

**PROJECT INFORMATION DOCUMENT (PID)
APPRAISAL STAGE**

Report No.: AB6511

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| Project Name | Research and Innovation in Science and Technology Project |
| Region | EAST ASIA AND PACIFIC |
| Sector | General education sector (100%) |
| Project ID | P121842 |
| Borrower(s) | REPUBLIC OF INDONESIA |
| Implementing Agency | The State Ministry of Research and Technology Telephone No.: (62-21) 310 2062 Fax No.: (62 21) 310 2046 Email: fpzen@ristek.go.id |
| Environment Category | <input type="checkbox"/> A <input type="checkbox"/> B <input checked="" type="checkbox"/> C <input type="checkbox"/> FI <input type="checkbox"/> TBD (to be determined) |
| Date PID Prepared | June 6, 2011 |
| Date of Appraisal Authorization | June 20, 2011 |
| Date of Board Approval | October 26, 2011 |

1. Country and Sector Background

1. *Indonesia has re-emerged after the Asian financial crisis with increasing regional and global standing.* Despite the recent global economic slump, Indonesia continues posting significant growth, and the national economy is expected to grow by 6 percent in 2011. Building on its existing economic and political stability, Indonesia today has the opportunity to create a virtuous cycle of sustainable and inclusive growth. But new engines of growth are needed to capture such opportunity. Currently, Indonesia is failing to keep up with other emerging economies in terms of export sophistication and the knowledge economy. In a context of increased openness and trade agreements, Indonesia needs to shift the sources of exports/products competitiveness from commodities and low cost production to high value added products if it is to maintain and accelerate economic growth and poverty reduction. The preparation of this shift will first need to build the overall innovation capacity for the country, including human resources, infrastructure, and most importantly, an enabling policy framework for the national innovation system.

2. *Innovation is rapidly becoming a priority in the country.* The president of the Republic of Indonesia made innovation a priority for his second term of presidency, highlighting its importance for the country for its long-term growth. To support this vision, the “Science and Technology” chapter of the Government’s medium-term national development strategy (RPJM) highlights the importance of strengthening “the quality and utilization of science and technology to support the overall goal of improving the country’s competitiveness and a move towards a more knowledge-based economy”. This vision is further articulated through three strategic pillars for government action: improving *institutions*, *resources* (for technology generation), and *networks* (for technology dissemination).

3. *Currently, Indonesia ranks poorly on competitiveness and knowledge economy indices.* Indonesia was ranked 54th out of 134 countries in the “Global Competitiveness Index”,

behind countries such as Malaysia (24), China (29), Thailand (36), and India (49)¹. One of the 12 pillars of competitiveness is the strength of a nation's innovation system, which puts Indonesia at the rank of 40, behind Malaysia (24), India (28), and China (29). According to the report, the main constraints faced by the country include: low national innovation capacity; little collaboration between R&D institutions and industry; and insufficient use of patents as a means of copyright protection for the inventor and at the same time a tool for disseminating and commercializing technology.

4. *The resources devoted to Research and Development (R&D) are insufficient and largely inadequate, especially in human capital investment.* Indonesia's overall public budget allocation to R&D is very low, estimated at only 0.05 percent of GDP, a level much lower than other countries in the region such as China (1.42), Malaysia (0.6), Thailand (0.26), and Vietnam (0.19). The low resource allocation for R&D has contributed directly to the low investment in human resources and infrastructure for research. The country has a low science base, with 199 researchers per million.

5. *Indonesia also underperforms in research outputs partly due to the low investment, but also because the productivity of R&D is lower than in other countries.* Perhaps the most direct output of R&D is scientific publications. Both when normalized by the size of the population or the number of researchers, Indonesia ranks especially low when compared to other middle income countries. Not surprisingly, other commonly used indicators of R&D output that tend to measure more advanced knowledge creation such as fees received from royalties and licenses (\$US 31 million, or 0.14 cents per person in Indonesia) or patents granted by the USPTO (18 in the 2003-07 period in Indonesia) are also much lower in Indonesia than in Brazil (royalty/license fees of \$53 per person and 141 patents), China (\$31.9 and 758 patents) or India (\$13.3 and 446 patents).

6. *In this context the rationale for investment lies on the need to address short-term constraints, especially on human resources, while providing support for an overall policy framework that supports effective innovation and medium and long term reforms.* The international experience shows that reforms of innovation systems take time to materialize, and long-term planning is the key to success. However, there are constraints that need to be addressed in the short-run if any reforms are going to prove successful. For example, there is an urgent need to address the shortage in human resources in Indonesia's STI institutes, LPNK, so that any reforms at these institutions can be effective. Similar constraints apply to improving overall financing and coordination. But these short run reforms will not solve the innovation gaps in the country. The need for an overall policy framework is clear, and developing one is led by the National Innovation Commission in consultation with all relevant governmental and non-governmental partners.

