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ARTICLE

# Implementing Sukuk Financing in Indonesia

## Policy Actions to Improve and Support Development Research and Development Infrastructure (RDI)

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**Abstract:** The Indonesian government realizes that developing alternative instruments for financing the state budget needs to continue—one of them with financing instruments based on sharia principles. This study examines the response of the Indonesian government in policy actions to seek financing for research and development infrastructure through Sukuk financing. This study uses a qualitative method with a narrative approach. This study uses three data collection techniques: regulatory survey, secondary data research, and Expert Elicitation with Experts' Judgments. Meanwhile, the data analysis technique uses content analysis, stakeholder analysis matrix, 're-analysis,' and digital discourse analysis. The results of this research reveal that the policy actions taken by the Indonesian government are through 1) regulatory in the form of policies related to the Sukuk financing policy in Indonesia, by issuing one regulation in the form of a law, one rule in the form of a Government Regulation of the Republic of Indonesia, and four rules at the level of ministerial regulations. On the other hand, the results of the mapping of stakeholders show that there are four clusters of actors, namely decision makers, project initiators, support partners, and civil society - media. 2) applicative action in the form of budget allocation related to infrastructure financing Sukuk in the research and development sector, during 2018-2022, financed 41 projects from 10 ministries/agencies. In the end, this research provides recommendations; namely, it is necessary to diversify the types of infrastructure that can be financed from Sukuk financing so that they follow the needs of Ministries/Agencies and Local Governments.

**Keywords:** infrastructure financing sukuk; policy actions; Research and Development Infrastructure (RDI); Indonesia.

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## 1. Introduction

Creating a conducive research and development environment must be connected to the role of the government in a country. In many practices in developed countries, one of the main prerequisites is providing a research and development infrastructure (Clark, 2013; Lee, 1988; Ramadani et al., 2013) while continuing to strive to formulate and implement intensive policies for the advancement of science (Aminah & Wardani, 2018; Naibaho, 2021; Putera, Suryanto, et al., 2022b). Knowledge and technology as an integral part of the economic development plan (Sofanudin & Wahyudi, 2018). Therefore, since Indonesia's independence in 1945, attention has been paid to the construction of research and development facilities in Indonesia.

For example, in the 1960s, President Soekarno proclaimed to build research and development facilities in several places based on the MPRS/II/1960 Decree. R&D infrastructure development in this era was carried out in Cibinong (West Java), designated as a National Research Center in 1963. This development used an area of 200 hectares. The construction of the National Biological Institute in Bogor (West Java) on an area of 18 hectares is also carried out in branches of the National Biological Institute, such as the botanical research institute, Bogoriense herbarium, and botanical gardens in five other areas. Furthermore, President Soekarno launched the construction of a geological institution in Bandung (West Java) in 1963 on a land area of 10 hectares, and also built the National Research Affairs Department Building, MIPI Building, National Scientific Documentation Center Building, Marine Research Institute Building and Science Museum in 1964. in Jakarta, with a land area of 20 Ha (Committee for Drafting the Book of 20 Years of Independent Indonesia, 1966).

President Soeharto carried out the next period by issuing Presidential Decree of the Republic of Indonesia Number 43 of 1976 concerning the Research Center for Science and Technology Development in Serpong on October 1, 1976. This development was then known as Puspiptek. Since the beginning, the Puspiptek development has been carried out on land controlled by the Indonesian government on behalf of the National Atomic Energy Agency in Serpong (Tangerang Regency) and can be expanded as needed. Puspiptek development is financed from the Government Budget, based on the annual DIP from the Expenditure Budget Section 08 of the State Secretariat.

In addition, on the 15th anniversary of the Indonesian Institute of Sciences in 1982, President Soeharto inaugurated the Widya Graha Building in Jakarta. Location This building occupies a previously planned location for the construction of research facilities in the era of President Soekarno. The construction of the Widya Graha Building spent a budget of 5.3 billion (Rupiah) with a building area of 13,400 m2 and 11 floors (Direktorat Pengolahan Arsip Nasional Republik Indonesia, 2018). Several research facilities were inaugurated by President Soeharto, such as laboratory facilities at the Agricultural Research Center in Sukamandi (August 10, 1982), the inauguration of the use of Cobalt-Irradiator at the Pasar Research Center on Friday (December 5, 1968), the inauguration of the Atomic Reactor in Yogyakarta (March 1, 1982). 1979), the inauguration of the BATAN Laboratory, the LIPI Laboratory, and the BPPT Laboratory at Puspitek Serpong (December 11, 1989), and the inauguration of the operation of the LAPAN remote sensing satellite earth station system in Pare-Pare, South Sulawesi (September 29, 1993).

Research and development infrastructure has a positive influence after constructing innovative culture and strategy on the determinants of success in industrial innovation (Dos-Santos et al., 2022; Narutomo, 2017; Nurhaeni et al., 2021; Supriyanto et al., 2021). Research infrastructure development is also believed to encourage local innovation and the development of new business models in implementing renewable energy policies in Bangladesh (Mahmud & Roy, 2021). Even the limited research infrastructure is an inhibiting factor for developing quality innovations and producing patents (Desmaryani, 2017; Dimyati et al., 2022; Nyiwul, 2021).

The picture above indicates that infrastructure is an essential aspect in the creation of a research and innovation ecosystem in a country. The same concept was

put forward by Handoko (2022) at the XXV Graduation Scientific Oration at Al Azhar University Indonesia on February 26, 2022:

> *"Research and innovation infrastructure contribute as much as 20% to developing the research and innovation ecosystem. Thus, it is necessary to provide research infrastructure that is opened and shared by all parties (academics, researchers, business actors, communities)" (Handoko, 2022)*

The joint use of research facilities is in line with the results of research presented by Lima et al. (2022) that start-ups and SMEs in the maritime sector in France, Ireland, Portugal, Scotland, and Spain experience many obstacles in doing business. This is due to needing help to compete, especially the difficulty accessing research and development infrastructure to develop products in particular facilities for prototyping and product testing (Lima et al., 2022). Meanwhile, sharing research and development infrastructure in the biotechnology and pharmaceutical industries can change business models and create new opportunities for the biotechnology segment worldwide (Ribeiro et al., 2022).

