDG = Sustainable Development Goal.

Source: Authors.

Additional guidance is the *Kebijakan dan Strategi Penanggulangan Bencana* (*Policy and Strategy for Disaster Management*, JAKSTRA PB), a reference for disaster management from 2015 to 2019, prepared based on the RPJMN; Rencana *Nasional Penanggulangan Bencana* (*National Action Plan for Disaster Management*, RENAS PB); and the Sendai Framework.

The funds required to meet Indonesia's emissions reduction objective is roughly Rp4,002 trillion (MEF, 2021); this is equivalent to roughly 20% of Indonesia's GDP in 2022 or 130% of its State Budget in 2022. The allocation is mostly consumed by the energy and transport sectors. To track such financing, the Ministry of Finance created climate budget tags. The environment budget was Rp126.4 trillion in 2018, Rp83.5 trillion in 2019, and Rp77.8 trillion in 2020, always falling short of the annual finance requirement of about Rp300.0 trillion.

Table 8.5. Estimated Financing to Achieve the Nationally Determined Contribution Target in 2030

Sector	Policies and Programmes	Financing Needs (Rp trillion)
Forest and land use	Forest conservation and protection programme, forest fire prevention	307
Energy and transport	Construction of renewable energy power plants, clean technology investments	3,500
Agriculture	Low-emission rice varieties, improving irrigation, biogas use, and feed additives	7
Industrial processes and product use	Mostly for cement and steel industries	925
Waste	Solid and liquid waste management at household and industrial levels	185
Total		4,002

CO_2 = carbon dioxide.

Note: Based on the business-as-usual scenario.

Source: MEF (2021).

Most of the funding has historically come from the public sector. Foreign financial assistance was negligible (Table 8.6). During 2017–2019, only $16.15 million (0.4%) of the $3.7 billion (composed of $3.16 billion in loans and $0.58 billion in grants) pledged by development partners was realised, a significant decrease from the previous period (2015–2016), which totalled $1.8 billion and consisted primarily of concessional loans from bilateral sources such as Japan International Cooperation Agency (48.0%), Asian Development Bank (22.0%), Government of Germany (12.0%), and Government of France (6.7%) (MEF, 2018).

Table 8.6. Financial Support Received for Climate Mitigation Actions, 2017–2019
($ million)

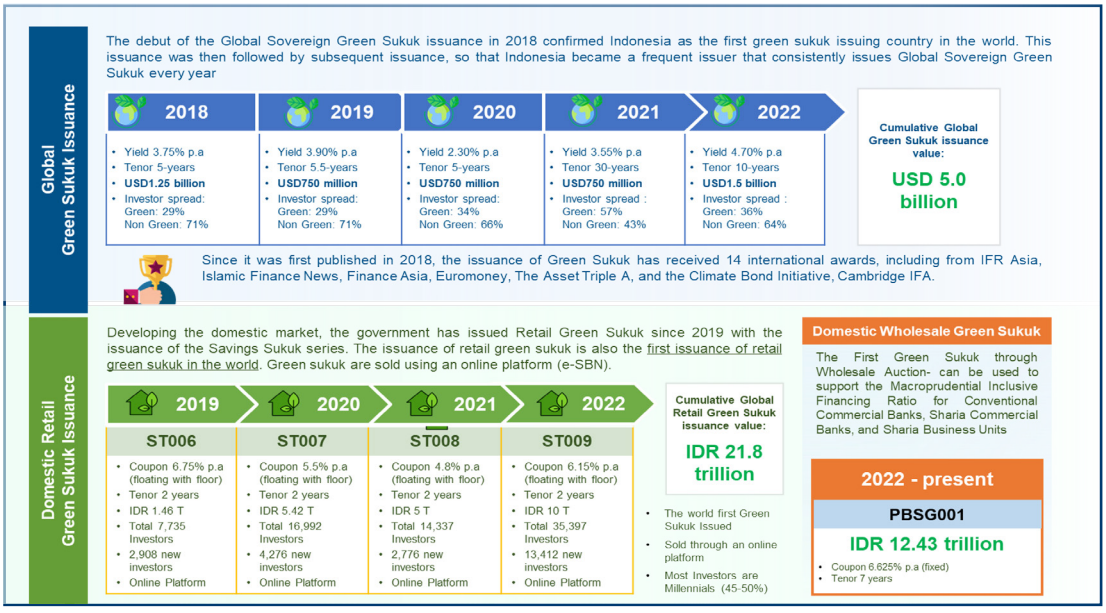
Financial Instrument	Sector	Bilateral	Multilateral	Total Received	Total Agreement
Concessional Loan	Energy				1,482.21
	Transport				1,528.56
	Waste				147.80
Sub-total					3,158.57
Grant	Agriculture				
	Multisector	2.40	10.88	13.27	395.62
	Energy				35.06
	Forestry		2.88	2.88	137.15
	Transport				1.3
	Waste				4.13
Sub-total		2.40	13.75	16.15	573.26
Total		**2.40**	**13.75**	**16.15**	**3,731.83**

Note: Total received based on funding track by Ministry of Environment and Forests.
Source: MEF (2021).

To finance climate-adaptive infrastructure, Indonesia also issued green *sukuk*, part of sustainable bonds issued by the government. In March 2018, the government issued its first global green *sukuk*,[5] which amounted to $1.25 billion (MOF, 2020). This offering was 2.5 times oversubscribed. Subsequently, Indonesia issued other green *sukuk*, dominated by the government as the issuer. It issued both global (US dollar-denominated) and domestic retail (rupiah-denominated) green *sukuk* (Figure 8.4).

[5] *Sukuk* is an equity or asset-based instrument that complies with Sharia.

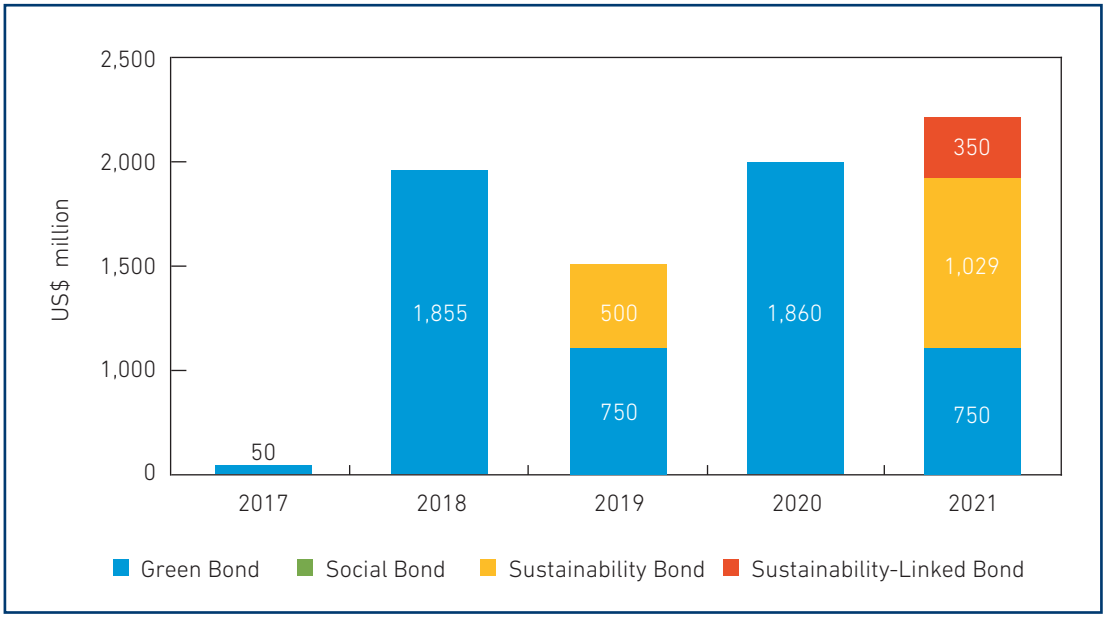
Figure 8.4. Sovereign Green *Sukuk* Issued by the Government of Indonesia, 2018–2022



Source: MOF (2022).

Besides the government, other issuers contributed green bonds. The government owned $3.1 billion out of the total $5.0 billion in green bonds outstanding by the end of 2020. Meanwhile, green bonds continue to dominate sustainable bonds in Indonesia (Figure 8.5).

Figure 8.5. Annual Issuance of Sustainable Bonds in Indonesia, 2017–2021



Note: All data as of 26 July 2022.
Source: ADB (2022).