2. Objectives

7. The project will be aligned with the higher level objective of improving Indonesia's competitiveness in the knowledge economy. The project is aligned with the Gol's medium term priorities to strengthen the national innovation, by creating a "National Science and

¹ "The Global Competitiveness Report (2009-2010)", World Economic Forum.

Technology System to make a real contribution to people's welfare and advance civilization through institutional strengthening, network strengthening, research and development improvement and science and technology application system improvement", as stated in the GoI's Medium-Term Strategy Document (RPJM).

8. The development objective of the proposed project is to create an enabling policy environment for R&D in science and technology and to improve the public R&D institutes' performance and STI human resource capacity.

3. Rationale for Bank Involvement

9. The Bank has successfully supported STI projects around the world. Bank will help facilitate the lessons learned from these projects to reinforce the technical soundness of the project. Bank has also assisted Indonesia in providing the overseas scholarships in the past. This project will also benefit from the past experience, particularly in the area of ensuring transparency.

4. Description

10. The project has the following four components:

11. **Component 1: Improving Innovation Policy Framework and Performance of Public Research Centers.** This component aims to support the ongoing efforts to strengthen the national innovation system through a series of policy reviews and analyses that provide concrete recommendations on designing and managing an effective National Innovation System (i.e., improving coordination among stakeholders, using funding and incentive mechanisms more efficiently, linking to regional needs through Regional Innovation Systems). The component will support RISTEK and the National Innovation Commission's (KIN) goals to improve the coordination of the innovation system and develop effective policy tools to promote innovation. More concretely, the studies and activities under this component are in line with the analytical background needed by RISTEK in their mandate to draft a revision of Law no. 18/2002 concerning the national innovation system and the application of science and technology. Therefore, in addition to broadening the analytical base on innovation in the country, a key contribution of this component will be building consensus among policy makers on the key reforms needed.

12. This component also aims at: (i) Strengthening the capacity of public research centers at to contribute to Indonesia's needs; (ii) Improving institutional conditions of public research centers; and (iii) Improving framework conditions of public research centers.

13. **Component 2: Strengthening Public Research Funding.** Component 2 will improve the public research funding system by strengthening the capacity of RISTEK management to enhance the quality and relevance of strategic industry-research consortium funding, and by helping RISTEK design a new competitive research funding system. More specifically, the component will support: i) the feasibility study and design of a national research foundation; ii) the strengthening of RISTEK's institutional research funding program; iii) the establishment of industrial and global research linkages; and iv) the improvement of monitoring

and evaluation of publicly-funded research. The Bank financing will focus on improving the management of the scheme, but will not directly fund the research grant itself. The government will continue to support the research grant through Rupiah budget allocation.

14. **Component 3: Developing S&T Human Resources Capacity.** The objective of this project component is to strengthen human resources and enhance the performance of RISTEK and public agencies functioning as research and technology institutes (LPNK); specifically their ability to contribute to Indonesia's economic and social development through knowledge and technology. The human resource capacity is a key aspect of RISTEK and LPNK institutional assessments, and HR development plans is a critical element of the overall RISTEK and LPNK institutional development plans. Therefore, implementation of this component is closely linked to the key activities of component 1.

15. **Component 4: Project management.** This component will support the operations of the project committee and implementation units.

5. Financing

| | |
|---|--------|
| Source: | (\$m.) |
| International Bank for Reconstruction and Development | 95 |
| Total | 95 |

6. Implementation

16. A Steering Committee will be established to provide guidance and oversight of the project. This steering committee will be chaired by the RISTEK Executive Secretary. The Deputy Minister for Economic Affairs of BAPPENAS will be the vice chair, and the Deputy Minister for S&T Resources of RISTEK will be the secretary of the steering committee.

17. A Technical Committee will also be established to provide technical advices and support to the Steering Committee and Project Management Office in the matters pertaining to the specific project implementation issues. The Technical Committee will be chaired by the Deputy Minister for S&T Resources of RISTEK. The Chairman of the Technical Committee will be supported by the Director for Industry, S&T, and State Owned Enterprises, BAPPENAS as the vice chair, and the Assistant Deputy Minister for S&T Human Resources of RISTEK as the Technical Committee secretary.