Meanwhile, The National Science and Technology Council (NSTC) Subcommittee on Research and Development Infrastructure of the United States Government defines Research and Development Infrastructure as:

> *"Facilities or systems used by scientific and technical communities to conduct research and development (R&D) or foster innovation" (Subcommittee on Research and Development Infrastructure-Committee on Science and Technology Enterprise of the National Science and Technology Council, 2021).*

The research and development infrastructure includes experimental and observational infrastructure, knowledge infrastructure, and research cyberinfrastructure. The U.S. government categorizes R&D facilities into two types, namely 1) facilities that directly influence economic competitiveness, national security, and public health, and 2) facilities that support research and innovation from pure sciences oriented to discovery (Subcommittee on Research and Development Infrastructure-Committee on Science and Technology Enterprise of the National Science and Technology Council, 2021). Indonesia's research and development infrastructure funding still use pure rupiah, non-tax state revenues, and foreign loan grants. However, since 2018 the Indonesian government has rolled out funding for research and innovation infrastructure financing through Sukuk financing.

The Indonesian government realizes that developing alternative instruments for financing the state budget needs to continue—one of them with financing instruments based on sharia principles. Financial instruments must comply with sharia principles, provide legal certainty, and be transparent and accountable. Therefore, the Law of the Republic of Indonesia Number 19 of 2008 concerning State Sharia Securities and several related regulations was issued. One form of sharia financial instrument widely issued by corporations and the state is securities based on sharia principles, internationally known as the term Sukuk.

Implementing Sukuk infrastructure financing in Indonesia faces challenges, primarily related to the strategy to attract investors. There are still many who are pragmatic, namely those with a profit orientation. On the other hand, Sukuk infrastructure financing still has limitations in financing specific development projects (Pratiwi et al., 2017). Therefore, alternative types of other projects are needed to accommodate the parties involved in Sukuk investment (Kusumawardhani, 2021). Infrastructure financing through the issuance of State Sukuk has been carried out since 2010 since the issuance of the State Sukuk with the Project Based Sukuk (PBS) series. PBS series State Sukuk has two mechanisms, namely (1) underlying project and (2) project financing. The first mechanism used is to use government projects listed in the APBN as the underlying asset for State Sukuk. The second mechanism

promoted by the government is a proposal through the Ministry/Agency to request infrastructure financing by issuing State Sukuk to the National Development Planning Agency (Hariyanto, 2021).

Policy action is a component of the policy formulation process. Policy action is seen as a deliberate action that is always carried out in an organized and repeated manner to form specific patterns of action to create acting norms for the policy system (Anggara, 2014). Usually, the policy action taken by the central government is about more than just setting regulations. However, it has touched on actions that influence or encourage changes in patterns and behavior of those affected by the policy (Putera & Gustina, 2014).

Dunn (2003) places policy actions as one of the policies, in addition to policy problems, policy alternatives, policy outcomes, and policy outcomes. Policy action is a movement or series of movements following the chosen policy alternative, which is carried out to achieve a valuable goal (Dunn, 2003). Generally, policy action has two main objectives: regulation and allocation (Abdal, 2015). Regulatory measures are actions designed to ensure compliance with specific standards or procedures. On the other hand, allocative actions require input in the form of money, time, personnel, and tools. In this study, policy action is intended to be related to regulatory actions in the form of policies related to the Sukuk financing policy and allocative actions in the form of the availability of budget allocations related to Sukuk infrastructure financing in the research and development sector. Based on the above conditions, this research is focused on describing the Indonesian government's response to financing research and development infrastructure through Sukuk financing. So, the formulation of the research questions is as follows:

R.Q. = How does Indonesian government responses/policy actions in pursuing the development of research and development infrastructure?

## 2. Methods

This study uses a qualitative method with a narrative approach (Creswell, 2014). This method was chosen because this research attempts to explain implementing Sukuk financing in Indonesia: policy actions to improve and support development research and development infrastructure. This research has two objectives to be achieved, namely 1) regulatory actions in the form of policies related to the Sukuk financing policy in Indonesia and 2) applicative actions in the form of budget allocation related to infrastructure financing of Sukuk in the research and development sector. Diagrammatically, the research framework, data collection techniques, and data analysis are shown in Figure 1.

For the first purpose, the data collection technique uses a regulatory survey (Keener, 2022). This technique collects all regulations related to the research focus, namely the Sukuk financing policy in Indonesia, ranging from laws to regulations from the minister of finance and the minister of national development planning (Table 1). Furthermore, the data analysis technique uses content analysis (Chung et al., 2022; Gatto & Sadik-Zada, 2022; Puspitasari & Laksmono, 2021; Putera, Widianingsih, et al., 2022) and stakeholder analysis (Blázquez et al., 2021; Chantre et al., 2022; Hutagalung & Hermawan, 2018; Putera, Suryanto, et al., 2022a; Rahimi-Feyzabad et al., 2022; Soesanto, 2017).

Content analysis is appropriate for this study because it can describe conceptually from empirical phenomena. The empirical phenomenon in this research is related to the Sukuk financing policy in Indonesia, which is used for research and development infrastructure. The second analysis uses a stakeholder analysis matrix that is useful for mapping the role of actors in the Sukuk financing policy in Indonesia, which is used for research and development infrastructure.