Indonesia is the second-largest issuer of green bonds in the Association of Southeast Asian Nations (ASEAN) region after Singapore, with $6,417 million outstanding as of March 2023. There are nonetheless only four issuers in Indonesia: the government, PT Sarana Multi Infrastruktur (PT SMI), Star Energy Geothermal, and TLFF I. Meanwhile, Malaysia has 13 green bond issuers, and the Philippines has 8. The small number of issuers in Indonesia may indicate a lack of interest from stakeholders on both the supply and demand sides or that the issuing of green bonds in Indonesia faces obstacles.

The lack of funding incentives for the green industry for financial services is the primary barrier. Additionally, extra methods are necessary to evaluate whether a sector has the foundation for the green sector. In the meantime, the verification process incurs additional expenses for the payment of the independent verifier's fee to examine a sector's eligibility for sustainable finance. As a country with a developing but immature financial industry, Indonesia has great capacity for growth but lacks several supplementary instruments as enablers. One of these is insurance involvement to decrease the financial exposure of high-risk populations to disasters to participate in long-term climate-resilient investment and to provide incentives. Cooperation with other nations, particularly those in East Asia, can strengthen the national and regional markets.

3.3. Role of Public–Private Partnerships and Blended Finance

There are four categories of infrastructure finance sources: public (taxes and loans), private, development partners, and charitable organisations. Since infrastructure is owned by the government – and the government has a solid justification for building infrastructure – the most common source of funding is the public sector. Yet most infrastructure projects necessitate enormous investments, and the limited State Budget must meet a variety of spending requirements. Competition amongst programmes and policies in the State Budget is intense, and some politicians may want to avoid infrastructure spending that necessitates multiyear budgeting and whose operational phases will not be completed before the next election cycle.

There are usually one or more market failures present with infrastructure as well, making it challenging to rely solely on private investment. For example, public roads are non-excludable goods, which means that the operator cannot prevent people from using them for free. Water, electricity, schools, and general hospitals also contain some market failures because, in developing economies, they are used to address inequality and poverty. Government action is therefore required, and PPPs can be used to achieve this. Furthermore, PPPs provide the advantage of utilising private sector technology and innovation.

PPPs have been evolving; recently, because of the pandemic and various disasters, they have shifted their emphasis from value for money to a more ecologically friendly strategy. Despite this, efforts are fragmented and intermittent due to the terrain's complexity – particularly variable costs, estimates, standards and conformity, and technology – and disparities in government capacities. Fortunately, global collaboration is underway to investigate methods for incorporating resilience, sustainability, and adaptation themes into PPPs. In conjunction with the World Bank and other multi-lateral development banks, the Global Center on Adaption has made significant efforts to develop best practices for the sustainability, mitigation, and adaptation of PPPs. It produced *The Climate-Resilient Infrastructure Officer Handbook*, a knowledge module on PPPs for climate-resilient infrastructure, as a cooperative technical study in September 2021.

Infrastructure resilience requires PPPs that incorporate strategic innovation and new intelligent technology. Despite intense efforts to construct a PPP framework in developing economies such as that of Indonesia, project implementation has stalled. Public financing is often between 2% and 10% of GDP, whereas that for PPPs is typically less than 1% of GDP. Key variables impacting the adoption of PPP include consistent policy, public sector capability to handle PPPs appropriately, public sector commitment to developing cooperative relationships with private partners, and leadership (Zen et al., 2019).

PPPs in Indonesia are discussed in further depth in Chapter 6, including policy formulation, scale, plans, and responsibilities in the country's infrastructure development. It illustrates that procuring land and coordinating and harmonising the activity of all public parties (particularly governmental organisations) continue to be significant PPP issues. Because there are over 500 autonomous municipalities in 34 provinces in Indonesia, it is not surprising that sub-national governments have various capacities and interests towards infrastructure development and employing PPPs.

Four areas must be improved to promote more private involvement in infrastructure development (APEC Policy Support Unit, 2019). First, bureaucratic and regulatory effectiveness must be improved. The government's lack of understanding of PPPs should be remedied by fostering capacity-building initiatives, particularly in value for money. The second is to strengthen government assistance and facilities by instituting hybrid or blended financing. The third objective is to enhance the efficacy of land acquisition support and techniques. Fourth, PPP contracts must be strengthened to withstand unanticipated risks resulting from political and regulatory shifts.

The promotion of PPPs for climate-resilient infrastructure necessitates certain conditions. First, there should be a clear allocation of climate risks between the public and private sectors. This facilitates estimations and anticipation, including the duties of each contributing party if necessary. Second, all parties must concur on the norms and methodology for risk assessment. Although the government has published general guidelines for risk assessment, an independent assessor may be required. Third, there may be risk variances at different phases of project execution, such as during the construction phase against the operational phase, or the mitigation versus the respond versus the recovery management phases. Consequently, different responses to the same risk may come from various parties. These situations should be managed correctly.

3.4. Fiscal Capacity

PPPs require a significant commitment from the public sector. Even if most investment is provided by private partners, the public roles – in selecting projects; preparing, directing, and managing the entire process; as well as providing fiscal and non-fiscal support – need significant public sector resources. The scope of financial help varies from project to project, however. Highly commercial projects – such as telecommunications for densely populated areas, large airports, and heavily travelled toll roads – may require minimal government funding. In contrast, projects with a significant proportion of public goods may need substantial financial backing. Indonesia provides a variety of government guarantees and direct fiscal assistance to enhance the creditworthiness of such projects and to maintain their functionality. The supplied fiscal supports include guarantees; the Project Development Facility (PDF) to prepare the project; tax incentives; viable gap funding (VGF) to reduce construction costs borne by the special purpose vehicle; and availability payments, in which the government pays instalments to the special purpose vehicle during operation.

Additionally, the facilitation of the entire process – including the preparation of business cases for possible PPP projects – consumes public resources. The PPP procedure is intricate and lengthy; therefore, it is not advisable for the government to pursue many PPP projects without thoroughly preparing for and anticipating fiscal implications.

Currently, the government has a narrow fiscal space[6] for non-mandatory spending, including infrastructure. Many sub-national governments are also experiencing this. The fiscal sufficiency indices for all sub-national governments have been reviewed by the Audit Board of the Republic of Indonesia in its yearly audit report of the central government's financial statements (BPK, 2020; 2021). One of the issues is the significant disparities in fiscal adequacy amongst areas; more than 90% of municipalities are fiscally insufficient, while just eight provinces and two cities (for fiscal years 2018 and 2019) are fiscally sufficient. Just one city is classified as being highly sufficient.

3.5. Institutional Arrangements

Institutional procedures for BAU PPPs are already complex, requiring authorised line ministries, BAPPENAS, Ministry of Finance, and sub-national governments (if the government contracting agency is a local government) to define, approve, implement, and monitor the project. Adopting sustainable and resilient concepts in PPP projects may provide additional challenges, but the initial obstacles will be more formidable. In the future, adaptation of sustainable and resilient ideas will be a necessary and critical element. Incorporating the ideas of climate-change mitigation and adaptation into infrastructure projects involving PPPs must be codified. Indonesia has recently established and reinvigorated the *Komite Percepatan Penyediaan Infrastruktur Prioritas* (Committee for the Acceleration of Priority Infrastructure, KPPIP) to intervene in coordination issues and to find solutions for delayed projects.

In addition to public and private finance sources, as described at the beginning of this section, there are also development partners and charitable organisations. The role of development partners is well known, although the participation of charitable organisations in infrastructure development is relatively recent.

[6] Fiscal space is defined as room in a government´s budget that allows it to provide resources for a desired purpose without jeopardising the sustainability of its financial position or the stability of the economy (Heller, 2005).

3.6. Collective Responsibility for Green and Resilient Infrastructure

There are two essential factors regarding responsibility for green and climate-resilient infrastructure. First, because the effects of climate change transcend administrative jurisdictions, the costs of green and resilient infrastructure should be borne by governments that span international boundaries. Second, not only do the causes and effects of climate change transcend jurisdictions, but they also occur across economic and social groups, genders, and sectors; therefore, it is the responsibility of all stakeholders, not just the government. Private entities – including households and individuals – must be held accountable for their conduct, including compliance with public sector environmental standards. These facts provide the rationale for increased global action and commitment.

