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PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US$80.0 MILLION

TO THE

REPUBLIC OF INDONESIA

FOR THE

SUSTAINABLE MANAGEMENT OF AGRICULTURAL RESEARCH AND TECHNOLOGY DISSEMINATION (SMARTD) PROJECT

JULY 1, 2012

Indonesia Sustainable Development Unit
Sustainable Development Department
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective April 20, 2012)

9,190 IDR = US$1
US$0.00011 = IDR1

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AAEHRD	Agency for Agricultural Extension and Human Resources Development
ACIAR	Australian Center for International Agricultural Research
ADB	Asian Development Bank
AIATs	Assessment Institutes for Agriculture Technology
APBN	Anggaran Pendapatan dan Belanja Negara (State Budget)
ASEAN	The Association of Southeast Asian Nations
AusAID	Australian Agency for International Development
Balitvet/ Balai Penelitian Veterinary	Indonesian Research Center for Veterinary Sciences
BAPPENAS	*Badan Perencanaan Pembangunan National* (National Development Planning Agency)
BCRS	Beef Cattle Research Station
BKPM	*Badan Koordinasi Penanaman Modal* (Indonesia Investment Coordinating Board)
BLU	Badan Layanan Umum (Public Service Unit)
BP3K	Balai Penyuluhan Pertanian, Perikanan dan Kehutanan (Extension Services for Agriculture, Fisheries and Forestry)
BPATP	Badan Pusat Statistik (Central Bureau of Statistics)
BPS	Consultative Group on International Agricultural Research Central Research Institute
CGIAR	Global Conference on International Agricultural Research
CRI	Central Research Institute
ECOP	Environmental Code Of Practice
GCARD	Global Forum on Agricultural Research
GFAR	Government of Indonesia
GoI	Indonesian Agency for Agricultural Research and Development
IAARD	Indonesian Agency for Agricultural Research and Development
IAERI	Indonesian Agricultural Environment Research Institute
ICT	Information and Communication Technologies
ILRI	International Livestock Research Institute of the Consultative Group for International Agricultural Research
INPRES	Presidential Instruction (Instruksi Presiden)
IOPRI	Indonesian Oil Palm Research Institute

IPARD	Indonesian Planters Association for Research and Development
IPB	Bogor Agricultural University (Institut Pertanian Bogor)
IPGRI	International Plant Genetic Resources Institute
IPM	Integrated Pest Management
IPR	Intellectual Property Right
IRIEC	Indonesian Research Institute for Estate Crops
IRRI	Indonesian Rubber Research Institute of the Indonesian Research
ISARI	Indonesian Swampland Agric. Research
ISICRI	Indonesian Spices and Industrial Crops Research Institute
ISNAR	International Service for National Agricultural Research of the Consultative Group for International Research
ITFRI	Indonesian Tropical Fruits Research Institute
ITOFCRI	Indonesia Tobacco and Fiber Crops Research Institute
ITTO	International Tropical Timber Organization
IVEGRI	Indonesian Vegetable Research Institute
Keppres	Presidential Decree (Keputusan Presiden)
KKP3T	Implementation of Agricultural Research Partnership Cooperation with Higher Education
KPK	*Komite Pemberantasan Korupsi* (Anti Corruption Committee)
LIPI	Indonesian Institute of Sciences (Lembaga Ilmu Pengetahuan Indonesia)
M&E	Monitoring and Evaluation
MDG	Millennium Development Goal
Menristek	Ministry of Science and Technology
MoA	Ministry of Agriculture
MoF	Ministry of Finance (Kementerian Keuangan)
MoFo	Ministry of Forestry (Kementerian Kehutanan)
MoMAF	Ministry of Marine Affairs and Fisheries (Kementerian Kelautan dan Perikanan)
MoNE	Ministry of National Education (Kementerian Pendidikan Nasional)
MP3MI	Model of Agriculture Rural Development Through Innovation
MSc	Master of Science degree
NCAED	National Center for Agricultural Extension and Development
NGO	Non-Government Organization
NRI	National Research Institute
O&M PAATP	Operations and Maintenance
PhD	Doctor of Philosophy degree
PIU	Project Implementing Unit
PM&E	Planning, Monitoring, and Evaluation
PMU	Project Management Unit
PO	Producer Organization
POM	Project Operations Manual
PTC	Provincial Technology Commission
R&D	Research and Development
RAPBN	Draft State Budget (Rancangan Anggaran Pendapatan dan

	Belanja Negara)
RENSTRA	Strategic Plan (Rencana Strategis)
RISET	Research and Innovation in Science and Technology Project
RISTEK	State Ministry of Research and Technology
Rp	Indonesian Rupiah
RPJM	Medium Term Development Plan (Rencana Pembangunan Jangka Menengah)
RPN	Rencana Pembangunan Nasional (National Development Plan)
SADI	Smallholder Agribusiness Development Initiative
S&T	Science and Technology
SMARTD	Sustainable Management of Agricultural Research and Technology Dissemination project
SME	Small- and Medium-Enterprises
SMERU	Independent institution for research and public policy studies
TA	Technical Assistance
UGA	University of Gadjah Mada
UNHAS	University of Hasanuddin
USAID	United States Agency for International Development
USU	University of Sumatera Utara
WB	World Bank
WDR	World Development Report

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Sector Manager:	Franz R. Drees-Gross, EASIS
Task Team Leader:	Patrick Labaste, EASER

INDONESIA

SUSTAINABLE MANAGEMENT OF AGRICULTURAL RESEARCH AND TECHNOLOGY DISSEMINATION

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PAD DATA SHEET

Indonesia

Sustainable Management of Agricultural Research and Technology Dissemination (SAMRTD)

PROJECT APPRAISAL DOCUMENT

EAP

EASER

Basic Information			
Date:	July 8, 2012	Sectors:	Agricultural Extension and Research (100%)
Country Director: Sector Director: Sector Manager	Stefan G. Koeberle John A. Roome Franz R. Drees-Gross	Themes:	Other Rural Development (60%); Other accountability/anti-corruption (20%); Global food crisis response (20%)
Team Leader(s):	Patrick Labaste	EA Category:	B Partial Assessment
Project ID:	P117243		
Lending Instrument:	SIL		
Does the project include any CDD component? No			
Joint IFC: No			
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Borrower: Republic of Indonesia			
Responsible Agency: Indonesian Agency for Agricultural Research and Development Ministry of Agriculture Jl. Ragunan No. 29 Pasar Minggu Jakarta Selatan			
Contact:	Dr. Haryono	Title:	Director General
Telephone No.:	62-21-780-1242	Email:	kbadan@litbang.deptan.go.id
.			
Project Implementation Period:	Start Date: 10/1/2012	End Date:	9/30/2017
Expected Effectiveness Date:	10/1/2012		
Expected Closing Date:	9/30/2017		
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Project Financing Data(US$M)		
[X } Loan [ ] Credit	[ ] Grant [ ] Guarantee	[ ] Other

For Loans/Credits/Others

Total Project Cost
$100 million

Total Bank
Financing : $80
million

Total Cofinancing

Financing Gap :

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Financing Source	Amount(US$M)
BORROWER/RECIPIENT	20.0
IBRD	80.0
IDA: New	
IDA: Recommitted	
Others	
Financing Gap	
Total	100.0

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Expected Disbursements (in USD Million)

Fiscal Year	FY 2013	FY2014	FY2015	FY2016	FY2017	FY2018			
Annual	10.0	20.0	25.0	10.0	10.0	5.0			
Cumulative	10.0	30.0	55.0	65.0	75.0	80.0			

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Project Development Objective(s)

The project development objective (PDO) of SMARTD is to improve the institutional capacity and performance of the Indonesian Agency for Agricultural Research and Development (IAARD) to develop and disseminate relevant and demand-driven innovative technologies, meeting the needs of producers and of the agri-food system.

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Components

Component Name	Cost (USD Millions)
Component A: Development and Management of Human Resources	40.0
Component B: Improvement in Infrastructure and Facilities	35.0
Component C: Research Management and Policy Support	15.0
Component D: Project Management, and Monitoring and Evaluation	10.0

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Compliance		
Policy		
Does the project depart from the CAS in content or in other significant respects?	Yes [ ]	No [X]
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Does the project require any exceptions from Bank policies?	Yes [ ]	No [X]
Have these been approved by Bank management?	Yes []	No [ ]
Is approval for any policy exception sought from the Board?	Yes [ ]	No [X]
Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No [ ]
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Safeguard Policies Triggered by the Project	**Yes**	**No**
Environmental Assessment OP/BP 4.01	X	
Natural Habitats OP/BP 4.04		X
Forests OP/BP 4.36		X
Pest Management OP 4.09		X
Physical Cultural Resources OP/BP 4.11		X
Indigenous Peoples OP/BP 4.10		X
Involuntary Resettlement OP/BP 4.12		X
Safety of Dams OP/BP 4.37		X
Projects on International Waters OP/BP 7.50		X
Projects in Disputed Areas OP/BP 7.60		X
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Legal Covenants

Description of Covenant
Establishment of the Project Steering Committee

Name	**Recurrent**	**Due Date**	**Frequency**
Establishment and maintenance of the Project Steering Committee	Yes	Three months after effectiveness	