Meanwhile, for the second purpose, the data collection technique uses secondary data research (Tight, 2019). This research uses data sources from List of SBSN Project

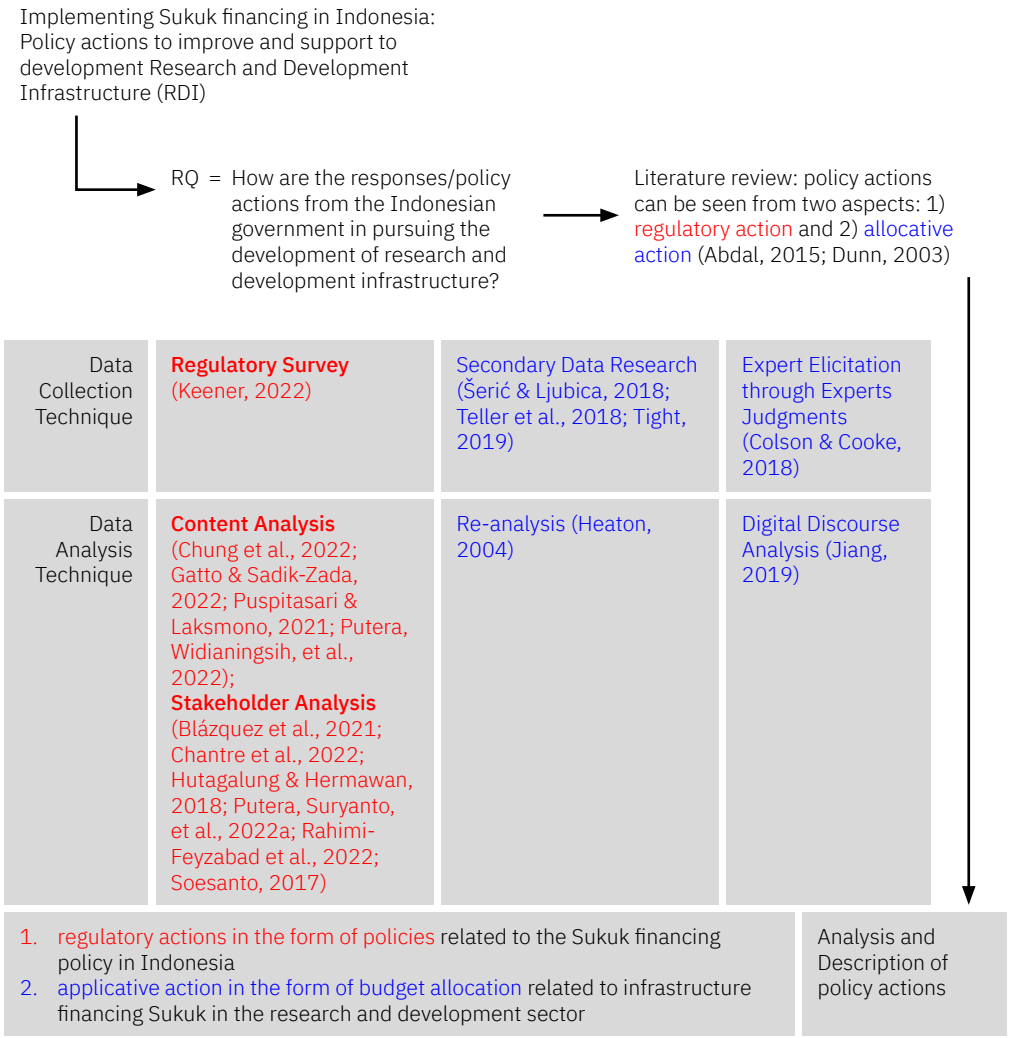


**Figure 1.** Research Framework

**Table 1.** Data Collection and Analysis Protocol for Sukuk Financing Policy in Indonesia

| | |
|---|---|
| Content analysis of regulations | Data sources: https://www.peraturan.go.id/, https://www.jdihn.go.id and https://www.peraturan.bpk.go.id/ |
| | Data period: 2008–2020 |
| | Type of data: regulations from the level of the Act/Constitution to Ministerial Regulations |
| | Implementation of regulatory data collection: October 15–November 30, 2022 |
| The scope of regulation used in the analysis | Regulatory actions in the form of policies related to the Sukuk financing policy in Indonesia |

Priorities (DPP SBSN) for Fiscal Years 2022, 2021; List of SBSN Project Priorities (DPP SBSN) for Fiscal Years 2018, 2017; List of SBSN Project Priorities (DPP SBSN) for Fiscal Years 2019, 2018; List of SBSN Project Priorities (DPP SBSN) for Fiscal Years 2020, 2019; List of SBSN Project Priorities (DPP SBSN) for Fiscal Years 2021, 2020. This technique is commonly used in many fields of science, such as in the sports industry (Šerić & Ljubica, 2018). There are two types of secondary data: data from internal records—sports entities, and external databases. Secondary data can also help conduct simulation modeling in food waste research (Teller et al., 2018). The available data was then analyzed by re-analysis (Heaton, 2004). This analysis was conducted to confirm and interpret the data to answer research questions. Through 're-analysis,' research findings can be confirmed and validated. In addition, in achieving the second goal, data collection techniques are also used through expert Elicitation. Expert

Elicitation uses Experts' Judgments (Colson & Cooke, 2018), which is helpful for stakeholders. However, due to the Covid-19 pandemic, collecting data using Experts' Judgments has been adjusted and adapted to new research methodologies, namely digital discourse analysis (Barclay & Garcia, 2020; Jung et al., 2021). Digital Discourse Analysis (Jiang, 2019), in this research using data sources from the "Infrastructure Project Financing Policy Forum through SBSN Year 2021" at the link https://www.youtube.com/watch?v=6YqQLnzg2YQ (Direktorat Jenderal Pengelolaan Pembiayaan dan Risiko - Kementerian Keuangan, 2021) and "2020 SBSN Project Financing Performance Dialogue" on the link https://www.youtube.com/watch?v=oSxUxGAdJmE (Direktorat Jenderal Pengelolaan Pembiayaan dan Risiko - Kementerian Keuangan, 2020) (Figure 2).