It is possible to develop blended finance to improve PPPs while also mobilising additional financial resources. Blended finance combines funds from international organisations, development agencies, the private sector, charitable foundations, and other sources. In blended finance, various actors supply a range of complementary services based on their unique qualities. Typically, charitable foundations, public contributions, and development organisations have a higher tolerance for risk than the private sector. The funds from these parties can thus be utilised to reduce a project's risk and make it more attractive to private investors. Indirect investments can also be made through technical grants, the demonstration of initial initiatives, and the acceptance of subordinate positions.

There are two possible fund structures: equal risk and return allocations for all investors, or different risk and return allocations for different investors. The *2020 OECD Blended Funds and Facilities Survey* found that pension funds and insurance companies invested a total of $2.5 billion in these blended finance vehicles, representing 4% of the total capital in blended finance (Dembele et al., 2022). Institutional investors are the primary capital providers for funds. This may be explained by the fact that blended finance funds, due to their structure and mandate, attract a significantly more diverse group of investors (Basile and Dutra, 2019). Still, 69% of blended finance funds and facilities' total capital continue to come from the government, while multi-lateral development banks are the second largest source.

Despite the obstacles and steady progress, blended finance provides options for mobilising financial resources for climate-resilient infrastructure. Academic and research institutions can help capture the intangible benefits of infrastructure projects, while other investors can leverage environmental benefits as a return on investment in a blended financing scheme with varying characteristics (i.e. objectives and risk tolerance). The utilisation of environmental advantages varies according to the needs of stakeholders. If it is neither immoral nor exploitative, it can be advantageous to many people in various ways.

There are other green financing choices, like international funds and carbon pricing. Indonesia published a regulation on a carbon tax (No. 7/2021) in 2021 that will apply to coal-based power producers starting in April 2022. The tariff is determined based on cap and trade, as well as cap and tax, which allow emitters to exchange their surplus carbon emissions for permits to emit those gases or to pay taxes. However, the government has delayed the implementation date. In terms of international funding, the Green Climate Fund, Global Green Growth Institute, and Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+) initiative are the most used funds for emerging economies. Indonesia has access to Green Climate Fund financing and REDD+ through the Fiscal Agency of the Ministry of Finance; $476.9 million has been allocated to Indonesia, including $103.8 million for REDD+ results during 2014–2016.[7]

4. Conclusion and Moving Forward

Humans must be aware that the frequency and severity of disasters can be influenced by their actions. The Intergovernmental Panel on Climate Change found in its 2021 report that human activities are a major contributor to global surface temperature changes (IPCC, 2021). Mitigation and adaptation are two important types of efforts for reducing the effects of disasters. As a country with a high-risk profile, Indonesia cannot ignore the threats and must take responsibility.

Indonesia's infrastructure remains inadequate. Although public spending on infrastructure has increased significantly, infrastructure demand still exceeds supply. The government has made efforts to mobilise a range of financial resources, including those from the private sector, state-owned enterprises, and development partners. Recently, the number of PPP projects has been on the rise, and many delayed strategic and priority projects have been de-bottlenecked.

Despite this progress and accomplishments, Indonesia is cognizant of the lack of infrastructure and the growing threats posed by climate change. Indonesia has pledged to reduce its GHG emissions by 29% below BAU levels by 2030 under an unconditional mitigation scenario and by 41% under a conditional mitigation scenario. To achieve the goals, Indonesia has focussed on the two sectors that contribute the most to GHG emissions: LUCF and energy. Related to resilient/adaptive infrastructure, energy and transport sectors dominate the financing requirement at approximately 87% of total needs.

[7] GCF, Republic of Indonesia, https://www.greenclimate.fund/countries/indonesia and GCF, FP130, https://www.greenclimate.fund/project/fp130

The total estimated annual financing requirements are Rp300 trillion, which cannot be met by public funds alone. International community grants and loans fall short of the commitment. Green bonds and green *sukuk* are additional sources of financing that have been issued since 2018, with global green *sukuk* totalling $5 billion by the end of 2022. Private financing, charitable foundations, and other development partners can contribute to the mobilisation of various financial sources. PPPs have been contributing more to infrastructure development, including climate-resilient projects, but the demands continue to rise. Blended finance is the most recent scheme for financing climate-resilient infrastructure. There is potential and stakeholder interest, but implementation is still slow. Like PPPs, this collective financing requires a healthy ecosystem, especially for mitigation and adaptation measures. In addition, the market must grow to a sufficient size. Additional sources of financing include the Green Climate Fund and REDD+, but their funds are quite small.

Some actions can advance the development of infrastructure that is more climate-resilient:

(i) **Establish the appropriate incentives for each key stakeholder to partake in collective finance.** Given that the interests and risk-reward profiles of the stakeholders vary, it is essential to design the appropriate incentives.

(ii) **Expand the financial market by enhancing regional and global cooperation.** Clearly, a moderately expanding market will be more desirable. In addition to participating actively in international communities, Indonesia can also initiate global cooperation and financing.

(iii) **Integrate climate considerations into sub-national infrastructure, and provide innovative local governments with incentives.** This requires comprehensive technical guidance and capacity development, with an initial emphasis on critical sectors such as transport, energy, and LUCF, so that local governments can participate actively.

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INDORAMA

Chapter 9

Lessons Learnt Regarding Infrastructure Development in Indonesia

Sri Mulyani Indrawati
Titik Anas
Candra Fajri Ananda
Fauziah Zen

1. Infrastructure Development and Inclusive Economic Growth

Infrastructure has always been perceived as a critical factor in ensuring the quality of development. Its impacts range from lower prices, equality amongst regions, to higher frequency of mobility. Infrastructure also plays a significant role in alleviating poverty and reducing inequality. In short, it presents both short- and long-term benefits by helping foster productivity and promote improved living standards.

For Indonesia, the development of adequate infrastructure is an essential aspect in determining the welfare of its regions. The existence of infrastructure – such as roads, ports, and electricity access – will support interconnectivity across its provinces and therefore determine the preconditions to achieve higher and inclusive economic growth. In addition, physical infrastructure is needed to support the country's pattern of urbanisation, which is primarily triggered by its growing population.

Chapter 1 showed that the successive governments have put forth solid efforts into accelerating the development of infrastructure in Indonesia. President Susilo Bambang Yudhoyono, who governed 2005–2014, introduced several initiatives to boost development progress. President Joko Widodo, who has governed since 2014, is emphasising infrastructure development as one of nine priority development programmes known as *Nawacita*, which were translated into the *Rencana Pembangunan Jangka Menengah Nasional* (*National Midterm Development Plan,* RPJMN), 2015–2019. Joko Widodo's government also established a priority programme for infrastructure delivery – *Proyek Strategis Nasional* (PSN) – and allocated large amounts of the State Budget to infrastructure. To de-bottleneck coordination problems, it established the *Komite Percepatan Penyediaan Infrastruktur Prioritas* (Committee for the Acceleration of Priority Infrastructure Delivery, KPPIP) in 2014, which is equipped with stronger authority, including providing incentives for projects. The PSN is under KPPIP authority.

In addressing overlapping issues and asynchronous regulations on infrastructure development (including PPPs), the government issued Presidential Regulation No. 3 of 2016 concerning acceleration of the implementation of the PSN – it was focussed on meeting basic needs, improving people's welfare, and prioritising job creation. The regulation has been amended three times to accelerate regional infrastructure development further. PSN projects are thus receiving facilities such as 0% tariffs for land and building right acquisition fees. Furthermore, to facilitate the PSN, the government also created Regulation No. 42 of 2021 as in Chapter 3.

Massive infrastructure provision comes with enormous investment needs. Based on KPPIP (2022), 153 PSN projects have been completed, with estimated investment financing of Rp1,040 trillion from 2016 until mid-2022. However, this amount is comparatively small compared to the total financing planned until 2024. As stated in the RPJMN, 2020–2024, the need for national infrastructure investment will reach Rp6,445 trillion – equivalent to around 11% of the annual GDP, 68% of annual realised national government spending, and 29% of total financial assets (Chapter 4).

The inability to fulfil the investment needs for the infrastructure development agenda through the State Budget and traditional private financing schemes has made Indonesia look towards innovative financing. PPP regulations were amended in 2015 to foster an implementation framework and to facilitate the need for government support to address private investors' concerns about project viability and bankability. As part of the regulatory framework, the Ministry of Finance undertook several innovative programmes to enhance infrastructure financing, such as the Project Development Facility, viability gap funding, and guarantees.