18. A Project Management Office (PMO) will be formed to be responsible for the coordination of the overall project implementation, carrying out the activities under the project. The Director of PMO will be the Assistant Deputy Minister for S&T Human Resources of RISTEK. PMO staff will be officially appointed, representing RISTEK, BAPPENAS, Education and Training Bureau, and Human Resources Bureau at LPNK.

19. The PMO Secretariat draws staff from the RISTEK Ministerial Secretariat, and will be responsible for the budget planning and fiduciary aspects of the project. The day-to-day project coordination will be supported by additional contractual technical staff in necessary areas

such as procurement, financial management, monitoring and evaluation, progress reporting, etc. These contractual staff will work closely with the PMO Secretariat, and should report to the PMO Director.

7. Sustainability

20. The Government's commitment to increasing and using improved STI capacity to reach national goals of accelerated economic growth and improved competitiveness is crucial to ensure the institutional sustainability of the project. This commitment is first evidenced through a series of policy measures aimed at increasing the role of STI in national development agenda. During a high level meeting between the President and Governors across the country on "national economic growth acceleration and improvement program", human resources and technological innovations are clearly identified as key factors for accelerating economic growth. Within this context, a few policy proposals were put forward for the strengthening of the National Innovation System (SINAS). The key steps in the proposed action plan include: establish a National Innovation Commission to build synergy among the government, business and academics; prepare a National Innovation Policy blueprint (led by KIN); develop a strategic program and a long-term research agenda to improve Indonesia's competitiveness; focus on maritime continents and other natural resources, human resources, biotechnology and renewable energy as part of the Green Economy; establish national clusters to revitalize strategic industry; implement strategic and prime research programs in seven priority areas (food security; health and medicinal (drug) technology; energy; transport technology and management; information and communication technology; defense and security technology; and advanced materials); develop science and technology parks; increase government budget for innovation development; and provide tax incentives for research and development activities.

21. The sustainability of the advanced training program can only be achieved through the development and expansion of the domestic advanced education and training programs. This has been identified as one of the priorities of the higher education strategy as emphasized by the Minister of Education in Indonesia. With increasingly large public resource envelop for education sector development (20 percent of the public budget as stipulated by the Constitution), the sustainability of supplying advanced human resources should be able to be achieved with better allocation of public budget within the education sector, together with improving the public spending efficiency on basic education, which currently absorbed the largest share of public spending within the sector.

8. Lessons Learned from Past Operations in the Country/Sector

22. *Key lessons learned on reforming public research institutes:* The project design has taken advantage of lessons learned from successful and unsuccessful experiences in reforming public Research and Development Institutions in South and East Asia, as well as in Eastern Europe and Central Asian regions. These reforms include the transformations of India's Council of Scientific and Industrial Research (CSIR); Korea's Institute of Science and Technology (KIST); Taiwan's Industrial Technology Research Institute (ITRI), as well as the on-going endeavors of reforming large public research institutes in countries such as in Turkey and Russia.

23. *Key lessons learned on overseas training for researchers* are mainly drawn from the experience of implementing the "Science and Technology Training Project" (ICR Report no.

12560, 1993), “Professional Human Resource Development Project” (ICR Report No. 15134, 1995), and “Second Professional Human Resource Development Project” (ICR Report No. 24036).

24. *Key lessons on competitive research grant and STI system strengthening:* Bank’s experience with the Millennium Science Initiative has shown that focused investment in research excellence, awarded through competition and closely linked to training, can provide a catalytic stimulus for quality, relevance, and human capital development in science, technology, and innovation. Lessons can be drawn from experience in several countries such as Chile, Venezuela, Mexico, and Uganda.

9. Safeguard Policies (including public consultation)

| Safeguard Policies Triggered by the Project | Yes | No |
|--|--------------------------|-------------------------------------|
| Environmental Assessment (OP/BP 4.01) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Natural Habitats (OP/BP 4.04) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Pest Management (OP 4.09) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Indigenous Peoples (OP/BP 4.10) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Physical Cultural Resources (OP/BP 4.11) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Involuntary Resettlement (OP/BP 4.12) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Forests (OP/BP 4.36) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Safety of Dams (OP/BP 4.37) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Projects on International Waterways (OP/BP 7.50) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Projects in Disputed Areas (OP/BP 7.60)* | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