**Figure 2.** Experts' Judgments With Digital Discourse Analysis

## 3. Results and Discussion

The data collection and analysis results from this study are described in two parts: 1) Regulation of research and innovation infrastructure financing through project-based Sukuk, and 2) Project-based Sukuk in Indonesia for the research and innovation sector 2018–2022.

### 3.1. Regulation of Research and Innovation Infrastructure Financing Through Project-Based Sukuk

This study's first aspect of policy actions is regulation (Abdal, 2015). This section describes regulations issued by the Indonesian government, which become standards and procedures for implementing research and innovation infrastructure development with SBSN sources. Financing research and innovation infrastructure in Indonesia with project-based Sukuk also follows the pattern of planning and budgeting in the APBN cycle.

The APBN cycle can be interpreted as a series of activities from planning and budgeting to APBN accountability which repeats regularly and regularly every fiscal year. The APBN cycle begins with the stages of planning and budgeting the APBN and ends with the Reporting and Recording of the APBN. At each stage of the APBN cycle, a series of activities involve each stakeholder in managing the State Budget. Managing the State Budget is also limited by a schedule or time frame mutually agreed upon by the government and the DPR. From each series of activities carried out by each stakeholder on each predetermined schedule, an output is produced, which becomes the basis for determining the output for each subsequent stage so that it becomes the State Budget (Hadi et al., 2014; Purwiyanto et al., 2014).

As a financial instrument, project-based Sukuk has a regulatory basis, from laws to regulations from the Minister of Finance and regulations from the Minister of National Development Planning. Financial instruments through Sukuk have the spirit to develop the economic sector and Islamic finance through the development of Islamic financial instruments as part of the national economic system to improve social welfare for all Indonesian people. On the other hand, financial instruments based on sharia principles have different characteristics from conventional financial instruments, so exceptional management and regulation are needed, both regarding the required legal instruments and instruments. The regulatory framework for implementing Sukuk-based projects in Indonesia is as follows (Table 2).

**Table 2.** Implementing Regulations for Project-Based Sukuk in Indonesia

| No. | Regulatory Title | Regulatory Level | Key Point |
|---|---|---|---|
| 1 | Law of the Republic of Indonesia Number 19 of 2008 concerning State Sharia Bonds | Constitution | BSN is issued to finance the State Budget, including financing project development. "Financing project development" means funding the construction of projects allocated in the State Budget, including infrastructure projects in the energy, telecommunications, transportation, agriculture, manufacturing, and public housing sectors. |
| 2 | Government Regulation of the Republic of Indonesia Number 56 of 2011 concerning Project Financing through the Issuance of State Sharia Bonds | Government regulations | 1. Projects that can be financed through the issuance of SBSN include 1) projects whose funding is partly or wholly proposed to be financed through the issuance of SBSN, both projects that will be implemented or those that are currently being implemented, and 2) projects that have received allocations in the APBN whose funding sources come from pure rupiah, both projects to be implemented and those currently being implemented.<br>2. In order to finance the project through the issuance of SBSN, the Minister of Finance coordinates with the Minister of Planning regarding the determination of the type, value, and timing of Project Implementation.<br>3. Project Financing through the issuance of SBSN proposed by the Project Proponent is carried out in the context of a) infrastructure development, b) provision of public services, c) empowerment of domestic industry, and/or d) other developments following the government's strategic policy. |
| 3 | Regulation of the Minister of Finance of the Republic of Indonesia Number 138/PMK.08/2019 concerning Procedures for Financing Projects through Issuance of State Sharia Bonds | Ministerial regulation | 1. The Head of State Ministries/Institutions submits Project Indications, including Projects sourced from the list of medium-term project plans that have been prepared by the State Ministries/Institutions and submitted to the Minister and Minister of Planning no later than the second week of January in the year the project is allocated in the APBN.<br>2. Each State Ministry/Agency can be proposed to obtain additional Project budget allocations if it has performed well in implementation in the previous year and prioritized environmentally friendly activities.<br>3. The Project Proponent may propose an allocation of counterpart pure rupiah funds to support the implementation of the project. The pure companion rupiah funds are used for: a. allocation of goods expenditure which is an integral part of the project; and/or b. Allocating capital expenditures, including capital expenditures on intangible assets, is an integral part of the achievement of Project outputs. Pure Rupiah Funds are limited to a maximum of 5% (five percent) of the total SBSN allocation for the project in question.<br>4. The Project Proponent may propose an allocation of financing for land acquisition to be used as a Project development location through the issuance of SBSN, provided that it can only be carried out on multi-year projects and become a single project financing unit (full costing).<br>5. Projects can be part of the budget implementation for activities financed other than through the issuance of SBSN (blended financing), including cooperation projects between the central government and business entities and cooperation projects between the central government and regional governments and/or regionally-owned enterprises, provided that a. the entire process of planning, budgeting, implementing and managing the project is carried out by following all applicable provisions in the field of SBSN; and b. the output of financing through SBSN sources of funds is recorded as SBSN assets and cannot be transferred until the SBSN matures. |
| 4 | Regulation of the Minister of Finance of the Republic of Indonesia Number 4/PMK.08/2019 concerning Amendments to Regulation of the Minister of Finance Number 120/PMK.08/2016 concerning Procedures for Monitoring, Evaluation, and Reporting of Project/Activity Financing through Issuance of State Sharia Bonds | Ministerial regulation | 1. The SBSN implementation report contains a recapitulation of the realization of the absorption of funds and supporting data in the form of a. the development of the physical achievements of the project, which includes a comparison between the project work completion plan and the realization of its implementation; and b. problems encountered and the necessary follow-up.<br>2. For projects completed at the contract's expiration in the current fiscal year, the opportunity to complete Project work may be given following the provisions of the laws and regulations regarding the procedure for implementing payments for activities financed through the issuance of SBSN.<br>3. State Ministries/Project Initiating Agencies must make SBSN asset markers by including information on SBSN funding sources on the Project nameplate at the time of Project development and the Project inauguration inscription. |