Chapter 5 estimated that the PSN has contributed to a total economic output of Rp1,799 trillion, generating economic value added of Rp805.20 trillion and total household income of Rp319.51 trillion. Additionally, around 4.9 million employment opportunities were created over the same period. In 2022, the economic value added and job opportunities associated with the PSN accounted for 0.21% and 0.17% of Indonesia's GDP and national workforce, respectively. Certain provinces, such as North Sumatra and West Kalimantan, exhibited high multiplier values, indicating substantial economic impacts. Economic and industrial zones, bridges and roads, and electric power sectors demonstrated the greatest economic and labour impacts compared to other sectors.

Given that the PSN consists of many different projects, it renders a comprehensive and holistic evaluation unfeasible. Chapter 6 provided a few case studies to show the socio-economic impact of PSN. An empirical investigation of the aggregate socio-economic impact of toll roads observed a positive impact on the improvement of broader aggregate-level socio-economic indicators. On average, sub-national economic growth accelerated in regions traversed by a PSN toll road; in addition, poverty incidence declined, and income distribution improved, albeit modestly.

For PSN clean water projects, drawing an inference from household-level data and several selected project technical documents, the ex-post evaluation found that household access to piped water is improving, particularly for households in the lowest income decile in the area served by the water projects. However, challenges remain, particularly in capacity optimisation and maintaining the quality of services. As the last-mile deliverers of piped water, local governments are struggling to secure adequate post-construction operational funding to install pipelines from

water treatment facilities to end-users. The fact that tariffs are not set solely on economic and financial considerations exacerbates the issue. The lack of adequate operational funding has also led to lacklustre service coverage increases and less-than-ideal service disruption management. This finding highlights the importance of coordination between the central and local governments on the construction of PSN projects as well as on project operation after completion. This is particularly important for basic infrastructure projects where, in most cases, the local government has a significant role in handling operational technicalities.

Chapter 6 also showed that the Widodo Administration has managed to leverage limited direct public spending to improve socio-economic outcomes by prioritising State Budget contributions for projects with high socio-economic impact but limited financial feasibility. Nonetheless, State Budget contributions for financially feasible projects are still quite substantial. While the State Budget contributions are expected, the sizeable number of projects receiving contributions indicates that there is room to invite the private sector to better leverage the direct contribution of public spending and to avoid the crowding out of private investment in otherwise financially viable projects.

The implementation of the PSN at the regional level varies. Chapter 7's case study of the Bitung Industrial Special Economic Zone demonstrated that land acquisition disputes remain and must be settled by the government – especially the provincial land agency – as the PSN project traverses three local government administrations in North Sulawesi. Land acquisition issues also hinder the progress of the special economic zone development as the private sector is still taking a wait-and-see approach to investing, despite facilities provided by the mayor to ease doing business in the city. Indeed, the strong commitment of the local government to the PSN project has been a key success factor of the West Semarang Water Supply Project. Chapter 7 indicated that the commitment of the mayor of Semarang occurred both through policy and regulation, as well as through a financial commitment for land acquisition and involvement of a city-owned enterprise to run the project.

These two above case studies showed that a project that provides basic needs for citizens – such as the water supply project – may receive more substantial commitments from local governments than one that promotes economic growth. In addition, a project that involves fewer land parcels to acquire seemed to be more successful than one that involves many land parcels, such as a transport network project.

To overcome regional disparity, integrated regional development is key, considering economic diversification, commodity downstreaming, development linkages, and human resources development. Local government commitment and its capacity are crucial as are stakeholder coordination and innovative financing schemes, including PPPs. Specialised institutions – like PT SMI and PT PII – are vital in facilitating infrastructure financing.

Looking to the future, climate change and environmental elements are important to consider. Adaptation and mitigation of climate change entail efforts to adapt to current or anticipated future climate conditions, reduce negative impacts, and maximise potential benefits. Creating infrastructure that is climate-resilient attempts to reduce vulnerability to climatic change and unpredictability, thereby mitigating their negative effects. The costs associated with adaptation are complex, but they represent only 3% of total investment requirements.

Infrastructure is also an integral component of emissions reduction initiatives. Infrastructure assets invulnerable to disasters are advantageous because they reduce greenhouse gas emissions and environmental costs. To demonstrate the importance of green and resilient infrastructure, however, the quantification of these intangible benefits and the various cost and benefit domains must be addressed.

As discussed in Chapter 8, the estimated funds required to achieve Indonesia's emissions reduction goal equal about Rp300 trillion per year (MEF, 2021), which is a sum that the State Budget cannot afford. Indonesia continues to encounter obstacles that impede private sector involvement in infrastructure development, however, including green infrastructure. To address this, KPPIP is working to facilitate the process of selecting, preparing, directing, and managing projects as well as providing fiscal and non-financial support, particularly for the PSN. In addition, to finance climate-adaptive infrastructure, Indonesia has issued green *sukuk*, government-issued sustainable bonds. By the end of 2020, the government owned $3.1 billion of $5.0 billion in outstanding green bonds.

Blended finance schemes are another alternative for bridging the funding deficit. This plan brings together funds from international organisations, development agencies, the private sector, charitable foundations, and other public sources. It requires a healthy ecosystem and a substantial market size for mitigation and adaptation measures. In addition, Indonesia has access to Green Climate Fund and Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+) financing; Indonesia has been allocated $476.9 million, including $103.8 million in REDD+ results-based payments for its efforts during 2014-2016. Chapter 8 suggested that to promote the development of climate-resilient infrastructure, Indonesia should create incentives for key stakeholders to participate in collective financing, expand the financial market through regional and global cooperation, and integrate climate considerations into sub-national infrastructure. This requires comprehensive technical guidance and capacity development, with an initial emphasis on critical sectors including transport, energy, land-use change, and forestry, to encourage the active participation of local governments.