Description of Covenant
Submission of Annual Work Plans and Budgets

Annual Work Plans and Budgets (Loan Agreement, Schedule 2, Section I.D (a))	Yes	November 30 of each year (except one month after effectiveness for the plan and budget for the	Annual

		first year of Project implementation)	
Description of Covenant Submission of satisfactory annual work plan and budget for the Project for each subsequent year of implementation			
Name	**Recurrent**	**Due Date**	**Frequency**
Training Scholarships and Research Awards Management (Loan Agreement, Schedule 2, Section I.E.1)	No	Six months after effectiveness	One-time
Description of Covenant Appointment of satisfactory consultant/s for management of training scholarships and research awards			
Name	**Recurrent**	**Due Date**	**Frequency**
Training Scholarships and Research Awards Review, Eligibility, and Terms (Loan Agreement, Schedule 2, Sections I.E.2-4)	Yes	Not applicable	Ongoing
Description of Covenant Review of applications for training scholarships and research awards, monitoring and evaluation of training and research activities, and eligibility criteria for and terms of training scholarships and research awards			
Name	**Recurrent**	**Due Date**	**Frequency**
Training Scholarships and Research Awards Audits (Loan Agreement, Schedule 2, Section I.E.5)	Yes	One month after the receipt of the report of each independent technical audit	Annual
Description of Covenant Submission to the Bank of the reports of the independent technical audits of the compliance of the training scholarships and the research awards with the eligibility criteria, terms, and implementation procedures set out in the Project Operations Manual			
Name	**Recurrent**	**Due Date**	**Frequency**
Environmental Code of Practice (Loan Agreement, Schedule 2, Section I.F.1 (a))	Yes	Not applicable	Ongoing
Description of Covenant Compliance with Project Environmental Code of Practice			

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Team Composition

Bank Staff

Name	Title	Specialization	Unit	UPI
Patrick Labaste	Task Team Leader	Agricultural Economics	EASER	102153

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Name	Title	Office Phone	City
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Eduardo Trigo	Ag. Research Expert	FAO	Rome, Italy
Jeroen Dijkman	Livestock Specialist	FAO	Rome, Italy

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Locations

Country	First Administrative Division	Location	Planned	Actual	Comments

I. STRATEGIC CONTEXT

A. Country Context

1. *More than a decade after the 1997 crisis, Indonesia has made remarkable progress and emerged as a middle-income economy with macroeconomic stability.* Real GDP growth has averaged 5 to 6 percent since 2002, and prudent macroeconomic management has resulted in low budget deficits, a low debt-to-GDP ratio, and manageable inflation. Indonesia's exports have grown strongly, while the external debt to GDP ratio has fallen. In contrast to the post-1997 crisis days, Indonesia proved to be quite resilient during the 2008-09 global economic downturns, and the economy continues to build momentum towards achieving stronger and more inclusive growth. Growth slowed sharply but remained positive in the fourth quarter of 2008, at the depths of the global downturn. By mid-2009, Indonesia's economy had recovered to pre-crisis averages, and the economy grew by 4.5 percent in 2009, making it one of the fastest growing economies in the G20. Indonesia's economy grew by 6.5 percent in 2011, with a projected growth of 6.2 percent in 2012, possibly increasing to above 7 percent by mid-decade, largely due to accelerating domestic demand and external competitiveness, while accounting for greater uncertainty surrounding the global economic outlook. The overall positive economic outlook provides a robust foundation for stronger and more inclusive growth, provided that the necessary institutional reforms continue to take place.

2. *Building on its existing economic trajectory and political stability, Indonesia today has the opportunity to create a virtuous cycle of sustainable and inclusive growth.* However 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 knowledge economy. Commodities accounted for 68 percent of exports in 2009 and, out of the manufactured exports (the remaining 30 percent); only 11 percent were high-technology products. In contrast, high-tech exports represent 31 percent on average in East Asia, 30 percent in China or 52 percent in Malaysia and the Philippines. Indonesia ranks 103 out of 146 countries on the Knowledge Economy Index, thus lagging behind its neighbors. In a context of increased openness and trade agreements, Indonesia needs to shift the sources of export/product competiveness from commodities and low cost productions to high value added items if it is to maintain and accelerate economic growth and poverty reduction. This shift, if it is to occur, will rely upon the overall innovation capacity of the country, including human resources, infrastructure, and most importantly, an enabling policy framework for national innovation systems.

3. *So far Indonesia has also been ranking poorly on competitiveness 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 twelve pillars of competitiveness in this analysis is the strength of a country's innovation system; on this criterion, Indonesia comes at the 40th rank, behind Malaysia (24), India (28), and China (29). According to the report, the main constraints faced by the country include a low national innovation capacity, little collaboration between R&D institutions and industry, and an 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.

[1] "The Global Competiveness Report (2009-2010)", World Economic Forum, 2010.

4. *Fostering innovation across the board has thus become a priority for the country.* The president of the Republic of Indonesia made innovation a priority for his second term of presidency, recognizing its importance for the country's long-term growth. The Government's national medium-term development plan (RPJM) for 2010-2014 recognizes the importance of institutional reform and capacity-building. It identifies bureaucracy and governance reform as one of eleven national priorities. To support this vision, the "Science and Technology" chapter of 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". A "National Innovation Commission" (Komite Inovasi Nasional, KIN), an advisory body reporting directly to the president and composed of representatives of the Ministry of Research and Technology (Kementerian Riset dan Teknologi, RISTEK), non-ministerial research institutes (Lembaga Pemerintah Non Kementerian, LPNK), academia, and private sector has been established to synergize the efforts of the various actors in the national system and convene them on a regular basis, as well as develop concrete policies and mechanisms that cut across sectors.

B. Sectoral and Institutional Context

5. *Historically, over several decades following Independence, progress in agriculture has been a major driver of Indonesia's impressive economic growth and reduction in poverty.* Today agriculture continues to be a potent driver of growth and poverty alleviation. In spite of its decreasing role in the economy, the agricultural sector still plays a strategic role in Indonesia's economic development. It employs the largest share of labor (45 percent of national workforce) and contributes the second-largest share of GDP (15 percent in 2008). More than half of Indonesians live in rural areas where agriculture is the primary source of livelihood. Growth in agricultural productivity has been shown to be the main driver in rural poverty reduction during the period 1976-96, during which rural poverty declined from 40 to 11 percent.

6. *In spite of rapid urbanization and strong economic growth, agriculture continues to play an important role in Indonesia's economy*, providing employment to 45 percent of the workforce and income to two-thirds of the country's poor. Agriculture remains a key development priority. Revitalizing agriculture is critical for the economic prosperity of rural Indonesia and also to improve the country's food security situation in the long run. Government is now aware that improving the resilience of the agricultural production system in the medium to long run is critical for sustainably improving food security. Agriculture's role has also been recast as part of the National Master Plan for Acceleration and Expansion of Indonesia's Economic Development (MP3EI), launched in 2011, in which the Ministry of Agriculture is responsible for overall coordination and particularly in charge of corridor 3 (Kalimantan). Finally the Ministry of Agriculture has recently launched the preparation of a long-term strategy for "Agriculture 2030".

7. *Public support and spending in agriculture have dwindled considerably during the past decade, although this trend has been reversed in the last couple of years.* While increases in agricultural productivity are credited with reducing poverty in Indonesia during the 1970s and 1980s, public spending on R&D was only 0.22 percent of the agriculture output in 2003. By 2007, spending on R&D was still only half of that devoted to seed subsidies. After adding in private sector R&D investments, the intensity with which Indonesia invested in agricultural

research[2], at 0.27 percent, was at the level of Laos (0.24 percent), and much lower than Malaysia (1.92 percent) or the Philippines (0.46 percent). Spending on the agricultural sector accounted for less than 5 percent of the total national budget in 2008. As a percentage of value added, Indonesia spends considerably less than other regional and middle-income countries. In 2004, public spending as a percentage of value added in Thailand or Malaysia was four times greater than in Indonesia.

8. *Yet, numerous studies in developing countries have consistently shown that investments in R&D generate high payoffs*. Investment has been shown to yield rates of return averaging over 40 percent and bringing about major declines in rural poverty (Byerlee and Alex, 2003). The World Development Report 2008 found an average internal rate of return of 43 percent across 700 agricultural R&D projects in developing countries throughout the world. Earlier publications (Evenson, 2001) reviewed published evidence that suggests the average annual rate of return stands at 49 percent for agricultural R&D, and 44 percent for R&D and extension combined. Fan and Rao (2003) found that agricultural research had a much larger impact on productivity than non-research spending. Even rural poverty has shown to be highly responsive to the dissemination of agricultural R&D outputs. In India and China, for instance, the rapid agriculture growth following technological innovations, like the diffusion of high yielding varieties of crops, were accompanied by major declines in rural poverty (World Bank, 2008).

9. *While Indonesia is one of the largest agricultural economies in Asia, it spends proportionally less on agricultural R&D than most Asian countries*, both as a percentage of agricultural GDP (ARI ratio) and as a percentage of total agriculture expenditure, despite rapid economic growth. In 2005 and 2007, Indonesia's ARI was 0.2 and 0.19 percent, respectively, which was less than half the regional average. In contrast, neighboring countries such as Malaysia and the Philippines reported the ratio of R&D spending to agricultural GDP at 1.92 percent and 0.46 percent respectively (ASTI, 2009). Along these lines, countries that are strong suppliers of quality agricultural research, such as Brazil and India, invested substantially more with ratios of 1.52 and 0.36, respectively.

10. *The recent Agricultural Public Expenditure Review (Ag PER) in Indonesia by the World Bank*[3], *underscored the need to invest in Ag R&D*. While, in real terms, Indonesia's public expenditure for agricultural R&D increased between 2001 and 2007, the level of spending is still low compared with other Asian countries. In addition, this trend was not maintained in 2008 and spending increased only slightly in 2009. Public spending on agricultural R&D in Indonesia was only 0.22 percent of the agriculture output in 2003 (0.27 including private sector). This was at a similar level to Laos (0.24 percent), while much lower than Malaysia (1.92 percent) and the Philippines (0.46 percent.