| No. | Regulatory Title | Regulatory Level | Key Point |
|---|---|---|---|
| 5 | Regulation of the Minister of Finance of the Republic of Indonesia Number 120/ PMK.08/2016 concerning Procedures for Monitoring, Evaluation, and Reporting of Project/Activity Financing through Issuance of State Sharia Bonds | Ministerial regulation | 1. The Project Proponent monitors and evaluates the performance of the project financed through SBSN carried out at the following stages: a. implementation, which includes monitoring and evaluation of 1) the progress of the realization of the absorption of funds; physical achievement of the project; 3) problems faced; and 4) necessary follow-up. b. completion of project work.<br>2. The Director General of Financing and Risk Management at the Ministry of Finance of the Republic of Indonesia evaluates the realization of the absorption of Project funds based on the following criteria: "good" for the project with the percentage gap between the plan and realization of less than 25% (twenty-five percent). This means that the realization of the absorption of Project funds is following or earlier than the planned schedule; "less" for Projects with the percentage gap between plan and realization reaching 25% (twenty-five percent) to 75% (seventy-five percent), which means that the realization of absorption of Project funds is slower than the planned schedule; "low" for Projects with a percentage gap between plan and realization of more than 75% (seventy-five percent) which means that the realization of absorption of Project funds is very slow from the planned schedule.<br>3. The Minister of Finance of the Republic of Indonesia may stop financing part or all of the Project funds for Projects that: a. have legal problems; and/or b. is in a state of force majeure. The termination is carried out taking into account the results of the coordination meeting between DJPPR, the Ministry of National Development Planning/Bappenas, and the Project Proponent. |
| 6 | Regulation of the Minister of National Development Planning/Head of the National Development Planning and Development Agency of the Republic of Indonesia Number 8 of 2020 concerning Procedures for Managing Projects Funded Through the Issuance of State Sharia Bonds | Ministerial regulation | 1. Projects that can be financed through the issuance of SBSN are Projects implemented in the context of:<br>a. Infrastructure development includes construction work to build or improve infrastructure capabilities; and/or infrastructure management and/or infrastructure maintenance projects to increase the utility of infrastructure.<br>b. The provision of public services is a project carried out by providing services to the community in the form of providing goods and/or services to support the function of public benefit by not solely seeking profit.<br>c. Empowerment of domestic industry is a project to encourage the improvement of domestic industry and/or the use of domestic production.<br>d. Other developments following the government's strategic policies are developments that have a direct and significant impact on the community, directly support the achievement of national development, are directives of the President's policies, and/or other strategic policies following statutory regulations.<br>2. The Project Proponent may submit a proposed change to the project that has been determined in the SBSN DPP by considering the urgency of the change, the implementation schedule, and the project's readiness. Proposed changes may include changes in scope, including changes in the location and volume of output, shifts in budget allocation in one echelon I work unit, changes in Project nomenclature, and/or utilization of remaining auctions in one echelon I work unit.<br>3. Utilization of the remaining auction is the remaining contractual budget that exceeds 10% (ten percent). It can accelerate the achievement of targets and targets for activities and new projects. |

Based on the results of policy mapping (Table 2) as well as analysis of policy content, stakeholders/actors in implementing Sukuk financing in Indonesia: Policy actions to improve and support to development Research and Development Infrastructure (RDI), can be grouped into four clusters (Figure 3), namely: 1) Decision Maker, consisting of the Ministry of Finance, Ministry of National Development Planning/National Development Planning Agency, and Bank Indonesia Governor, 2) Project Initiator, is the implementing cluster of the project, namely ten ministries/agencies (see Table 2), 3) Support Partner is an institution that functions as a supporter of the implementation of Sukuk financings such as Indonesia's National Government Internal Auditor, Sharia Bank, and the Indonesian Ulema Council, and 4) Civil Society & Media, which consists of Sukuk investors, Academia, NGOs, and Mass Media.

## 3.2. Project-Based Sukuk in Indonesia for the Research and Innovation Sector 2018–2022

The second aspect disclosed in this study is allocative actions in the form of the availability of budget allocations related to Sukuk infrastructure financing in the research and development sector. Budget allocations are one of the allocative actions on responses/policy actions (Abdal, 2015).

Sukuk financing is the choice of several ministries/agencies because the planning and monitoring patterns are carried out strictly and concern the leaders in the ministries/agencies.


**Figure 3.** Stakeholder Map: Actors at Implementing Sukuk Financing in Indonesia: Policy Actions to Improve and Support the Development of Research and Development Infrastructure (RDI).

*"...Sukuk financing in Indonesia has become a big force in its implementation because of the concern of the ministers who work with us in the ministry of finance and Bappenas and oversee them together. So, the projects tend to be of better quality." Sri Mulyani Indrawati, at the 2021 SBSN Infrastructure Project Financing Policy Forum: "Financing SBSN Projects in 2021, Building the Country in the Midst of a Pandemic", January 20, 2021.*

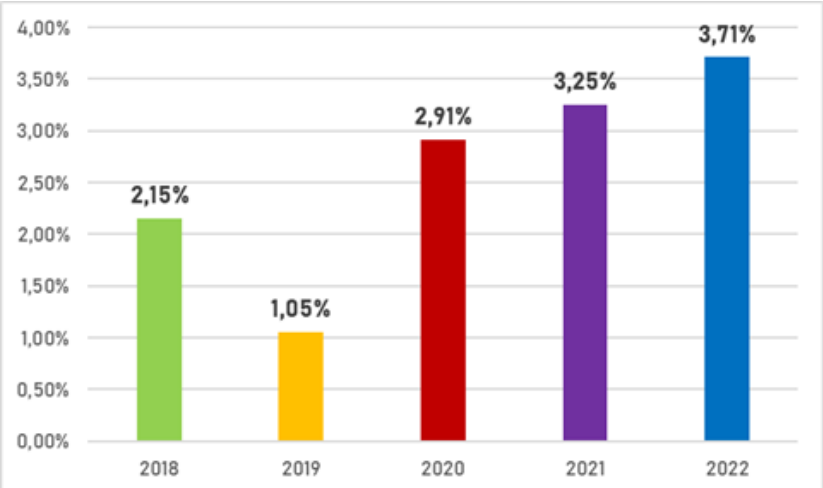


**Figure 4.** Distribution of the Percentage of SBSN Financing for the Research and Innovation Sector to the Total Determination of SBSN Financing for the 2018–2022 Period