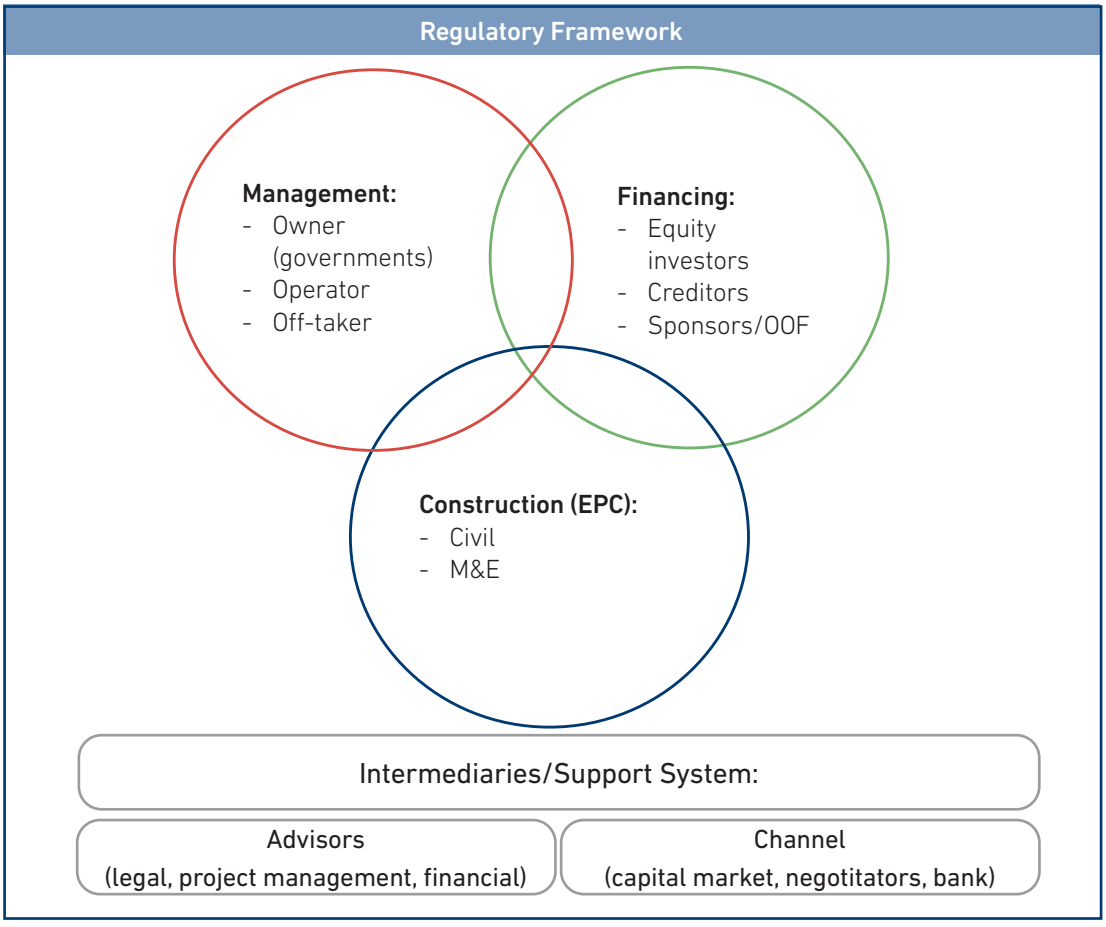
2. Future Infrastructure Development

Indonesia required more than 2 decades to reach its current status – from a deficit to an excess in electricity, from poor road connectivity to a more connected Indonesia (with additional ports connecting Indonesia's water and air transport), and better accessibility to clean water and sanitation. Telecommunications and internet infrastructure were accelerated during the COVID-19 pandemic, assisting Indonesia in mitigating the pandemic's negative effects. Satellites and an increase in mobile-based transceiver stations have made working and studying from home feasible – even for residents in remote areas.

To encourage more private investment in infrastructure to fill the remaining infrastructure financing gap, it is necessary to enhance regulatory and institutional frameworks and human capital to manage the process. From the successful implementation of the PSN through PPPs, it is essential to learn about the availability and affordability of long-term financing and risk-sharing instruments, as well as the capacity and transparency of public institutions to support regulatory reforms to design, purchase, monitor, and evaluate PPP projects. The next government needs to invest more in economically viable but financially unfeasible projects to make them attractive for private investors to participate. Additionally, private investors should be encouraged to invest in commercially viable infrastructure projects to nurture the infrastructure ecosystem through better risk adjusted scheme.

PPPs require wholesome, interconnected, and well-planned interactions amongst stakeholders. Governments, financiers, construction firms, project management and advisory services, off-takers, and facilitators/channels are the key stakeholders (Figure 9.1).

Figure 9.1. Infrastructure Ecosystem



EPC = engineering procurement construction, M&E = mechanical and electrical, OOF = other official flows.
Source: Zen (2019).

The government plays a dual role as both a project's regulator and owner. As a regulator, it drafts and issues necessary regulations and develops the infrastructure development system, which dictates the fundamentals of the entire ecosystem. Infrastructure development is fostered by a regulatory framework that encourages other actors' healthy and active participation. It includes fiscal and other support, facilitation, fair competition, and inclusive principles. It allows financial institutions, construction companies, and advisors to participate to a greater extent. The importance of the off-takers – who may be institutions or individuals – is not diminished as they determine project sustainability. Their participation from the beginning of the project plan is required.

Given the remaining infrastructure gap, with the active role of central government to provide infrastructure and stimulate private participation in infrastructure provision, higher local government participation, particularly in accelerating local infrastructure development, is needed for filling the gap sooner. The established infrastructure financing special vehicles such as PT SMI, PT PII and IIF should expand their work to local government. With improved capacity in project development and execution at local level, including developing risk-adjusted investment scheme to better attract investors to local infrastructure, much more projects can be executed at the same time.

Future objectives for a prosperous and more equitable Indonesia necessitate infrastructure that is not only adequate but also appropriate. Infrastructure plays a crucial role in adapting to and mitigating the threats posed by climate change, which are intensifying. Yet Indonesia, like many other developing economies, faces limited resources, including an inadequate budget for climate adaptation efforts. While the international community demands a more substantial contribution from developed economies, Indonesia can also improve its domestic strategy. Aside from constructing fundamental climate-adjustment infrastructure, Indonesia can adapt climate-resilient infrastructure management earlier to achieve more efficiency. Technology that improves analytical functionality, data management, connectivity, and automation in infrastructure construction and operation offers substantial economic benefits – the same holds for adaptability in management.

Sector-wise, energy is a major contributor to greenhouse gas emissions, while transport is a major player in the energy sector. Transport infrastructure is, therefore, essential for adaptation and mitigation efforts. Transport infrastructure such as roads, railways, airports, and seaports can be constructed for climate-resilient compliance and energy conservation. With structural adaptations, such as integrating technology into infrastructure, additional benefits, such as increased durability, green infrastructure, and a circular economy, can be realised. In addition, embracing adaptation management can enhance protection, reduce greenhouse gas emissions, and foster adaptation skills.

Meeting the future demands of essential human activities is another way of referring to adequate infrastructure. Advanced economies expect to enter Industry 5.0 (e.g. the European Union) or Society 5.0 (e.g. Japan) following Industry 4.0. This era will be distinguished by the emergence of a new phase of industrialisation in which humans collaborate with advanced technology and artificial intelligence, necessitating more sophisticated infrastructure characterised by being sustainable, resilient, cloud-based, and user-centric.

Demand levels and future infrastructure adoption will vary between developed and developing economies. Developing economies are responsible for determining their own paths and the types of infrastructure required to support them. The infrastructure of Indonesia must be resilient and sustainable. Due to the abundance of fossil energy sources in Indonesia, carbon capture can be utilised to maintain carbon neutrality. Forests and oceans must be carefully maintained to absorb greenhouse gases, produce clean air, and serve as sustainable economic resources, including for the blue economy.

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Reviewer Comments

Jon D. Lindborg
Advisor, Infrastructure Funding and Financing,
Korea Institute for Advancement of Technology

Hal Hill
Australian National University

Jon D. Lindborg

Advisor, Infrastructure Funding and Financing, Korea Institute for Advancement of Technology

Valuable information and insights for Indonesia infrastructure development stakeholders. The book is a highly commendable, wholly Indonesian-led effort aimed at documenting and analysing a wide range of topics related to the government's implementation of the *Proyek Strategis Nasional* (PSN) since 2016. Taken together, the book's analytical insights, case studies, and data are a valuable knowledge product and fill a major gap in obtaining comprehensive information on the PSN. The book's findings should be of interest to government authorities at both the central and regional levels, academics, international development agencies, infrastructure finance institutions, and infrastructure project sponsors and developers. In addition, the book's findings may be of interest to infrastructure policymakers in other middle-income countries as well as the G20-affiliated Global Infrastructure Hub.

Thoughtful overview of the historical context of infrastructure investment in Indonesia. The authors provide an informative overview, along with data, of Indonesia's infrastructure investment experience going back to the Suharto New Order government era. They also include the 'lost decade' of investment following the 1997 Asian financial crisis and budget complexities in managing the 'big bang' decentralisation of governance. This historical context is all too often ignored in external critiques of the government's record with respect to infrastructure investment.

Impressive progress and impact achieved. This is even more impressive against the backdrop of the COVID-19 pandemic. Utilising an economic impact multiplier model based on input-output methodology (along with a non-survey instrument), the authors' analysis of the economic impact of PSN projects during 2016–2022, as well as projects to be completed in 2023, add credibility to the book's conclusions. The book notes the overall infrastructure investment-enabling frameworks that were developed prior to 2016 through a series of legal, policy, regulatory, institutional, and financing reforms/arrangements. These include the government's efforts to establish specialised infrastructure financing and guarantee institutions, public–private partnership (PPP)-related reforms and coordination bodies, and various project development support mechanisms for PPPs (e.g. a project development facility and project preparation and transaction advisory through special mission vehicles like PT Sarana Multi Infrastruktur [PT SMI] and Indonesia Infrastructure Guarantee Fund [IIGF]).

Implementation and project delivery. As the locus of the PSN and the government entity charged with 'de-bottlenecking' infrastructure project implementation, Komite Percepatan Penyediaan Infrastruktur Prioritas (Committee for the Acceleration of Priority Infrastructure Delivery, KPPIP) is a success story in 'getting projects done' in the Indonesian context – a huge country with highly decentralised governance structures. As much as the actual PSN projects' outputs/impacts matter, most would have never reached operation if not for the coordination and implementation troubleshooting delivered by KPPIP. Given the oft-cited issue of poor coordination across government entities in Indonesia – coupled with the complexities of decentralised governance and funding mechanisms – there are broader economic governance lessons to be gained from the KPPIP experience that may be relevant in other sectors.