11. *Another issue is the relative underperformance of Indonesian research in terms of research outputs.* This is partly due to the low level of 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. When adjusted for both the size of the population and the number of researchers, Indonesia's ranking is especially low when compared to other middle income

[2] R&D expenditure as a share of total agriculture output.
[3] Agriculture Research and Development, Policy Note, World Bank, 2009.

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). While these indicators are not entirely relevant for Indonesia in the context of its early state of technological development, the significant differences with the above countries points at the urgency to establish innovation policy as a priority. In an increasingly globalized economy and given the growing prevalence of bilateral (most notably with China) and multilateral trade agreements (most notably the ASEAN free trade zone); Indonesia needs to step up innovation to avoid becoming increasingly reliant on low value agricultural and natural resource commodities.

12. *A recent study stressed the need for Indonesia to invest more and better in agriculture R&D.* The Australian Center for International Agricultural Research (ACIAR) has entrusted a team of the Australian National University (ANU) of carrying out a study on the effect of research on the improvement of agricultural productivity in Indonesia[4]. The study examined the extent to which agricultural research in the country has contributed to the enhancement of productivity growth. At the same time, the study looked at other possible determinants of agricultural productivity growth, including infrastructure investments, extension, research, educational attainment in rural areas, weather changes and epidemics. It used the existing literature to estimate the rate of Total Factor Productivity (TFP)[5] growth in Indonesian agriculture in order to explain its determinants. The main conclusion of this study points at underinvestment in agricultural research in Indonesia. Given the government's objective of raising the level of Indonesia's food self-sufficiency, combined with rapid population growth, diminishing returns on traditional factor inputs, declining availability of arable land, fresh water supply and other natural resources, concern over climate change and environmental degradation, along with high fuel and fertilizer prices, it is clear that agricultural research deserves a much higher policy priority within Indonesia than it has received in recent years.

13. *The strategic framework for the project is provided by IAARD's Strategic Plan (Renstra) for the period 2010-2014.* The Indonesian Agency for Agricultural Research and Development (IAARD) is the agency of the Ministry of Agriculture that has been mandated by GoI of carrying out agricultural research and agricultural technology dissemination in Indonesia. The agency was established in 1974. It is clearly stated in the strategic plan that the objective is for IAARD to become a world class agricultural research institution in 2014. This should be measured by its capacity to achieve both: (a) scientific recognition, which measures the contribution of IAARD to the advancement of agriculture science and technology, and (b) impact recognition, which measures the contribution of IAARD to the increasing productivity or quality of agriculture products and agriculture development as a whole. In order words, this means being globally competent and locally relevant. To achieve this, IAARD must have greater international involvement in agricultural research and development. A new national agricultural sector strategy for 2015-2045 is currently being drafted and is expected to feature a substantive transformation of the approach to the provision of agricultural services.

[4] The effect of research on agricultural productivity in Indonesia, ACIAR/ANU, March 2011.

[5] The TFP is the broadest measure of productivity. It compares the total output of the sector to the total land, labor, capital and material inputs used to produce that output (USDA/ERS).

14. *The Bank has a long record of successfully supporting the transformation of agricultural R&D in Indonesia.* The Bank has supported the development of the innovation capacity of agricultural research services since 1975, as well as improvement of the capacities of extension services, agricultural education and training since the late 1960s. In recent years, the now closed DAFEP and the ongoing FEATI projects have promoted participatory approaches to extension aimed at agricultural commercialization. Through the implementation of SMARTD, a multi-year investment program, MoA will further implement its agricultural research agenda by strengthening the capacities and performance of IAARD, its agricultural research agency. SMARTD - along with FEATI and other bilateral projects - offers an opportunity to reshape the delivery of agricultural services (research and extension) towards a dynamic, multi-provider model that is needed to increase the competitiveness of Indonesia's agriculture in domestic and international markets.

15. *Finally, SMARTD is an opportunity for IAARD to address the challenges of international agricultural research.* Put in the global context, the challenges facing IAARD and Indonesia's agriculture research system are similar in nature to the challenges of agricultural research for development that have been identified in the global conference on agricultural research for development, as reported by the Global Forum on Agricultural Research (GFAR) in 2010[6]. The conference resulted in a set of recommendations known as the GCARD road map that is quite relevant to IAARD. The main recommendation is for countries to engage in a revolutionary revitalization of agricultural research and innovation systems, as well as in fundamental changes in delivery systems in order to contribute to the abolition of hunger and poverty. These goals can only be attained if (i) all stakeholders work together, (ii) the necessary capacities to conduct research and scale up delivery are put in place, and (iii) their outputs are made available to millions of small farmers operating in diverse natural conditions.

16. *In this context, IAARD needs to address the shortage in research capacities while modernizing management systems and setting in motion institutional reforms that can make it a more effective research organization.* The rationale for investment in SMARTD lies on the need to address short-term constraints, especially on the human resources side, while providing support for further transforming research management and establishing an overall policy framework that supports effective innovation through 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.

C. Higher Level Objectives to which the Project Contributes

17. *The proposed investment is well aligned with the strategy and priorities of the Country Partnership Strategy (CPS) for FY 2009-12. The CPS focuses Bank support on building institutions*[7]. The CPS notes that this new phase of development was likely to be even more challenging for Indonesia because the country was entering into a period of second generation

[6] Uma Lele, Eugene Terry and Eduardo Trigo, 2010. The Road Map to Transform the Agricultural Research for Development (AR4D) System for Greater Global Impacts : Shifting for Being Observers to Actors. Global Conference on Agricultural Research for Development (GCARD), Montpellier, France, 2010.

[7] "Investing in Indonesia's Institutions for Inclusive and Sustainable Development", July 22, 2008.

reforms focusing on institutional transformation to promote economic development and social welfare. Failure to begin addressing these reforms would run the risk of falling into the middle-income trap -- squeezed between the innovations of high-income countries and the low labor cost of low-income countries. The consequences of this could include stagnant poverty levels, the accelerated depletion of natural resources and increased threats to social cohesion. This holds particularly true for the agriculture sector.

18. *The Bank will be already investing in the field of science and technology through the RISET project, due to start in 2012 like SMARTD.* This is part of a broader development effort in the area of science and technology in Indonesia that could potentially affect positively the institutional environment for SMARTD implementation and, in the medium to long term, also contribute to increase the effectiveness of IAARD and the potential impact of the planned investments. At the country level, following the Presidential Directives issued in April 2010, the Innovation Commission was established. It has been tasked with producing high level recommendations aimed at the improvement of the policy and institutional environment for innovation in the country; several of the areas under consideration impinge on agriculture and agro-industry and consequently on IAARD's activities. Progress on this will be closely monitored during SMARTD implementation.

19. *The proposed investment is a clear response to the national priority objective to improve food security. Pillar 1 of the Food Access Program (FAP) currently being prepared by the Bank relates to raising agricultural productivity growth in the medium to long term. It entails two sets of policy measures. The first one is the implementation of Presidential Instruction 5/2011*[8] by which several government line ministries and agencies have been instructed to design programs and actions in the following key areas: improvement of early warning systems and response mechanisms to strengthen the capacity of rice farmers to manage and cope with climate variability, enhancement of productivity and efficiency of rice production systems through improved access to inputs and machinery, improvement of irrigation and drainage service provision, improvement of farmer's access to markets and post-harvest facilities, and limitation of the rate at which productive rice fields are converted to alternative non-agricultural uses and improvement in the use of abandoned lands. The second set of policy measures is budgetary, i.e. substantially increasing the 2011 budgets of the Ministry of Agriculture and Ministry of Public Works to: (i) speed up rehabilitation of irrigation facilities and improve management of irrigation systems; and (ii) strengthen the contribution of R&D to growth in agricultural productivity. Clearly, the investment in SMARTD forms an integral part of the long-term responses of government to the challenge of improving food security in Indonesia.

20. *Third, the project will contribute to the higher level objective of improving Indonesia's competitiveness in the knowledge economy.* The project is consistent with GOI's medium term priority to strengthen the national innovation capacity. This will be achieved by creating a "national science and 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 GOI's medium-term strategy document (RPJM). Here again, the proposed project will support the country partnership strategy (CPS) objectives of building Indonesia's institutions,

[8] Presidential Instruction Number 5 of March 2011 (Inpres 5/2011).

with focus on supporting the public institutions related to science and technology, and/or having leading roles in research and innovation. The project will also help GOI in enhancing institutional incentives to mainstream research and innovation into the national priority areas.

21. *As already mentioned above, the proposed project has also to be put in the context of the main challenges of 21st agricultural research worldwide. Agricultural research organizations are, at present times, facing significant challenges.* Supporting the transformation of international agricultural research has long been a corporate priority for the World Bank. In recent years, strong political support and significant and sustained contributions have been brought by the Bank to the reforms of the CGIAR system. Developed to mobilize the innovations of the "green revolution" era, they now need to respond to an increasingly diversified demand, where, to the continuing challenges of contributing to food security, research priorities have also to take into account new sets of issues arising from urbanization, demands from more value added products, consumer requirements, climate change concerns, while, at the same time, adapt to the requirements and opportunities of the new emerging technologies, such as biotechnology and ICT. Higher investment, closer links to basic science, increased role of partnerships with the private sector, more complex regulatory environments, are some of the issues that need to be addressed as a "business as usual" behavior does not seem to be an option. SMARTD implementation strategy will require appropriate support in a number of these areas.

22. In sum, SMARTD represents a window of opportunity to assist Indonesia to make critical structural changes to improve the performance of its agricultural R&D agency which in turn will increase drastically the chances of getting a strong return on the proposed investment. The project entails the implementation of an innovative program to upgrade public sector R&D capacities in agriculture (human resource development, facilities upgrading, research management improvement) and improve the quality and relevance of research through stronger linkages with the private sector, universities, and NGOs as well as with extension services and farmer communities. It will also develop models that will improve the effectiveness and financial sustainability of the technology dissemination system with greater accountability to, and participation by, the farming communities.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

23. *The project development objective (PDO) of SMARTD is to improve the institutional capacity and performance of the Indonesian Agency for Agricultural Research and Development (IAARD) to develop and disseminate relevant and demand-driven innovative technologies, meeting the needs of producers and of the agri-food system.* The project will be implemented over a period of five years.