10. List of Factual Technical Documents

1. BAPETEN (2010). “*Rencana Strategis Badan Pengawas Tenaga Nuklir 2010-2014*” (2010-2014 Nuclear Energy Regulatory Agency Strategic Plan)”, Draft Report, Jakarta.
2. BAPPENAS (2010). “*Rencana Pembangunan Jangka Menengah Nasional (RPJMN) 2010-2014*” (2010-2014 National Medium Term Development Plan), Jakarta.
3. BAKOSURTANAL (2009). “BAKOSURTANAL Agency Profile”, Jakarta.
4. BAKOSURTANAL (2009). “*Rencana Strategis Badan Koordinasi Survei dan Pemetaan Nasional 2010-2014*” (2010-2014 National Survey and Mapping Coordination Agency Strategic Plan)”, Draft Report, Jakarta.
5. BATAN (2008). “Annual Report 2008”, Jakarta.
6. BATAN (2010). “*Rencana Strategis BATAN 2010-2014*” (2010-2014 BATAN Strategic Plan)”, Jakarta.

* By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas

7. BPPT (2009). "Annual Report 2008", Jakarta.
8. BPPT (2010). "*Laporan Akuntabilitas Kinerja Instansi Pemerintah: Buku I Indikator Kinerja Utama 2010-2014*" (2010-2014 Government Institution Performance Accountability Report: Book I Main Performance Indicator)", Jakarta.
9. BPPT (2010). "*Laporan Akuntabilitas Kinerja Instansi Pemerintah: Buku II Rencana Strategis 2010-2014*" (2010-2014 Government Institution Performance Accountability Report: Book II Strategic Plan)", Jakarta.
10. BPPT (1996). "*Science and Technology for Industrial Development (STAID) II - World Bank Implementation Plan 1996-1997*", April 1996, Jakarta.
11. BPLK - MoF, Education and Training Center Ministry of Finance (1996). "*Professional Human Resource Development Project Phase (PHRDP) II – Progress Report: Fiscal year 1995/1996*", April 1996, Jakarta.
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13. BSN (2010). "*Rencana Strategis Badan Standardisasi Nasional 2010-2014*" (2010-2014 National Standardization Agency Strategic Plan)", Draft Report, Jakarta.
14. DRN - RISTEK (2010). "*Pedoman Insentif Riset*" (Research Incentive Manual), 5th Edition, Jakarta.
15. LAPAN (2008). "National Institute of Aeronautics and Space - Lapan Profile", Jakarta. (Hard copy)
16. LAPAN (2010). "*Rencana Strategis LAPAN 2010-2014*" (2010-2014 LAPAN Strategic Plan)", Jakarta. (Hard copy)
17. LIPI (2010). "*Rencana Strategis LIPI 2010-2014*" (2010-2014 LIPI Strategic Plan)", Draft Report, Jakarta.
18. Mertins, Kai (Ed.) (2002) "*Evaluation of the Indonesian Science, Research and Technology Landscape to Strengthen the National Innovation System (PERISKOP)*", 11 Work packages, Bundesministerium für Bildung und Forschung (BMBF) and RISTEK.
19. RISTEK (2010). "*Pedoman Program Beasiswa Pascasarjana 2010*" (2010 Postgraduate Scholarship Program Manual), Jakarta.
20. RISTEK (2010). "*Rencana Strategis Kementerian Negara Riset dan Teknologi 2010-2014*" (2010-2014 Ministry of Research and Technology Strategic Plan), Draft Report, Jakarta.

21. RISTEK (2010). “*Kebijakan Strategis Pembangunan Nasional Ilmu Pengetahuan dan Teknologi 2010-2014*” (2010-2014 National Science and Technology Development Strategic Policy), Draft Report, Jakarta.
22. STAID and PT REDECON-PT GITA POLA (2000). “*Buku Pedoman Kebijakan Program Beasiswa*” (Scholarship Program Policy Manual), 6th Edition, December 2000, Jakarta.
23. World Bank (1985). Staff Appraisal Report: Indonesia Science and Technology Training Project, June 6, 1985, World Bank: Report No. 5425-IND.
24. World Bank (1993). Project Completion Report: Indonesia Science and Technology Training Project, November 30, 1993, World Bank: Report No. 12560.
25. World Bank (1994). Staff Appraisal Report: Indonesia Second Professional Human Resource Development Project, November 8, 1994, World Bank: Report No. 13537-IND.
26. World Bank (1994). Staff Appraisal Report: Indonesia University Research for Graduate Education Project, May 16, 1994, World Bank: Report No. 12841-IND.
27. World Bank (2002). Implementation Completion Report: Indonesia Industrial Technology Development Project, July 26, 2002, World Bank: Report No. 23742.
28. World Bank (2005). Project Performance Assessment Report: Indonesia Industrial Technology Development Project, July 5, 2005, World Bank: Report No. 32733.

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