Political economy of public sector, state-owned enterprise (SOE), and private sector investment. The book includes useful information regarding the source of financing for PSN projects. While there may be a perception that PSN infrastructure investment has been SOE-driven, the authors' analysis of KPPIP data indicates that in terms of value of projects, the financing and delivery partners are highly mixed. The authors present a highly informative analysis of PSN projects structured as PPPs. The sections on PSN PPPs are well written and serve as informative case studies for PPP practitioners. Overall, the book provides a practical entry point for further analyses as to how the government and KPPIP made decisions on the allocation and prioritisation of funding sources for PSN projects. This may be relevant with respect to external studies conducted by Asian Development Bank (ADB), Organisation for Economic Co-operation and Development, and World Bank on the role of SOEs in Indonesia's infrastructure sector and concerns about crowding out private sector investment, financial sustainability, and increased government exposure to unfunded SOE debt risks as the de facto lender of last resort.

International infrastructure investment benchmarking. As a G20 economy with ambitious aspirations to achieve high-income status, Indonesia cannot count on a business-as-usual approach to mobilising infrastructure-related investment. Various authors cite the infrastructure financing challenges inherent in Indonesia's relatively shallow domestic financial and capital markets. As such, larger private foreign investment is key. Yet barriers to mobilising increased foreign investment in infrastructure remain (e.g. lack of a robust project pipeline, relatively low commercial returns, favoured position of SOEs, and a complex foreign investment enabling environment). While significant progress has been achieved through the PSN, which rightly has a focus on project execution, the question remains as to how much foreign investment may have been forgone since 2016. This is even more important as the government moves forwards with massive projects such as the new capital city, Nusantara. In this regard, recent government efforts to take a more proactive approach to easing barriers and mobilising foreign investment in infrastructure are positive signs.

Land acquisition. The book cites the enduring challenge of land acquisition – and this despite important reforms introduced with Law No. 2 of 2012 and subsequent reforms specific to land acquisition to facilitate the PSN. There is some discussion as to why this is the case – landowners and/or community interests are not aligned with broader public interests, compensation is calculated only on the value of physical assets, and PSN project planning and regional spatial plans are inconsistent (e.g. the acquisition site is within a regional government-declared forest zone). These are important points. As such, the book provides an important reference for additional focus by policymakers in addressing the continuing challenge of land acquisition.

Indonesia's urbanisation trend and national and sub-national coordination. The authors raise an interesting point in making the case for the establishment of a lead agency (i.e. Ministry of Urban Areas) to coordinate urban infrastructure development from a macro perspective. Given Indonesia's urbanisation trend, this could be a beneficial approach. Ideally, it would be balanced with some rationalisation and streamlining of existing governance structures so it does not add yet another layer of bureaucratic complexity with respect to infrastructure planning, coordination, and investment.

Innovative financing. The core subject area of one chapter provides a summary of various financing schemes utilised for the PSN. The authors note the impressive role of government *sukuk* in funding the PSN. Most interestingly, they cite project-based financing *sukuk* for 2013–2023 totalling Rp210 trillion across all 34 provinces. One area that is not addressed in the chapter is the potential use of asset recycling for brownfield infrastructure through limited concession schemes. This is a policy area that KPPIP has been pursuing over the past several years, including potential pilot projects. Limited concession schemes are particularly relevant to address overleveraged SOE balance sheets and may also be used by the Indonesia Investment Authority. Likewise, there is significant upsides to exploring the use of a value capture approach that enables governments to recover and to reinvest land-based value increases and incremental economic value that result from public investment, especially for urban and transport infrastructure.

Positive socio-economic impact of the PSN. In the chapter on the socio-economic impact, the authors take a pragmatic approach in focussing on a sub-set of 200 PSN projects: toll roads (associated with productivity enhancement through improved access and connectivity) and bulk water supply (associated with equitable access to basic services). The stylised Infrastructure Financing Prioritisation Framework presented is insightful with respect to how PSN projects were selected and financed. Encouragingly, their ex-ante analysis concludes that 44 projects out of 61 in 'quadrant 4' (i.e. high socio-economic impact and low financial viability) were financed through the State Budget; one-third of government financing was still channelled to projects that are financially viable. This substantial public sector contribution indicates that increased crowding in of private investment in infrastructure remains a top priority.

More balanced approach to Java versus off-Java development. The authors document the remaining challenges and historical context of 23 years of decentralisation. Still, there has been significant progress over the past decade to advance more inclusive regional growth, especially in East Indonesia. There has been political commitment at the highest levels to address regional disparities, including through the PSN.

Climate change and financing schemes. The chapter on climate change includes a thorough discussion of the government's financing approach. The information on green sukuk is particularly useful as Indonesia is the second largest issuer of green bonds in the Association of Southeast Asian Nations (ASEAN) region after Singapore. The authors' reference to the ADB green bond market survey for Indonesia adds analytical depth to the chapter and allows readers to delve into the specific issues and obstacles as seen from an investor perspective. This, in turn, provides a menu of actions that need to be taken to expand the role of green financing in meeting Indonesia's infrastructure needs.

Overall, a welcome knowledge product of high relevance to Indonesia policymakers and infrastructure development practitioners. Congratulations to the Ministry of Finance and the Economic Research Institute for ASEAN and East Asia (ERIA) in spearheading this comprehensive book that presents a wealth of information as well as perceptive analysis on a wide range of infrastructure issues in Indonesia.

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Hal Hill
Australian National University

Infrastructure Policy: Some Analytical Considerations

Efficient and broad-based infrastructure in all of its forms is an essential prerequisite for successful economic and social development. Roads connect people and markets. Utilities enable businesses to operate efficiently and people to lead comfortable lives. Airports and ports connect people and goods to the rest of the world. The digital revolution is having transformational economic, social, cultural, and political effects. Innovation in all forms of infrastructure is central to addressing the world's looming climate crisis.

Infrastructure matters more to Indonesia than practically any other country. The world's largest archipelagic nation state, each of its approximately 10,000 inhabited islands requires roads, electricity, telecommunications, ports, and often airports. The imperative of territorial integrity is firmly imprinted into the national DNA. Lagging and infrastructure-deficit regions require special policy focus. The country's diversity is also illustrated by the fact that Java is one of the most densely populated islands in the world, that Jakarta is a sprawling megacity with complex infrastructure needs, and that most of the country's major urban settlements are in low-lying coastal regions highly vulnerable to rising sea levels.

Indonesia has had to contend with a huge infrastructure deficit. During the colonial era, infrastructure investments primarily served the needs of the export-oriented extractive industry enclaves and the tiny modern, expatriate-dominated economy. The slow economic growth during the first 2 decades of independence meant that the government was unable to make major infrastructure investments, and the private sector lacked the resources – and commercial incentive – to be a major provider. The country's first nation-wide infrastructure investments on any scale did not occur until the era of rapid economic growth, 1967–1996 – but the 1997 Asian financial crisis abruptly terminated this progress. Faced with soaring public debt – the equivalent of approximately 100% of gross domestic product (GDP) in 1999 – the government froze most capital works. The private corporate and banking sectors were also crippled by the crisis, while many foreign investors exited the country.

In the decade that followed, economic growth resumed, and successive governments implemented a successful programme of fiscal consolidation that resulted in a sharp reduction of public debt. Yet, understandably, major capital investments were not prioritised. The COVID-19 pandemic also put great stress on the government's budget, with health and social protection measures receiving high priority. For these reasons, it is not surprising that Indonesia lags behind most of its middle-income East Asian neighbours on various international infrastructure rankings. It also explains why the government now accords a high priority to the sector, and why important policy-oriented analytical studies – such as this volume – are being undertaken.

Infrastructure is one of the most complex areas of public policy. It requires large investments, typically of at least 5% and more of GDP for fast-growing developing countries. Moreover, infrastructure services are highly diverse, ranging from mega trunk road and airport investments to local roads serving small rural communities. They include massive power stations alongside small-scale local generators. They comprise both space-based telecommunications and local courier services.

Major infrastructure projects pose particular challenges for policymakers. They frequently have natural monopoly characteristics by design or owing to their fundamental economics. It only makes sense for most cities to have just one airport. There will only be one major trunk road and railway line straddling Java and the other major islands. There are very large economies of scale in electricity generation and transmission (although emerging technologies are making decentralised power grids increasingly viable). In these cases, the public policy imperative is to regulate monopoly providers to ensure high-quality services at reasonable prices. Asymmetric information can also be a major challenge in these cases, in the sense that the infrastructure provider knows more than – or may even 'capture' – the regulator. There is typically no market for some of these services, so some sort of international benchmarking is often the most useful guide.