24. IAARD is composed of 14 research centres, 19 research institutes, 2 supervisory institutes, and 32 provincial assessment institutes that include laboratories, research stations and experimental farms, spread across the country. SMARTD will make physical investments in only part of the research centres and in selected sites, as follows: Jakarta, Bogor, West Java (ICABIOGRD, ICAERD, ICAPOSTRD, IVEGRI, ISICRI, Center for Seed Production of Tropical Fruits), East Java (ITOFCRI, ILETRI), Central Java (IAERI), North Sulawesi (ICOPRI,

AIAT), and in the AIATs of South Sulawesi, Jambi, West Sumatra, South Kalimantan and West Papua.

25. The proposed investment is expected to enhance the performance, effectiveness and relevance of the agency in the development and dissemination of farmer and market demand-driven technologies. It will strengthen the capacity of IAARD to develop, adapt, and disseminate appropriate agro-technologies that can suit local agro-ecological and socio-economic conditions and enable actors and end-users to respond on emerging market demands (domestic and international) requiring improved agricultural productivity, profitability and sustainability.

Project Beneficiaries

26. The final beneficiaries of the Project will be the intermediate and end users of innovative agricultural technologies in Indonesia, i.e. the farmers, the farming community and the agro-food system, who will benefit from the improved capacity of IAARD to offer relevant and adapted technologies. Other beneficiaries are the civil servants who will be selected to receive scholarships for degree and non-degree programs. It is anticipated that close to 1,500 staff will participate in the program from 2012 to 2016, with approximately 220 in degree training (65 MSc., 85 Ph.Ds, and 70 participants in a linkage/sandwich program), approximately 245 in non-degree training, and 600 involved in seminars, workshops and conferences. SMARTD will particularly encourage women participation in the training programs.

27. The project should also contribute to improving the overall system for science, innovation and technology in Indonesia, by identifying key performance constraints and priority areas for improvement and policy reform, as well as establishing the basis for greater coordination among stakeholders, better implementation and monitoring of the impact of science and technology policies. Furthermore, it will contribute to improving the management of the competitive research incentives program, which is bound to become a fundamental tool of the national innovation policy in the future.

B. PDO Level Results Indicators

28. The project's main outcome results indicators are:

- Number of new technologies developed/refined (as a good estimate of the efficiency of the agricultural research system);
- Effective adoption of technologies by end users (number of farmers having adopted IAARD's technologies);
- Number of citations of IAARD research publications and number of internationally peer reviewed publications authored by IAARD researchers;
- Percentage of external funding in IAARD budget, i.e., funding for IAARD that comes from other resources than the national budget.

29. The above indicators are both qualitative and quantitative targets, and should reflect an improved standing of Indonesia's agricultural research in Asia as a result of the project. Most data for monitoring would be available from public or project records.

III. PROJECT DESCRIPTION

Project Components

30. To achieve the above objective, the project will support the improvement of the research capacities of part of the NRIs, CRIs and AIATs through investment in training of researchers and upgrading of facilities, as well as in improvements in research management processes throughout the institution. The activities to be undertaken are grouped into the following four components: (i) Human Resource Development and Management; (ii) Improvement in Infrastructure and Facilities; (iii) Research Management and Policy Support; and (iv) Project Management and Monitoring and Evaluation.

31. **Component A: Human Resource Development and Management (US$40 million).** The Human Resource Development and Management component aims at strengthening the scientific skills and research capacities of IAARD's professional staff. This objective will be achieved through a number of different programs and activities designed to enhance the academic and technical skills of IAARD staff and meet quantitative targets in terms of trained personnel. Activities in this component will address both the need to replace retiring staff and at the same time redress their disciplinary profile to better reflect current trends in science and technology and improving the research management capacities of researchers at all levels. To this end, the project will support the implementation of an advanced degree program (150 MSc. and Ph.D. degrees to be obtained in prominent overseas universities), a sandwich degree training program, and a post-doctoral and scientific exchange program, short-term training on research and ITC management, activities to improve HR management systems, and provision of short-term expertise to help implement the above programs. In total, close to 1,400 researchers, technicians and support staff should benefit to some extent of the training programs. Component A comprises four sub-components: (1) scientific training (degree and other) and networking; (2) technical and managerial training, (3) human resources management (mobility program, incentives/promotion and recruitment), and (4) short-term expertise and support for implementation of sub-components (1), (2) and (3) above.

32. ***Sub-Component A.1: Scientific training ($35.7 million).*** This sub-component will address the improvements required in the quality and quantity of research staff at all levels. It will entail three main activities: (i) implementation of a scientific degree overseas training program, (ii) implementation of a short-term advanced training program (sandwich training, post-doctoral, scientific exchange program), and (iii) enhancement of participation by IAARD research and management staff to seminars, workshops and conferences at international level. The training activities will be implemented through the awarding of scholarships and awards to eligible researchers. As part of the first activity, SMARTD will fund the training of 150 young researchers at PhD (85) and MSc (65) levels, mainly abroad. The disciplines of study and degree specialization are determined based on an assessment of the strategic needs of IAARD and on nominations by the NRIs, CRIs and AIATs. In recent years, the degree training program for IAARD's researchers was funded by national budget (APBN) and done essentially in national universities. SMARTD will enable IAARD to train a strong contingent of researchers in prominent institutions abroad over the next five years. An advisory consultant of international caliber will be recruited to help IAARD screen and select the most appropriate training

institutions abroad for its long-term degree training program, and review/update the agency's strategic staffing plan.

33. ***Sub-component A.2. : Technical and management training ($3.1 million).*** The objective of sub-component A.2 is to improve the capacity of researchers and research support staff through technical and management training. This sub-component will cover two sets of activities: (i) technical and research management training, and (ii) training on professional skills. Technical and research management training will entail short-term training for researchers and research technicians to improve their broad knowledge and skills in disciplines such as biotechnology, food processing, molecular biology, bio energy, nano-technologies, animal reproduction, and climate science. It will also provide opportunities for research managers and staff, as well as for field and laboratory technicians, to improve their management skills in areas such as field station management, laboratory management, monitoring and evaluation, public-private partnerships, commercialization of research results, and other relevant topics. This activity will be implemented through collaborative programs with relevant national and overseas institutions. The second set of activities - training on professional skills - consists in short-term training to strengthen the professional skills of IAARD researchers in specific cross-cutting areas such as IPR, regulatory issues, management leadership, ICT, librarianship, and others. Around 242 IAARD staff should benefit from training under this sub-component.

34. ***Sub-component A.3: Human resources management ($1.2 million).*** The objective of sub-component A.3 is to strengthen the capacities of IAARD in terms of management of its human resources. It will include the following activities: (i) implementation of a detachering (mobility) program for mentoring to optimize the use of available research capabilities. The mobility system (detachering) will be designed and institutionalized to allow skilled and experienced researchers to move more easily from one institution to the other thus enhancing knowledge transfer from senior researchers to junior ones, (ii) improvement in the staff evaluation, promotion and incentives system, in order to make IAARD's conditions of service more competitive with those of other organizations, and with the private sector. The evaluation of staff performance will be established as a principle, conducted initially through pilot projects in one national research center and one AIAT, and then rolled out in the entire institution, and (iii) improvement in recruitment procedures of new research staff through consultations within MoA and collaboration with the best universities. The new recruitment procedure would be piloted during the project, and, in a second phase, institutionalized throughout IAARD.

35. **Component B: Improvement in Research Infrastructure and Facilities ($35 million).** The objective of Component B is to rehabilitate, improve and upgrade the physical infrastructure of some of the operational units within IAARD (NRIs, CRIs, and AIATs) in terms of laboratory equipment, upgrading of experimental farms, and rehabilitation/construction of additional research facilities. Activities also include the development in year 1 and 2 of the project of a fully comprehensive strategic master plan - to be entrusted to a team of consultants of international caliber - to guide IAARD's future investments in research infrastructure.

36. ***Sub-component B.1: Laboratory improvement (US$14.7 million).*** The objective of sub-component B.1 is to improve the capacity of IAARD in terms of laboratories that operate at a level meeting world standards. There are currently 156 laboratories within IAARD and 36 of them have ISO 17025/2005 certification. 35 of these laboratories will benefit from investment in

equipment to be made through SMARTD. Besides the focus on the modernization of their equipment, the project will also support an extensive program of accreditation of all laboratories to conform the Indonesian National Standard (SNI 19-17025/2009). It will also foster a more systematic networking of all laboratory facilities to ensure a higher efficiency of resource use, particularly with regards to equipments of high complexity.

37. ***Sub-component B.2: Field station improvement (US$6.8 million).*** SMARTD will provide resources to upgrade part of IAARD's field stations (FS). The field stations are one of IAARD's important assets to support the process of generating improved applied science and technologies in the NRIs/CRIs and AIATs. 16 research stations will be improved, upgraded and equipped under SMARTD, of which four experimental stations specialized in seed production (UPBS). The improvement of the experimental farms will include the renovation and/or provision of appropriate irrigation infrastructure, green-houses, screen-houses and other required facilities, such as seed processing facilities and warehouses.

38. ***Sub-component B.3: Building construction and renovation (US $13.5 million).*** This sub-component will support the relocation and construction of new AIAT offices in 3 provinces (Jambi, N. Sulawesi and W. Papua), and new the construction of new office facilities for the seed production center for tropical fruits in Subang, the construction of four new laboratories (food nano-technology, gene banks, integrated laboratories), and the renovation of other selected facilities and infrastructure.