***Source:*** *Processed by the author from Daftar Prioritas Proyek SBSN (DPP SBSN) Tahun Anggaran 2022, 2021.; Daftar Prioritas Proyek SBSN (DPP SBSN) Tahun Anggaran 2018, 2017; Daftar Prioritas Proyek SBSN (DPP SBSN) Tahun Anggaran 2019, 2018; Daftar Prioritas Proyek SBSN (DPP SBSN) Tahun Anggaran 2020, 2019; Daftar Prioritas Proyek SBSN (DPP SBSN) Tahun Anggaran 2021, 2020*

**Table 3.** List of Priority Research and Innovation Infrastructure Development Projects (Including Higher Education) in Indonesia, Sourced From 2018–2022 State Sharia Bonds

| No. | Infrastructure Project | Year | Ministries/ Implementing Agencies | Project Value (Rp) |
|---|---|---|---|---|
| 1. | Development of facilities and infrastructure for the Third Phase of IPB Darmaga Campus and IPB Science Techno Park | 2018 | Ministry of Research, Technology and Higher Education Indonesia | Rp185,000,000,000 |
| 2. | Accelerating the development of the Sumatran Institute of Technology (ITERA) | | | Rp129,634,771,000 |
| 3. | Development of the National Standards Unit of Measurement (SNSU) Laboratory | 2018 | National Standardization Agency of Indonesia | Rp50,000,000,000 |
| 4. | Development of Level 3 Bio-Safety Laboratory for food and drug research | 2018 | Indonesian Institute of Sciences | Rp55,000,000,000 |
| 5. | Construction of physical and chemical metrology laboratories for product quality testing | | | Rp65,000,000,000 |
| 6. | Construction of vocational education field laboratory facilities in the Sawala and Mandapa Training Forests, Kadipaten | 2019 | Ministry of Environment and Forestry of The Republic of Indonesia | Rp8,859,600,000 |
| 7. | Development of a national standard laboratory unit of measure | 2019 | National Standardization Agency of Indonesia | Rp50,000,000,000 |
| 8. | Construction of physical and chemical metrology laboratories for product quality testing | 2019 | Indonesian Institute of Sciences | Rp35,000,000,000 |
| 9. | Construction of productive infrastructure of Cibinong Science and Technology Park | | | Rp110,000,000,000 |
| 10. | Development of Integrated Bio-Products laboratory | | | Rp95,000,000,000 |
| 11. | Construction of Indonesian Natural Silk Research Laboratory Bogor Forest Science Park | 2020 | Ministry of Environment and Forestry of The Republic of Indonesia | Rp27,099,500,000 |
| 12. | Construction of a Mercury Laboratory and Environmental Metrology | | | Rp73,990,000,000 |
| 13. | Development of a National Standard Laboratory for Units of Measure | 2020 | National Standardization Agency of Indonesia | Rp70,000,000,000 |
| 14. | Cibinong Science and Technology Park Productive Infrastructure Development | 2020 | Indonesian Institute of Sciences | Rp100,000,000,000 |
| 15. | Development of the National Repository Center for Biodiversity and Intellectual Property | | | Rp150,000,000,000 |
| 16. | Construction of an Integrated Tropical Biodiversity Genomic Facility and National Environment | | | Rp150,000,000,000 |
| 17. | Construction of Traditional Food GMP Facility (FGF) | | | Rp100,000,000,000 |
| 18. | Construction of an aircraft component testing laboratory based on the international standard DO-160 | 2020 | National Institute of Aeronautics and Space | Rp125,000,000,000 |
| 19. | Construction of Indonesian Natural Silk Research Laboratory Bogor Forest Science Park | 2021 | Ministry of Environment and Forestry of The Republic of Indonesia | Rp24,446,310,000 |
| 20. | Development of the National Repository Center for Biodiversity and Intellectual Property | 2021 | Indonesian Institute of Sciences | Rp150,000,000,000 |
| 21. | Construction of the National Tropical Biodiversity and Environmental Genomic Center Facility | | | Rp109,000,000,000 |
| 22. | Construction of facilities for the Indonesian geodiversity area in Karangsambung | | | Rp75,000,000,000 |
| 23. | Bandung Advanced Sciences and Creative Engineering Space (BASICS) | | | Rp100,000,000,000 |
| 24. | Development of an integrated national tropical biodiversity greenhouse | | | Rp100,000,000,000 |
| 25. | Provision of appropriate technology laboratory facilities (TTG) for the application of precision engineering concepts in producing superior and competitive TTG equipment in industry 4.0 | | | Rp80,000,000,000 |
| 26. | Construction of integrated traditional food processing facilities with current good manufacturing practices (cGMP) standards | | | Rp45,000,000,000 |
| 27. | Construction of Biak earth station facilities | 2021 | National Institute of Aeronautics and Space | Rp90,000,000,000 |
| 28. | Design and Build High Energy Electron Accelerator (AEET) Facility and Laboratory | 2021 | National Nuclear Energy Agency of Indonesia | Rp124,107,000,000 |