The issue of natural monopolies is present not just for megaprojects. Each urban settlement typically has just one water and sanitation authority, adjacent towns have just one connecting transport mode, and town planning is usually under the jurisdiction of just one authority.[1] At the local level, the political market is therefore crucial – that is, the community elects officials who are expected to manage the delivery of these services; if they do not, the theory (if not always the practice) is that ballot box substitutes for competitive markets in providing the discipline to maintain service quality.

In other cases, the main task of public policy is to ensure that markets work efficiently. Even here, economies of scale are such that many of the industries are highly concentrated. In telecommunications, for example, there are typically a small number of providers, even in a vast country like Indonesia. Where these providers are privately owned – as is the case in most countries but not Indonesia – some sort of competition authority is required to ensure that at least the market is contestable in the sense that entry is unrestricted. In cases of poor service quality – and where for some reason market pressures are not operative – governments have other policy weapons at their disposal, ranging from public information campaigns to withdrawal of business licences.

[1] Although in some cases, urban settlements are privately run, as noted below with reference to Indonesia.

Another important feature of infrastructure service provision is the importance of coordinating complementary inputs that operate in each sector. Jakarta's Soekarno-Hatta International Airport and various ancillary operations supply the package of airport services, and then a mix of state and privately owned airlines provide domestic and international civil aviation services. For efficient passenger and goods traffic, both groups of service providers, in turn, need to operate efficiently. The role for policymakers is to ensure that the monopoly airport is efficient – whether in state or private hands – whereas its role in civil aviation is to ensure that there are competitive markets along with meeting safety and security standards. A similar set of considerations applies to shipping (i.e. a monopoly port provider servicing a competitive shipping industry).

Of course, airports and ports are local – not national – monopolies. Especially in large countries, there may be sub-national competition for the provision of these services. In Indonesia, this does not appear to be a significant factor, in part owing to the concentration of economic activity in and around Jakarta, and Java more generally. Moreover, in the case of port management, Indonesia's approach has been to assign primary responsibility to the state-owned port operator, Pelindo. As a result, the competition for the provision of port logistics services – including by foreign firms – has remained relatively limited.

Project evaluation is an essential feature of infrastructure policy, but here, too, there is much complexity. First, rigorous cost–benefit analysis (CBA) is inherently difficult for major investments in which some sort of market test is not readily available. In the competition for scarce investment resources, how should policymakers decide amongst, for example, a trans-Papua highway, extension of the Jakarta mass transit system, the trans-Java fast train network, and upgrading the provincial port network? Should (and could) the new Indonesian capital city, Nusantara, be subject to some sort of CBA? The textbook approach involves comparing the initial construction costs against a discounted stream of future net earnings, yet a moment's reflection highlights the obstacles. President Joko Widodo clearly sees Nusantara as nation building and promoting more balanced regional development – both of which cannot be readily subject to conventional CBA scrutiny. In the case of Papua roads, the government's concern is the region's lagging socio-economic development and whether a particular project is economically viable.

In addition, there are externalities, both positive and negative. An efficient urban mass transit system, for example, should contribute to lower air pollution as commuters migrate from cars and buses as well as lower road tolls. Workers should have quicker commute times to work and therefore better health. There can be negative externalities in major infrastructure projects, too; communities are resistant to coal-fired power plants and their attendant health risks, for example.

There are also many governance issues. Politicians are prone to support uneconomic 'white elephant' projects and monument building. There is political pressure to favour particular constituencies in a manner that overrides conventional CBA. Often, this is to reward patronage (e.g. donors to political parties) or to attract voter support in hotly contested electorates. Almost

all major infrastructure projects also involve more than one tier of government, making inter-jurisdictional coordination a major challenge. A common example concerns land acquisition for major transport corridors. This not only involves the relocation of households – often on a large scale – but also some major transport projects are planned on the assumption that they will be partially funded by being able to capture the real estate appreciation that occurs as a result of the construction of a proposed road or rail project.

Malfeasance is also a ubiquitous feature of large corruption projects. Again, there is the problem of asymmetric information since information flows are opaque. There may not be readily available market prices for the construction of a port in a remote location, for example. There will be cost guidelines, but these will be imperfect at best, and the construction company will invariably have greater commercial knowledge than the regulators. Similarly, the tendering process – if there is one – can be subject to widespread manipulation. These problems appear to be present regardless of whether the key providers are state or private entities.[2] A safeguard of the public interest is to have high-quality, incorruptible regulators and transparent information flows, yet this lofty ideal is more often honoured in the breach.

The pricing of infrastructure is often a vexed issue as well. The starting point is that infrastructure projects should be self-financing. This ideal, however, only provides guidance where no externalities nor social objectives are present. Yet politically motivated price suppression is present in most countries, including Indonesia. For example, the state electricity company, PLN, is under pressure to subsidise small-scale consumers on the assumption that they are also lower-income households. The issue then is how the subsidies should be financed. Larger consumers may be expected to cross-subsidise small consumers, yet this has disadvantages. Trade-exposed producers (i.e. exporting and import-competing firms) have cost handicaps. In addition, manipulation can occur, for example, through large households sub-dividing their electricity accounts.

Price suppression – including the possibility of its subsequent introduction – will also deter potential private sector providers, thus transferring the responsibility to the public sector. The subsidies should then at least be explicit and transparent; if PLN is expected to subsidise certain consumers, ideally this would be clearly costed and recorded in the government budget. In a well-

[2] According to one school of thought, private providers are the most efficient infrastructure providers, on the assumption that they only invest in a project if it is commercially viable; in effect, the CBA issue is thereby addressed. However, this is not necessarily the case for the reasons adumbrated above – infrastructure markets are imperfect and opaque. Sometimes governments seek to attract private infrastructure by offering additional concessions, including restraint on competition and guaranteed rates of return. See, for example, the mixed record of the world's largest private infrastructure provider, Australia's Macquarie Group (*Financial Times*, 2023).

functioning tax and transfer system, the best policy would be to support low-income households directly through tax relief and/or social benefits. Yet this theory assumes that low-income households can be accurately identified and that the subsidies are politically palatable.

Social objectives are present in many other infrastructure areas. For example, the literature on 'getting agriculture moving' has clearly shown the beneficial effects for small farmers of improved rural roads. Farmers benefit from lower farm-to-market transport costs, and the improved road network also introduces more traders – and therefore competition – lowering marketing costs.

Indonesia and Infrastructure Development: Some Observations

Introduction. This section provides some observations on Indonesian infrastructure development and policies, drawing on the contributions to this volume and my own thinking about these issues. Three general points need to be made at the outset.

First, there has been great progress – indeed an infrastructure revolution – in Indonesia over the past half century. Infrastructure investments have massive socio-economic impacts and benefits, as emphasised in Chapters 4 and 5. On virtually every indicator, Indonesia's achievements have been remarkable. It is now possible to move around the archipelago, including to quite remote locations, quickly. The road, inter-island shipping, and civil aviation networks have been transformed. Utilities have expanded rapidly, especially electrification. Connectivity via telecommunications has improved dramatically.[3]

Second, as Chapter 1 emphasises, in the comparative East Asian context, Indonesia lags behind most of its middle-income neighbours on the various infrastructure surveys and rankings. This is not necessarily surprising, as the more advanced East Asian economies are at the international frontiers of high-quality infrastructure, and Indonesia's initial conditions meant that there was a huge backlog to be overcome. Moreover, the Asian financial crisis and its aftermath were huge setbacks for the country and its fiscal capacities. Perhaps a fairer – if less aspirational – benchmark would be against countries with similar per capita incomes and institutional features (e.g. India), in which case Indonesia performs more satisfactorily.

[3] For general surveys of Indonesian infrastructure from a comparative East Asian perspective, see ADB (2020) and Brooks (2016). Over the past decade, McCawley (2015), Salim and Negara (2019), and Sandee (2016) have conducted state-of-the-art surveys of Indonesian infrastructure, including extensive reference to the literature on the subject.