39. **Component C: Research Management and Policy Support ($15 million).** The objective of the Research Management and Policy Support component is to enhance the efficiency and effectiveness in the use of research resources through the implementation of improved research management strategies, processes and instruments. The component includes the following sub-components: (i) improvement of priority-setting, planning and programming systems with more effective stakeholder participation; (ii) scaling-up of competitive research funds to enhance collaborative programs with other national and international research organizations and foster local innovation; (iii) support to the commercialization of research products, leading to the establishment of more diversified and sustainable research funding strategies; and (iv) improvement of technology dissemination systems. As far as policy support is concerned, the project will assist in the generation of information and studies in support for strategic policy decision making, both in terms of MOA's policies and programs and in terms of to IAARD's research strategy, resource management and positioning within the national innovation system.

40. ***Sub-component C.1: Research priority-setting, planning and program*****ming** ***(US$1.1 million).*** The objective of sub-component 1 is to improve the existing priority-setting, planning and programming system to enable IAARD to better respond to technology needs and innovation demands from the whole range of potential research end-users through an improvement of stakeholder participation. Sub-component C.1 entails the following activities: (i) data collection, data base development and analysis to better identify and quantify farm-level productivity gaps and barriers to technology adoption, (ii) improvement of performance assessment processes by strengthening IAARD's internal control system (SPI) and by developing and testing an assessment framework in selected IAARD institutions, and (iii) revision of the current priority-setting, planning and programming system and procedures.

41. ***Sub-component C.2: Competitive funds to enhance research collaboration and local innovation (US$10.6 million).*** The objective of the sub-component is to promote, develop and implement collaborative research consortia with national and international research institutions, and promote local innovation essentially through the awarding of competitive research funds. The sub-component will include two activities: (i) the establishment and/or scaling up of competitive funds to enhance research collaboration through the promotion of research partnerships with international and national institutions, the latter through the existing mechanism (KKP3T), and (ii) the establishment of a local competitive innovation funding scheme to foster innovation in agricultural technologies at local level (provincial and district levels).

42. ***Sub-component C.3: Commercialization of research products to increase and diversify funding ($1.2 million).*** Sub-component C.3 aims to strengthen commercialization of its research products by IAARD, and thereby increase the amount of non-tax revenue generated by the agency, as part of a broader strategy to diversify research funding. The sub-component includes three activities: (i) identification of technology/knowledge commercialization opportunities; (ii) development of a business plan for IAARD's research product commercialization, and (iii) support to the implementation of strategies that aim at better disseminating research products to the benefit of end-users. The final output of this activity will be an institutional policy and strategy for technology/knowledge commercialization (products, clients, market segmentation strategies, negotiation instruments, procedures, management of income revenues such as royalty payments), emulating successful models like the one of Embrapa in Brazil.

43. ***Sub-component C.4: Improvement of technology dissemination systems (US$2.1 million).*** This sub-component aims at improving the technology dissemination systems within IAARD and includes the following activities: (i) organization of periodic events at local and provincial levels - such as road shows and other initiatives - to display and demonstrate available technologies, as well as contribute to mobilize funding from local governments and partners, and (ii) strengthening of the multi-channel dissemination (MP3MI) system currently used by IAARD. This system consists of on-farm participatory demonstrations, by which the dissemination of technology resulting from research activities is done not only by extension workers and by the agricultural services (*Dinas Pertanian*) in general, but also by private sector actors, and by the more progressive farmers.

44. **Component D: Project management and monitoring and evaluation ($10 million).** The Project Management, and Monitoring and Evaluation component includes activities that will facilitate project implementation, provide the necessary administrative support, and carry out monitoring and evaluation activities related to project implementation. To this effect, IAARD has already established a national project management unit (PMU). The project will provide resources for contractual staff, operational costs, equipment, as well as technical experts and consultant support. Funding will also be provided for external audits, independent reviews, and support for preparing mid-term review and project completion reports.

45. Project management support will be provided to help the IAARD staff of the PMU lead, oversee and coordinate implementation and ensure timely delivery of planned outcomes. As part of the M&E, a baseline survey will be implemented in year 1 for all components. A reporting

system will also be set up to provide regular monitoring data and help identify project initiatives to be institutionalized for long term adoption.

C. Project Financing

Lending Instrument

46. A Specific Investment Loan (SIL) is selected as the lending instrument. This lending instrument is appropriate in terms of financing the identified training, infrastructure improvements, technical assistance, funding of research grants, piloting of activities and project management.

Project Cost and Financing

47. Total project cost and financing by component is summarized in Table 1 below.

Table 1: Project cost by component (US$ million)

Component	Cost (including contigencies)	% of total	World Bank financing	% WB financing
1. Development and Management of Human Resources	40	40%	39.7	99%
2. Improvement in Infrastructure and Facilities	35	35%	34.2	98%
3. Research Management and Policy Support	15	15%	5.7	38%
4. Project Management	10	10%	0.4	4%
Total	00	100%	80.0	80%

D. Lessons learned and reflected in project design

48. The Bank has extensive experience in reforming public research and technology institutions (RTI) throughout the world and particularly in South and East Asia. The lessons drawn, summarized below have been used in the preparation of the RISET project[9]. They are quite relevant for SMARTD. The Bank has also been supporting agricultural research in Indonesia since 1975, recently through the Agricultural Research Management Projects (ARM1 and ARM2). The independent evaluation of the research projects done after completion[10] confirmed the satisfactory ratings of the ICR of ARM2, with sustainability rated as likely and institutional development as substantial.

[9] RISET Project Appraisal Document, June 2011.
[10] Project Performance Assessment Report (Report No 39843), 2007.

49. *Key lessons learned on reforming public research institutes*. Many lessons can be drawn from successful and unsuccessful experiences in reforming public RTI 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 Turkey and Russia. The following key factors are associated with successful reforms:

- *What do successful RTIs do?* They mostly stay away from basic research. They do not do "commercialization" in addition to their core business - commercialization *is* their core business; RTIs do not innovate, companies do; they focus on offering knowledge rather than products;

- *How do successful RTIs operate?* They strive to be locally relevant and globally competent; their management and governance are influenced by market forces; they are flexible and autonomous, and able to continuously adapt to changing markets and changing times; they are customer-focused organizational structures. They have strong networks and have in-depth industry experience;

.

- *How do governments foster successful RTIs?* Government should define their mandate and mission, but not their strategy; Government should set them free of bureaucracy. Government should enforce clear and measurable performance indicators. Government should rely on independent panels to carry out regular assessments and evaluations of RTIs. Government should use funding as a lever for better performance.

50. *Key lessons learned on overseas training programs 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). Key lessons include:

- Combining initial studies in a national university with completion of a program at an overseas university is particularly valuable, being more cost-effective than programs offered completely overseas, thus enabling Indonesia to send more students overseas for at least part of their program. The combined programs also allow the tailoring of the study programs to the needs while building the capacity of domestic higher education institutions;
- It is unrealistic to expect Ph.D. candidates to complete their programs in three years, even though the candidates are among the brightest and most motivated that Indonesia has to offer. There needs to be a good balance between (i) reasonable standards of efficiency, and (ii) an optimal learning experience;
- So far Indonesia has had quite remarkable success in ensuring that fellows studying abroad return home and find positions appropriate for their training. The reasons appear to be cultural: a vast majority of Indonesian students choose to spend their lives at home rather than in the countries in which they studied. However, as the country becomes increasingly linked in the world economy and as transportation and communications

continue to improve, Indonesia may become somewhat less successful in ensuring that all its overseas fellows return to the country after completing their studies.

51. *Key lessons on competitive research grant and STI system strengthening*: Bank 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. They include:

- Giving highly-selected researchers grants large enough to attract them to stay in their home countries has been critical to renovating quality in critical research areas. Using competitive funding mechanism is more effective than simply providing S&T infrastructure without a mechanism for competitive screening of the specific research activities for which the funds will be used;
- Improving S&T systems involves overall institutional strengthening which takes place over reasonably long time frames. Projects can leverage such changes by demonstrating the advantages of improved research funding, administration, and industry linkage practices. The use of competitive, peer-reviewed grant awards systems, or intensive researcher accountability, can be initially resisted by those who may feel unable to compete. The monitoring and evaluation should be able to reflect the benefits of this type of system, and promote transparent and merit-based practices.

52. *Key lessons from agricultural research projects in Indonesia.* The main lessons drawn in the ICR for the Agricultural Management Project (ICR Report No. 16078), prepared in 1996, were as follows:

- Institutional capacity building. The most logical step towards strengthening the R&D system, after investing in basic infrastructure and intensive staff development, is to give priority to developing an improved research management capacity to promote the most productive and cost-effective use of research investments. It takes time to build a national capacity to conduct high quality and relevant research and for institutional changes to take place;
- Decentralization of R&D. To benefit fully from new achievements in research and promote the effective use of available local resources and knowledge, a decentralized R&D system with strong linkages to farmers, community-based organizations and local governments, is required. Continued reliance on commodity-oriented research is not appropriate at the field level. Farming systems research, based on agro-eco-systems and emphasizing location-specific needs and socio-economic conditions would better support resource-based planning and development. Decentralized planning should ensure participation of farmers and other stakeholder in the research process.
- Reforms of research management. Research management procedures and tools adopted by IAARD through ARM 1 need to be further implemented, especially in three areas: (i) further improve the assessment of priorities for R&D using economic efficiency parameters, such as periodic assessments of the economic impacts of technology adoption; (ii) further develop the MIS, IAARD should develop MIS sub-systems for use by researchers and technical staff, in addition to further improving the existing sub-

systems already used by research managers and planners; and (iii) the HR resource development plan should be prepared as part of project preparation and refined during early stages of project implementation as a basis for determining training needs and technical assistance requirements.