| No. | Infrastructure Project | Year | Ministries/ Implementing Agencies | Project Value (Rp) |
|---|---|---|---|---|
| 29. | Development of Bandung Advanced Sciences and Creative Engineering Space (BASICS) | 2022 | National Research and Innovation Agency Republic of Indonesia | Rp100,000,000,000 |
| 30. | Construction of Indonesian Geodiversity Area Facilities in Karangsambung | 2022 | | Rp75,000,000,000 |
| 31. | Development of National Integrated Greenhouse for Tropical Biodiversity | 2022 | | Rp100,000,000,000 |
| 32. | Development of the National Repository Center for Biodiversity and Intellectual Property | 2022 | | Rp197,155,560,000 |
| 33. | Provision of Appropriate Technology Laboratory Facilities (TTG) for the Application of Precision Engineering Concepts in producing Superior and Competitive TTG Equipment in Industry 4.0 | 2022 | | Rp70,000.000,000 |
| 34. | Construction of Strategic Local Mineral Processing Laboratory Facilities Based on Low Cost and Zero Waste Technology | 2022 | | Rp97,000,000,000 |
| 35. | Satellite Data Control and Receiver Earth Station Facilities | 2022 | | Rp60,000,000,000 |
| 36. | Construction of Incubation Building and Laboratory for Integration of Remote Sensing Data and Information Services | 2022 | | Rp76,316,789,000 |
| 37. | Construction of the High Energy Electron Accelerator (AEET) | 2022 | | Rp92,777,000,000 |
| 38. | Development of Teaching Factory (TEFA) Coffee at the Agricultural Development Polytechnic (Polbangtan) Medan | 2022 | Ministry of Agriculture | Rp10,150,000,000 |
| 39. | Development of Horticultural Seed Facilities and Infrastructure at the Gurgur Agricultural Technology Research and Assessment Installation (IP2TP) | | | Rp30,000,000,000 |
| 40. | Development of Meteorology, Climatology, and Geophysics College (STMKG) (Construction of MKGI Educational and Laboratory Buildings) "Centre of Excellence" | 2022 | Meteorological, Climatological, and Geophysical Agency | Rp144,923,365,000 |
| 41. | Development of Phytopharmaceutical Production Facilities at the Center for Chemistry and Packaging | 2022 | Ministry of Industry | Rp43,219,246,000 |

***Source:*** *processed by the author from (Daftar Prioritas Proyek SBSN (DPP SBSN) Tahun Anggaran 2018, 2017; Daftar Prioritas Proyek SBSN (DPP SBSN) Tahun Anggaran 2019, 2018; Daftar Prioritas Proyek SBSN (DPP SBSN) Tahun Anggaran 2020, 2019; Daftar Prioritas Proyek SBSN (DPP SBSN) Tahun Anggaran 2021, 2020; Daftar Prioritas Proyek SBSN (DPP SBSN) Tahun Anggaran 2022, 2021)*

In 2018, SBSN started its first year of financing for Indonesia's research and innovation sector. The portion of infrastructure financing through SBSN sources in 2018 was recorded at Rp22,526,588,352,747,- and for the innovation research sector, Rp484,634,771,000,- or 2.15% of the total SBSN allocation in 2018. In 2018, three ministries/agencies implemented five infrastructure projects: The Ministry of Research, Technology and Higher Education, the National Standardization Agency (BSN), and the Indonesian Institute of Sciences (LIPI). Financing for research and innovation infrastructure with SBSN sources continues (2022) – see Table 3. The allocation has increased every year (see Figure 4).

> *"..., Thank you for trusting us at LIPI, that LIPI has been a pioneer in using Sukuk financing for the science and technology sector since 2018 and will continue until 2023 with a total of fifteen projects. For LIPI, we are open to the public, academics, and industry. So that this national laboratory can ensure its utilization is high and sustainable and can become an enabler for the science and technology-based economy, especially for industry." Laksana Tri Handoko, at the 2021 SBSN Infrastructure Project Financing Policy Forum: "Financing SBSN Projects in 2021, Building the Country during a Pandemic", January 20, 2021.*

Research and innovation infrastructure financing sourced from SBSN from 2018–2022 was used to finance 41 projects with a total allocation of Rp3,573,679,141,000,-, which has been utilized by ten ministries/agencies, namely the Ministry of Research, Technology and Higher Education, the National Standardization Agency (BSN), the Indonesian Institute of Sciences (LIPI), the Ministry of Environment and Forestry (KLHK), the National Institute of Space and Aviation (LAPAN), the Ministry of Agriculture, the Meteorology, Climatology and Geophysics Agency (BMKG), the Ministry of Industry, and the National Nuclear Energy Agency (BATAN). However, since 2022, the SBSN project, which was previously implemented by the Indonesian Institute of Sciences (LIPI), the National Institute of Space and Aviation (LAPAN), and the National Nuclear Energy Agency (BATAN), has been continued by the National Research and Innovation Agency (BRIN) as the executor of the program. Implementation of Presidential Regulation of the Republic of Indonesia Number 78 of 2021.

In 2019 the Government of the Republic of Indonesia set the value of the SBSN project at Rp28,434,745,453,084,-, and the allocation for the research and innovation sector is Rp298,859,600,000,- or 1.05% of the total value of SBSN projects in 2019. The infrastructure for the research and innovation sector in 2019 was carried out by three ministries/agencies: The Ministry of Environment and Forestry, the National Standardization Agency (BSN), and the National Standardization Agency, Indonesian Institute of Sciences (LIPI).

In 2020 the Government of the Republic of Indonesia set the value of the SBSN project at Rp27,352,286.736.000,-, and the allocation for the research and innovation sector is Rp796,089.500.000,- or 2.91% of the total value of SBSN projects in 2020. The infrastructure of the research and innovation sector in 2020 is carried out by four ministries/agencies, namely the Ministry of Environment and Forestry (KLHK), the National Standardization Agency (BSN), the Indonesian Institute of Sciences (LIPI), and the National Institute of Space and Aviation (LAPAN). In 2020, the research and innovation sector carried out eight infrastructure development projects.