Third, owing to the complexity of infrastructure policy – and particularly domestic institutional and political factors – Indonesia has struggled with policy formulation and development of the sector. In the words of one observer, 'Infrastructure plans and policies in Indonesia are a bewildering kaleidoscope of promises, underfulfillment, delays, and outright cancellations. The various industries within the sector operate largely as silos …" (McCawley, 2015:263).

I return to these observations in the narrative that follows, which is organised around six general themes.

Finance. As noted, infrastructure is hugely expensive (Chapter 3). Therefore, infrastructure progress is dependent on the financial capacities of the three major funding sources: the state, domestic private firms, and foreign firms. As Salim and Negara (2019) observed, infrastructure expenditure in Indonesia fell dramatically during and after the Asian financial crisis, from as high as 9% of GDP in the early 1990s to around 2% in the late 1990s. It has since risen to about 4% of GDP, but this is well below the country's earlier buoyant levels and those of most East Asian comparators. The government has very limited fiscal space. With a tax–GDP ratio of approximately 11%, fiscal deficit cap of 3% of GDP, fuel and other subsidies 1%–3% of GDP, and a daunting array of competing claims on public expenditures, in the absence of a major increase in public revenue, it is inevitable that the government will be unable to directly fund a significant increase in infrastructure expenditure.

Who Provides Infrastructure? In addition to limited public sector resources, historically, the private sector – both domestic and foreign – has played a modest role in Indonesian infrastructure provision. This appears to reflect the interplay of several factors. The first is an ideological predilection for state-owned enterprises (SOEs) to be the key players. As Sandee (2016:234) observed, 'In Indonesia, there is a long history of [SOEs] having a virtual monopoly over the implementation of infrastructure projects.' Second, attempts to engage the private sector has had a mixed record. Commenting on the Yudhoyono Administration's initiatives to engage the private sector through infrastructure summits and public–private partnerships (PPPs), Salim and Negara (2019:241) concluded that the results were 'disappointing', owing to inadequate preparation of the proposed projects and the uncertain regulatory environment (e.g. the legislature placing price caps on infrastructure services, and the preference of infrastructure SOEs to be both regulators and providers).

A third factor has been that Indonesia's financial system is still somewhat under-developed. It is still primarily bank-based with a small bond market and other financial products that have the longer horizons required for infrastructure projects. Fourth, for various reasons, private foreign infrastructure providers play a minor role. Perhaps this is still from the unhappy experience of private power suppliers to PLN, most of which collapsed (and the firms exited) during the Asian financial crisis. This led Wells and Ahmed (2008) to conclude that borrowed funds and state ownership – with all their problems – are preferable. In any case, foreign private infrastructure providers have to be managed with great caution.

Perhaps change is on the way. There are examples of innovative private sector initiatives (e.g. in urban planning). The World Bank (2023) pointed to examples of smart cities in its multi-country case studies, and two of these are from Indonesia – Batam and Kota Baru Maja.

Infrastructure Evaluation and Competition Policy. As noted, the provision of infrastructure services takes many forms, from natural monopolies to decentralised competitive markets. The public policy challenge, therefore, must be nuanced. In the case of natural monopolies (e.g. the Jakarta airport), an arms-length and trusted regulator is needed to ensure service quality and competitive pricing. This is not easy, however, as the world is replete with examples of regulatory capture. Fortunately, international benchmarks help protect the national interest. Indonesia needs to look no further than to neighbouring Singapore for an example of world-class airport and port services. Indicators, such as those provided by the Japan External Trade Organization (JETRO) and the World Bank's Logistic Performance Index, also provide useful guidance.

Where there are no natural monopoly considerations such as in civil aviation and telecommunications, the public interest is served by a competition authority (i.e. Komisi Pengawas Persaingan Usaha [KPPU]), ensuring that there is free entry into the industry and that predatory pricing and other examples of collusive behaviours are outlawed. The work of the competition regulator can be supplemented by additional policy interventions as needed (e.g. airlines may be required to service non-commercial routes). In these cases, explicit subsidy arrangements need to be introduced.

Infrastructure and Decentralisation. Infrastructure provision in Indonesia is complicated by the country's size and geography (Chapter 6). In addition, since 2001, all three major tiers of governance have been infrastructure providers. The smooth functioning of fiscal and administrative relations between the central and regional governments is essential. However, the assignment of responsibilities and finances is still evolving. As in all federal systems,[4] there is a tendency to 'pass the buck' between different tiers of government, especially when these tiers are governed by different political parties. Recent reforms have been introduced to address some of these challenges, in particular the apparent underspending of local governments on capital works, large vertical fiscal imbalances between different tiers, and consequent reluctance of local governments to strengthen their fiscal bases and to increase their tax efforts (Lewis, 2023).

Land acquisition and compensation issues have continued in major Indonesian infrastructure projects, especially roads and rail. The reasons are complex and difficult to resolve. Lembaga Manajemen Aset Negara (State Asset Management Agency, LMAN) has been tasked to address these issues, as discussed in Chapters 2 and 3. Part of the problem also appears to be weakly

[4] Noting that, technically, Indonesia is a unitary state, albeit one with a considerable degree of local government fiscal and administrative autonomy.

defined property rights, especially off-Java. Salim and Negara (2019:250) pointed to another obstacle – the National Land Agency (Badan Pertanahan Nasional, BPN) is alleged to be 'notoriously corrupt'.

Managing the Energy Transition. In addition to expanding infrastructure provision, Indonesia is engaged in the difficult process of energy transition and de-carbonisation (Chapter 7). This is an issue that is complicated for middle-income economies like Indonesia that are also major fossil fuel exporters (Resosudarmo et al., 2023). Therefore, there needs to be a large expansion of land transport and utilities, and they also have to be increasingly 'green'. The expansion of urban mass transit and development of an electric automotive industry is expected to assist in this transition. Political economy considerations are particularly pertinent for major coal exporters like Australia, Indonesia, and South Africa. Especially in the wake of the Russia–Ukraine war, coal is a highly profitable industry, and its producers are politically influential. There is an ongoing – and scientifically unresolved – discussion about whether carbon capture facilities are feasible. There is also concern about the possibility of stranded assets, as financial institutions appear to be increasingly wary of supporting coal projects.

The regional and international dimensions of this transition will be crucial. With its vast tropical forest reserves, Indonesia can expect some international compensation for its successful efforts towards slowing the pace of deforestation. Both the government and foreign funders can draw lessons from the mixed outcomes of the earlier REDD+[5] agreement with Norway. The Asian power grid – and possibly Australia's Sun Cable venture with Singapore – may create additional opportunities.

Managing the intersection of macroeconomic policy and the energy transition is essential. Low- and middle-income economies typically confront a risk premium in accessing international capital markets – even Indonesia with its excellent record of macroeconomic prudence. Indonesia has a vital interest in the development of efficient and accessible international climate finance mechanisms (Basri and Triggs, 2023; Wolf, 2023).

Preparing for the Digital Era. The digital revolution is permeating all aspects of economic, social, educational, cultural, and political life. Indonesian citizens are early and enthusiastic participants in the opportunities created by the rapid spread of digital technology. Several Indonesian unicorns, for example, have already become major national and regional players. During the pandemic, information and communications technology was rapidly promoted, as was its use in public services, including the government's 100 Smart Cities Movement together with e-government services (Anas and Cahyawati, 2023). The major public policy challenge is to ensure the fast,

[5] Reducing emissions from deforestation and forest degradation in developing countries.

efficient, and equitable availability of internet services, consistent with a cybersecurity regulatory regime that protects citizens against web-based criminal activity. Digital innovation is occurring rapidly, and regulators everywhere are struggling to keep abreast of the latest technologies.

Moreover, access to internet services should be regarded as a public good, the provision of which is the responsibility of governments, in a manner analogous to the public provision of universal primary and secondary education. This, in turn, requires competitive market structures to ensure that internet provision equates with global best practices. To the extent that there is a shortfall, the competition problem needs to be addressed by regulators. There may also be cases where additional government intervention is needed (e.g. in remote regions and for low-income households). These interventions will typically take the form of some sort of community service provision required of telecommunications providers and/or direct government subsidies. The complementary availability of electricity is also essential for internet provision in remote regions.

Indonesia has taken historically bold initiatives in this area through its Palapa Ring project. However, access to fixed broadband remains limited and expensive; the costs of this under-provision were evident during the pandemic. As education rapidly migrated to online provision, children in poorer households with limited or no access to the internet (and sometimes electricity) suffered the greatest losses in learning.

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