53. The main lessons drawn from the ICR of the ARM2 Project (ICR Report No. 25940), published in 2003, are summarized below:

- Regional technology assessments. Technological innovations are more likely to be useful to and adopted by farmers/fishers when they are tested and validated in a participative manner under local conditions. Farmer-to-farmer exchanges are very effective mechanisms for introducing improved technologies. Any follow-up project should give high priority to promoting farmer-managed assessments and dissemination activities. Better production practices are more widely disseminated among farmers/fishers when the practices are integrated into a small business/enterprise framework, and linked with the private sector.
- R&D management: Local governments are only willing to provide funding when they see tangible benefits to farmers/fishers in their province or district. Documenting economic benefits and impact of new technology is critical for convincing local governments and other partners to provide funding for the AIATs Decentralization of R&D activities will yield better outcomes if accompanied by an appropriate decentralization of authority and clear mandates within IAARD.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

54. The Ministry of Agriculture (MoA) will be the implementing agency of the SMARTD Project. The executing agency will be the Indonesian Agency for Agriculture Research and Development (IAARD). IAARD is a department of the Ministry of Agriculture created in 1974 and given the mandate by GOI to carry out agricultural research and agricultural technology dissemination. IAARD is composed of a range of research centers.

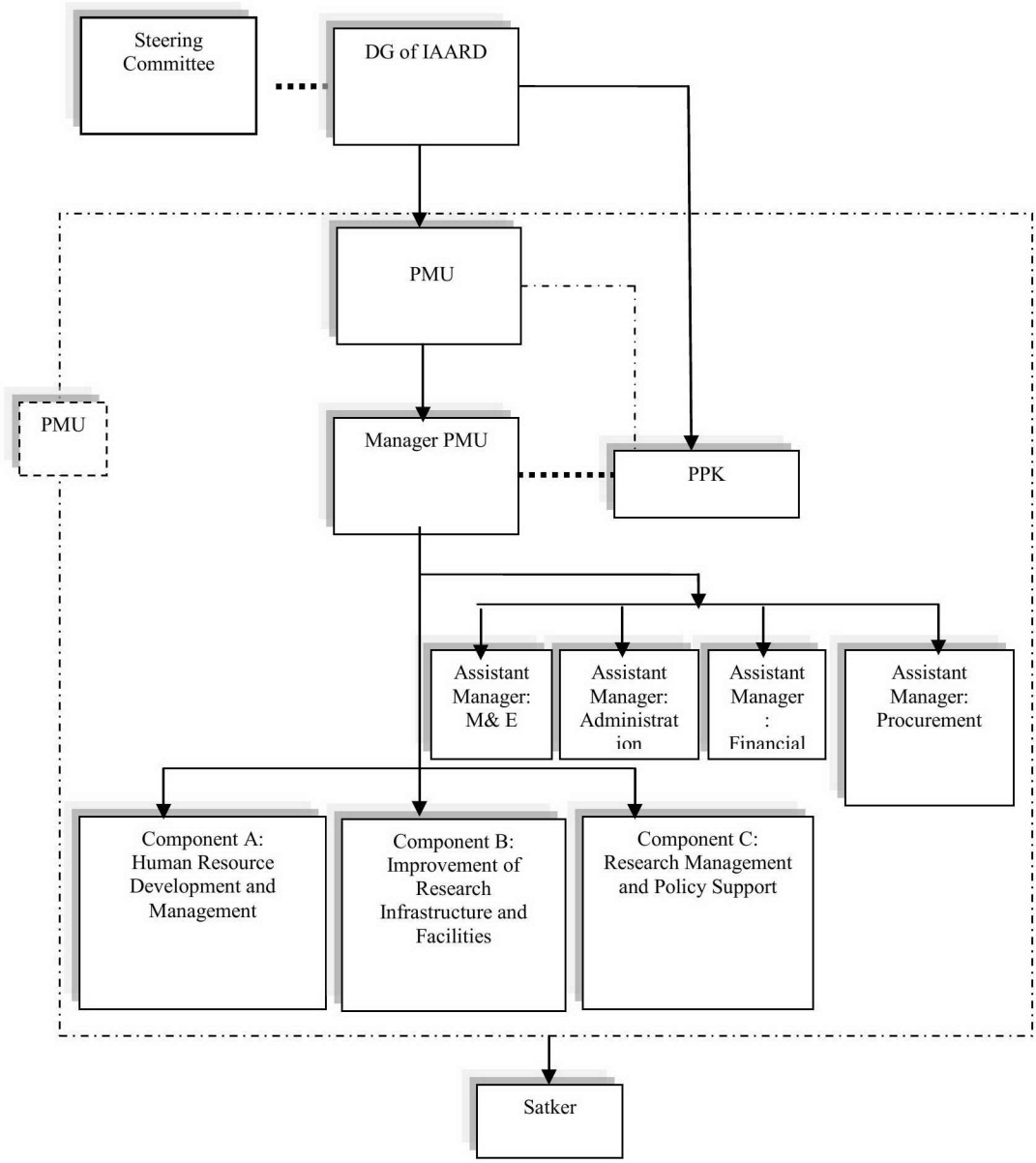
55. A Project Management Unit (PMU) in charge of implementing the project was established by a decree of the Director General of IAARD issued in November 2011[11]. The decree appointed the Executive Secretary of IAARD as PMU Director, as well as the Manager and staff of the PMU. A Commitment Holder (PPK) - financial administrator – has also been appointed. The PMU also includes one manager for each of component A, B and C who will be in charge of implementing activities and investments under their component in coordination with the decentralized units of IAARD (NRIs, CRIs and AIATs). The PMU is formally mandated to coordinate the overall project implementation and to carry out and supervise all activities to be implemented under the project. The PMU will be the central unit responsible for all activities as well as for the collection, monitoring, evaluation and consolidation of required data and information to prepare and submit reports to the Government of Indonesia and to the World Bank. The day-to-day project coordination will be supported by additional contractual technical

[11] Decree 273 of 11/8/2011.

assistance. Technical assistance consultants will be recruited in areas such as financial management, program management, M&E, and safeguards compliance, as well as specifically to support the PMU in implementing the project components. The TA consultants will be part of the PMU, and report to the Project Manager (Figure 3).

56. Project Steering Committee (PSC) will be established at the national level and will be headed by the Director General of IAARD/Secretary General of MoA, and comprise the following members: (a) Director of Debt Management, Ministry of Finance (MoF), (b) Director of Food and Agriculture, *Badan Perencanaan Pembangunan Nasional (BAPPENAS),* (c) Director of Technical Cooperation, Ministry of Research and Technology , (d) Director of Bureau of Planning, (MoA), (e) Inspector IV of General Inspectorate (MoA), Director of International Cooperation Center (MoA), (f) Marketing Division of Indonesia's Chamber of Commerce (KADIN), (g) four Directors of Research Center (IAARD) and (h) two representatives of Provincial Technology Commissions (PTC) from Central and East Java. The SC will be responsible in the formulation of national policies and plans, and coordination work arrangements required among inter-government agencies to effectively implement the SMARTD project at the national and provincial.

Figure 1. Organizational chart for project implementation



B. Results Monitoring and Evaluation

57. The implementation plan for the project results monitoring and evaluation (M&E) includes: (i) organizational arrangements, (ii) monitoring of progress in the implementation of activities with respect to the agreed annual work plans and overall project implementation plan, (iii) M&E staffing and cost estimates, (iv) M&E of outcome/results, and (v) M&E for early impact assessment. The M&E function is envisioned as part of the overall institutional development and capacity building of the project implementing units at the central, national and provincial levels. The PMU, which has been established within the Secretariat of IAARD, will have the overall responsibility for M&E operations and dissemination of results. Formal M&E

mechanisms and structures will be established at all levels of project implementation, while still maintaining the supervisory function of the PMU. The PMU will be responsible for monitoring implementation progress (physical and financial), verifying and consolidating data. It will also be responsible for monitoring of overall project implementation progress, outcome/results, evaluations, data entry/import MIS, commissioning and supervision of baseline, satisfaction, impact evaluation and other surveys.

58. A baseline study will be carried out in year 1. Data on results and output indicators will be obtained through IAARD's management information system and through specific surveys.

59. Monitoring activities and providing regular feedback is an important part of the empowerment agenda and a key to the success of the project. NRIs and AIATs will provide inputs to the PMU on a biannual basis as to how the various services and activities are proceeding, and whether or not project activities are responding to their needs. Baseline surveys, mid-term evaluations, and beneficiary assessments will be carried out throughout the project life. Technical assistance will be provided to the PMU to enable the implementation and supervision of an independent monitoring and to help strengthen the links between the project and NRIs and AIATs.

C. Sustainability

60. 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: to establish a National Innovation Commission (KIN) to build synergy among the government, business and academics; to prepare a National Innovation Policy Blueprint (led by KIN); to develop a strategic program and a long-term research agenda to improve Indonesia's competitiveness; to focus on maritime continents and other natural resources, human resources, biotechnology and renewable energy as part of the Green Economy; to establish national clusters to revitalize strategic industry; to implement strategic and prime research programs in seven priority areas (food security; health and pharmaceutical technology; energy; transport technology and management; information and communication technology; defense and security technology; and advanced materials); to develop science and technology parks; to increase government budget for innovation development; and to provide tax incentives for research and development activities.