In 2021 the Government of the Republic of Indonesia set the value of the SBSN project at Rp27,576,059,350,781,-, and the allocation for the research and innovation sector is Rp897,553,310,000,- or 3.25% of the total value of SBSN projects in 2021. The infrastructure for the research and innovation sector in 2021 will be carried out by four ministries/agencies, namely the Ministry of Environment and Forestry (KLHK), the Indonesian Institute of Sciences (LIPI), the National Institute of Space and Aviation (LAPAN), and the National Nuclear Energy Agency of Indonesia (BATAN). In 2021, the research and innovation sector will carry out ten infrastructure development projects.

The plan for implementing Sukuk financing by the Ministry of Environment and Forestry in 2021 follows the policy for using Sukuk financing in the environment and forestry sector 2020–2024.

> *"... indeed, the 2021 project has complied with the policy on using Sukuk financing in the environment and forestry sector 2020-2024, by allocating financing to strengthen research, innovation, and technology development in the environment and forestry sector." Siti Nurbaya, at the 2021 SBSN Infrastructure Project Financing Policy Forum: "Financing the 2021 SBSN Project, Building the Country during a Pandemic", January 20, 2021.*

In 2022 the Government of the Republic of Indonesia set the value of the SBSN project at Rp29,536,460,397,000,-, and the allocation for the research and innovation sector is Rp1,096,541,960,000,- or 3.71% of the total value of SBSN projects in 2022. The infrastructure for the research and innovation sector in 2022 will be carried out by four ministries/agencies: The National Research and Innovation Agency (BRIN), the Ministry of Agriculture, and the National Agency for Research and Development. Meteorology, Climatology, and Geophysics (BMKG), and the Ministry of Industry. In 2022, the research and innovation sector will carry out thirteen infrastructure development projects.

On the other hand, entering a decade of implementing Sukuk financing, many benefits have been felt with this type of funding.

> *"..., the government issues Sukuk financing, one of which is to encourage economic growth through infrastructure development that you are doing. Then improve public services such as the Hajj dormitory. There is a campus in education, and how we want to increase industrial empowerment in the country, as well as other strategic government programs. Project financing for Sukuk has provided benefits. Namely, it can increase independence in financing national development because with SBSN, we can determine the use of technology, including goods and labor." Dwi Irianti Hadiningdyah, at the 2020 SBSN Project Financing Performance Dialogue, August 26, August 26, 2020.*

However, the more the year rolls on, the more challenges in implementation and not limited to the higher financing needs but also the need for the scope of financing.

> *"... Hopefully, in the future, Sukuk financing can be accessed by private religious universities, Islamic boarding schools, and private madrasas. These three institutions also contribute to educating the lives of the nation's children." Yaqut Cholil Qoumas, at the 2021 SBSN Infrastructure Project Financing Policy Forum: "Financing SBSN Projects in 2021, Building the Country during a Pandemic", January 20, 2021.*

> *"..., various innovations have been made. We will try to diversify this financing instrument to follow the needs of the Ministries/Agencies and even the Regional Government." Sri Mulyani Indrawati, at the 2021 SBSN Infrastructure Project Financing Policy Forum: "Financing SBSN Projects in 2021, Building the Country during a Pandemic", January 20, 2021.*

Based on the description above, the policy actions taken by the Indonesian government to improve and support the development of Research and Development Infrastructure through Sukuk financing are; 1) actions for regulation in the form of policies related to the Sukuk financing policy in Indonesia by issuing one regulation in the form of a law, one rule in the form of a Government Regulation of the Republic of Indonesia, and four rules at the level of ministerial regulations. On the other hand, the results of the mapping of stakeholders show that there are four clusters of actors, namely decision makers, project initiators, support partners, and civil society - media. 2) actions for applicative in the form of budget allocation related to infrastructure financing Sukuk in the research and development sector, during 2018-2022, financed 41 projects from 10 ministries/agencies.

## 4. Conclusion

Response/policy actions taken by the Indonesian government in developing research and development infrastructure can be seen from regulatory and allocative actions.

a. Regulatory actions in the form of policies related to the Sukuk financing policy in Indonesia, starting with implementing the Law of the Republic of Indonesia Number 19 of 2008 concerning State Sharia Securities, to providing a reference in the form of a Regulation of the Minister of National Development Planning/Head of the Planning and Development Agency National Republic of Indonesia Number 8 of 2020 concerning Procedures for Managing Projects Funded Through Issuance of State Sharia Securities, and Regulation of the Minister of Finance of the Republic of Indonesia Number 138/PMK.08/2019 concerning Procedures for Financing Projects Through Issuance of State Sharia Securities.

b. Meanwhile, applicative action in the form of budget allocation related to infrastructure financing Sukuk in the research and development sector, which from 2018-2022 was used to finance 41 projects with a total of Rp. 3,573,679,141,000,- which has been utilized by ten ministries/agencies, namely the Ministry of Research, Technology and Higher Education, the National Standardization Agency (BSN), the Indonesian Institute of Sciences (LIPI), the Ministry of Environment and Forestry (KLHK), the National Institute of Space and Aviation (LAPAN), the Ministry of Agriculture, the Meteorology, Climatology and Geophysics Agency (BMKG), the Ministry of Industry, and the National Nuclear Energy Agency (BATAN), and the National Research and Innovation Agency (BRIN).

**Policy Recommendations**: it is necessary to diversify the types of infrastructure that can be financed from Sukuk financing so that they follow the needs of Ministries/ Agencies and Local Governments. For example, financing for the purchase of capital expenditure for laboratory equipment without constructing a laboratory building. Another example is the construction of research vessels or other facilities that are not built and used on the ground.

**The Limitations and Future Research**: This research is a policy research and focuses on Response/policy actions taken by the Indonesian government, so it requires further research that seeks to reveal the dynamics of implementation/evaluation of the implementation of research and innovation infrastructure development programs in Indonesia with SBSN financing.

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