61. In June 2010, KIN was formally appointed by the President through President Decree No. 32/2010. KIN is responsible for: assisting the President to strengthen the national innovation system and develop a culture of innovation nationally; providing input and consideration of priority programs and action plans, including funding allocations and facilities to strengthen the national innovation system and to produce innovative products; carrying out monitoring and evaluation of the implementation of policy and system-strengthening of national innovation

programs. KIN performs its duties in consultation, coordination, and cooperation with governmental and non-governmental agencies, representatives of community groups, as well as scientific communities and universities, technology experts, and innovators in the framework of strengthening an integrated national innovation system. IAARD is a member of KIN and this linkage is critical to ensuring that the agricultural research organization remains clearly anchored in the national science and innovation system.

62. 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 absorbed the largest share of public spending within the sector.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary

Stakeholder Risk	M	**Project Risk**	M
Operating Environment Risk - Country: The political commitment to reforms and good governance by the current government remains relatively strong. The new cabinet put in place by President Sudyono after his reelection in 2009 for a second term has been focusing on measurable performance targets and launching some ambitious reforms of the public sector institutions like the "bureaucracy" reform. Weaknesses in public procurement regulatory and management resulting in delays, especially of selection of consulting services, inefficiency and low quality of public procurement. A sound regulatory framework in public financial management (budgeting, accounting, reporting and audit) is in place, but internal control is weak and thus may adversely affect development effectiveness.	M	- Design: Project design involves - and project implementation will require - a set of structural measures to improve the management of resources (staff and facilities management, incentives systems, partnerships, diversification of research funding, etc.). The provision for TA included under the project as well as the grant to be provided by AusAid should guarantee that the necessary support and high-level expertise will be available throughout implementation.	M
- Sector and Multi-Sector: The agriculture sector in Indonesia is known for having generally weak institutions and capacities.	S	- Social and Environmental	N
	M	- Program and Donor The commitment from AusAID to provide support to SMARTD in the form of a multi-year agreement covering SMARTD implementation period is a key risk mitigation measure. Communication with key development partners during the	N

		preparation process, and harmonization of support during the implementation period will be ensured.	
Implementing Agency Risk		- Delivery Monitoring and Sustainability	M
- Capacity Arrangements were made during project preparation to secure the required expertise and technical assistance for detailed design studies and implementation support. Strong linkages will be established with the international agricultural research network that would provide support to implement the GCARD road map in Indonesian agricultural research. Finally, project design allows for adjustments at mid-term. IAARD has relatively low capacities in procurement as demonstrated during the project preparation phase. The unallocated amount of the loan will be used to recruit TA for procurement during project implementation.	M	**Other (Optional)**	
- Governance	M	**Other (Optional)**	
Fraud and Corruption (sub-category of Governance): There are risks of research grants for students not being awarded in a sufficiently objective, merit-based and transparent manner. There are also risks linked to procurement of works and equipment for the improvement in research facilities (component B). There are also risks associated with the awarding of matching grant mechanism and competitive funds (component C). The risks of fraud and corruption should be limited by ensuring compliance with the detailed procedures laid out in the Project Operations Manual that has been be agreed upon during project preparation.			
Overall Preparation Risk	M	**Overall Implementation Risk**	S

B. Description

63. Annex 4 provides the detailed assessment of risks and mitigation measures that have been built in the project design (ORAF).

64. A key risk in project design is that having more qualified researchers is a necessary but not sufficient condition for higher quality research outcomes. The civil servant researchers currently do not have sufficient incentives to do better research, particularly in terms of better market orientation and industry linkages. The substantial investment in scholarships for advanced overseas training of researchers that will be done through SMARTD therefore may not automatically lead to better research outcomes. The mitigation measure entails addressing institutional management issues to provide better incentives for outcome, as planned under component C of the project.

65. An important complementary activity - and an important risk mitigation measure - is the likely funding by AusAID of a technical assistance component to support SMARTD implementation with an indicative amount of around $6.5 million. This will ensure that the appropriate expertise is mobilized throughout the project life, particularly for the "software" component (component C) which includes some very innovative instruments to foster research management in IAARD like the revision of research priority-setting mechanisms, the scaling up of the competitive grant schemes, and the development of IAARD's business plan for research product commercialization.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

66. Given the lag time between the expenses incurred by the project in long-term training of researchers, upgrading of research facilities and improvement in research management, and the expected impacts in terms of improved research efficiency and technology dissemination, project economic benefits will be differed and indirect. However, the overall investment in agricultural research is justified in economic terms by the high returns to R&D spending, which have been estimated in the economic literature to be larger for countries that spend little on R&D and are natural resource abundant and documented in the case in Indonesia in the agriculture public expenditure review.

67. In addition, a study was done in early 2011 by a team from ACIAR (report AGB/2010/018) who examined the extent to which agricultural research within Indonesia contributes to the enhancement of productivity growth, while allowing for other possible determinants of agricultural productivity growth, including international agricultural research, infrastructure investments, extension, weather changes and epidemics.

68. Growth of total factor productivity (TFP) has been shown to contribute significantly to output growth in the Indonesian agricultural sector and its contribution has been greater than in the non-agricultural sectors. However, there may have been a slowdown in agricultural TFP growth in recent years. Refocusing attention on what determines TFP in Indonesian agriculture is thus important for understanding and sustaining long-term agricultural growth and thereby

maintaining its contribution to overall economic performance. The study drew upon the existing literature which estimates the rate of TFP growth in Indonesian agriculture and to attempt to explain its determinants, in particular the contribution of agricultural research. The data assembled for this research shows that the research intensity of agricultural production in Indonesia (the ratio of agricultural research expenditure to total value-added in agriculture) has declined from around 0.13% in the decade from the mid 1970s to mid 1980s to around 0.04% in the decade from the mid-1990s to the mid-2000s. This study provides a statistical analysis of the relationship between government expenditure in agricultural research, expressed in constant prices, and the level of total factor productivity in Indonesian agriculture. The data used relate to the years 1974 to 2006. The methodology is based on the error correction econometric procedure, designed for the analysis of time series data.

69. Based on these econometric results a projection was made of the impact on total factor productivity within Indonesian agriculture of a 1 billion Rupiah increase in agricultural research occurring in the year 2007. Impacts on the change in the value of Indonesian agricultural output were estimated from this analysis. From this it was possible to estimate the real rate of return (at constant prices) from a marginal increase in investment in Indonesian agricultural research. The estimated annual real rate of return was 13%. The estimated real rate of return is well above rates normally required for public investments. It is concluded that Indonesia has under-invested in this form of public expenditure and an increase is warranted. If means could be found to increase the efficiency of publicly funded agricultural research this would further enhance the case for increased funding.

B. Technical

70. An initial assessment of the issues and challenges facing IAARD and agriculture research in general in the 21st century was carried out in May 2010 and its main findings and recommendations were provided in the expert's report[12]. This 2010 mission identified the main constraints facing IAARD and suggested improvements for change, and was used to guide the overall preparation work.

71. The initial project submitted by IAARD was a long list of investments that the agency deemed necessary to reinforce its capacities in terms of human resources and equipment for research facilities, yet with little attention given to improving research management processes. Throughout project preparation and intensive discussions with IAARD management and preparation team, the project design was strengthened with the inclusion of a full-fledged component C focusing on research management improvements to be brought during SMARTD implementation (priority-setting, funding of research consortia, partnerships and innovation, commercialization of research products and improvement of dissemination mechanisms). The two other components (A and B) were also strengthened with the inclusion of activities and expertise to address the main issues involved in the proposed investments in HR and research facilities improvement. For example, component A includes a provision for the recruitment of an international advisor to assist IAARD in screening and selecting training institutions abroad, as well as in improving its strategic staffing system currently based on a "critical mass" approach.

[12] "SMARTD (Policy Support and Research Management Component): Mission Findings and Recommendations", Dr. E.J. Trigo, May 2010.

In component B, a consultant of international level will be recruited in year 1 to help IAARD prepare a grand design/master plan study of the agency's future investments in research facilities, with a view at rationalizing, optimizing and ensuring adequate operations and maintenance of these facilities.

72. The project has benefited from a long and intensive preparation since concept note stage, particularly from preparation support missions by FAO experts and consultants, as well as by ACIAR experts and also indirectly through the network of international agricultural research institutions grouped in CGIAR, especially the GFAR (Global Forum on Agricultural Research), based in Rome. Several follow-up missions took place, particularly on the research management component (component C) led by Mr. J. De Meyer, Research Officer at FAO (June 2011), and on topics like strategic staffing and HR management (E. Gilbert, FAO consultant, January 2011), on laboratory needs assessment (G. Gilman, ACIAR, April 2011) and on experimental farm upgrading needs (B. Winter, FAO consultant, July 2011) the last two for component B of the project.

C. Fiduciary

73. *Financial management assessment.* The purpose of the project's financial management assessment is to determine whether the financial management systems of the executing agency (IAARD) are capable of producing timely, relevant, correct and reliable financial information on project activities, and whether the accounting systems for the project expenditures and underlying internal controls are adequate to meet fiduciary objectives, satisfying the Bank's OP/BP 10.02 and allowing the Bank to monitor compliance with agreed implementation procedures, and evaluate progress towards its objectives.

74. The main risk of the project is due to (i) significant amounts of soft expenditures (aggregating to about 62% of the total project cost), mainly on training and incremental operating costs that are vulnerable to misuse, and (ii) the fact that IAARD has not implemented a World Bank project for quite some time. To overcome these risks, the following arrangements have been requested (i) the Project Operations Manual (POM) will guide project implementation, which should cover additional mechanisms for improving internal control over accountability for soft expenditures; (ii) internal audit of project activities will be carried out by the MoA Inspector General (IG), and (iii) training on POM will be provided to staff involved in project implementation

75. *Disbursement arrangements.* The disbursement table below shows the disbursement categories for eligible expenditures under the project by source of funding, the allocations of the loan proceeds to each category and percentage of expenditures to be financed under each.

Category	Amount of the Loan Allocated (expressed in Dollars)	Percentage of Expenditures to be financed (inclusive of Taxes)
(1) Non-consulting services and training for Part A of the Project, except for Parts A.3 (b) and (c) of the Project, and training scholarships and training awards for the Project (Parts A.1 (a) and (b) of the Project, respectively)	39,525,000	100
(2) Goods, works, non-consulting services, and training for Part B of the Project	34,025,000	100
(3) Research funds for the Project (Part C.2 of the Project)	5,600,000	100
(4) Consultants' services for Part D.2 of the Project	850,000	100
TOTAL AMOUNT	80,000,000	

76. The applicable disbursement methods are (i) advance payment, (ii) reimbursement and (iii) direct payment. When the advance method is authorized, one single Designated Account (DA) in USD will be established for the project at the Bank of Indonesia and used to finance eligible project expenditures.

D. Procurement

77. ***Procurement arrangements***. Procurement under the Project will be carried out in accordance with the Bank's Procurement and Consultant Guidelines, January 2011 and the provisions of the Loan Agreement, including the provision for National Competitive Bidding (NCB) to be carried out in accordance with GOI's national Procurement Decree 54/2010 subject to the improvements listed in the NCB Annex to the Loan Agreement. Details of the procurement arrangements are provided in Annex-3.

78. However the scholarships to be awarded under the first two activities under Sub-component A.1 and the research grants to be awarded under Sub-component C.2 will not be subject to the Bank's Procurement Guidelines. The scholarship program has, however, been designed to ensure that the Bank requirements of the application of funds towards the purposes intended and on the basis of the principles of economy and efficiency are satisfied. The major proportion of the scholarship monies will cover the scholars' tuition/research fees at approved academic institutions, which will be paid directly to the concerned institutions. The balance of the scholarship monies will cover the scholars' living expenses, travel and supplies, and will be paid out as lump sum allowances with a basis in cost.

E. Governance and Anti-corruption

79. The objective of the Transparency and Accountability Framework is to identify corruption risks and mitigation measures beyond the standard control systems employed by the Bank. In particular, this Framework (i) maps potential risks of corruption; and (ii) presents program activities to address these risks in the form of a framework of measures to be undertaken. The plan is drawn based on based on the October 2006 World Bank Guidelines on

Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants, as revised in January_2011.

80. The Plan identifies the following risks: 1) risks related to the provision of scholarship (unfair selection, fraudulent practices by scholars, poor or mismatched quality of education, retention issues post award); 2) risks related to the administration of the project (procurement, administration of payments); 3) risks related to the provision of research grants (unfair selection, quality of research).

81. In order to address or mitigate such risks, the Plan seeks to ensure that criteria for selection and award of scholarships and research grants are well defined, easy to understand and disclosed; that the process is transparent, rights and obligations of scholarship and grant recipients are well communicated, monitored and enforced; and a grievances mechanism is available to capture and address complaints. Sanctions against individuals and/or firms are also outlined in the Plan to be imposed against those who are found guilty of committing corrupt, collusive or fraudulent practices. Specific mitigation actions are detailed in the Plan and in the Corruption Mapping Matrix.

F. Social (including safeguards)

82. SMARTD's main objective is to improve the institutional capacity and performance of the Indonesian Agency for Agricultural Research and Development (IAARD) in developing and disseminating innovative technologies. During project design, it was identified that no major social issues involved in the proposed investment. It is expected that the proposed project will enhance the performance and effectiveness of the Indonesian Agency for Agricultural Research and Development (IAARD) in the development and dissemination of farmer and market demand-driven technologies. IAARD is composed of 14 research centres, 19 research institutes, 2 supervisory institutes, 32 assessment institutes, and several research stations and research localized farms, spread across the country.

83. Social participation will be promoted during project implementation, it is anticipated that approximately 1,393 civil servants will participate in the program from 2012 to 2016, with approximately 220 in degree training (60 MScs, 90 Ph.Ds, and 70 participants in a linkage/sandwich program), approximately 245 in non-degree training, and 600 involved in seminars, workshops and conferences.

84. Regarding indigenous peoples, the proposed project activities will not finance activities that directly or indirectly will affect indigenous peoples; the activities are related to agricultural research and will be site specific and localized activities to be developed in the research centers for improving the human resource development, facilities and mobility improvement. Indigenous peoples are "neither present in nor have a collective attachment to the project area"; for this reason the OP 4.10 is not triggered for this project.

85. The project does not trigger the Bank's involuntary resettlement policy (OP/BP 4.12), as the project sites will be located on land owned by the Ministry of Agriculture or by the authorities at local and provincial level, so that there is no need for acquiring land for the proposed constructions. For the North Sulawesi IAAT, there is a decree from the Governor of

North Sulawesi Province (Decree No. 179/1984 of 30th October 1984) that allows the use of the land by the Ministry of Agriculture/IAARD. Also, IAARD has issued a letter, dated 14 February, 2012, confirming that all activities to be undertaken under SMARTD will be on land belonging to the Ministry of Agriculture or to local government authorities.

G. Environment (including Safeguards)

86. The project is rated as a Category B project due to the scale of potential environmental impacts and triggers the Bank's Operational Policy (OP) 4.01 on Environmental Assessment. Potential environment impacts may likely come from the improvement of research infrastructure (Component B includes civil works for two new laboratories, the rehabilitation and/or the upgrading of laboratories, and field stations). Laboratories and field stations will be designed and/or improved and their management systems will have to meet world standards (ISO 17025) as shown by some IAARD laboratories that have already been certified. Civil works contracts will follow the current government regulations such as Permit to Build (*IMB = Izin Mendirikan Bangunan*) that considers technical and environmental standards and include clauses on proper housekeeping, waste management and occupational health and safety.

87. In operating the laboratories, research activities may use chemicals that could have potential impacts. However, the usage of chemicals will be limited and on a very small scale. In addition, there are existing standards for laboratory operations, which include provisions relating to waste management and safety. With regards to the construction and civil works, the potential impacts will be limited in view of the following: (i) buildings are simple and small in size (including the new buildings); (ii) most constructions are within existing IAARD's facilities; and (iii) they will follow the current regulations on construction permit (IMB).

88. The project will not require a stand-alone environmental impact assessment or Environmental Management Plan (EMP). Instead the project will apply environmental codes of practice (ECOPs) for construction activities. The IAARD team prepared ECOPs for the construction of laboratory and research facilities and for the renovation project, based on World Bank standards. During appraisal, the Environmental safeguards team revised the ECOPs and provided specific recommendations to improve the existing version. In order to meet disclosure requirements, the ECOPs were disclosed on IAARD's website on January 30, 2012, and were made available to the public through the Bank's InfoShop on February 3, 2012. The ECOPs address construction-related impacts including clauses on proper site management, waste management and occupational health and safety. The environmental safeguards compliance process (implementation, monitoring and reporting) and ECOPs will be referred to and outlined in the Project Operations Manual (POM).

89. During the appraisal mission, a safeguard institutional capacity assessment was conducted. The organizational chart for SMARTD was discussed and reviewed. Three institutions are in charge of monitoring the environmental impacts of the project, i.e. (1) the Manager of Component B, (2) the Assistant Manager for M & E (Monev), and (3) the Head of Satkers (Satuan Kerja). The PMU Manager has mandated the Assistant PMU in charge of M&E to be responsible of ensuring that the institutional safeguards requirements are met. In addition, a safeguards consultant will be hired in year 2, 3 and 4 for which a budget allocation has been made. The safeguard training shall be conducted in coordination with other workshops

(procurement, FM etc.) prior to year 2. The Project Operations Manuals clearly explains the role and responsibilities of the Assistant PMU for M&E in monitoring and supervising safeguards compliance at every stage of the project and also in ensuring that contractors follow the ECOPs.

90. In addition, IAARD has also been familiar with the application of quality management and audit system (manuals, Standard Operating Procedures, and technical guidelines or juknis) related to the IAARD business processes and their laboratory management under ISO 17025 for two research institutes (BIOGEN and ICAERD). In other words, the institution has the capacity and experience to ensure that the safeguard policies will be followed, monitored and evaluated.

Annex 1: Results Framework and Monitoring

INDONESIA: SMARTD

Project Development Objective (PDO)	PDO Indicators	Use of outcome monitoring
The project's development objective is to improve the institutional capacity and performance of IAARD to develop and disseminate relevant and demand-driven innovative technologies, meeting the needs of producers and of the agri-food system.	P1: Percent of farmers that have adopted IAARD research results, disaggregated by gender.	P1 measures the relevance to farmers of IAARD's capacity to generate and disseminate technology. SMARTD contributes directly to this indicator's performance through its support to Multi-Channel Dissemination Program managed by ICATAD (see Indicator C4).
	P2: Number of technologies developed and/or refined and that are disseminated to users	P2 tracks IAARD's capacity effectiveness in developing and disseminating technology that is relevant to users. SMARTD contributes directly to this indicator through the training of researchers (component A), the improvement of laboratories and research stations (component B), support to research collaborations with other research institutions (component C), and by supporting the focusing of IAARD's resources to research through a more effective management of IAARD human resources and facilities.
	P3: Number of articles in internationally peer reviewed journals and publications on agricultural R&D results developed by the IAARD system.	Indicator P3 tracks IAARD's capacity to develop technology and applications whose interest and validity are recognized by the international scientific community. SMARTD contributes directly to this indicator's performance through the training of PhD level researchers (A2), improvement in research facilities (B1), and support to collaborative research (B3, C1).
	P4: Percentage of external funding in IAARD research budget.	Indicator P4 tracks IAARD's capacity to diversify its research budget by improving the relevance of its research and improving the management of its research. SMARTD contributes to this outcome through its support to scientific training and

		networking (sub-component A1), to the improvement in research infrastructure and facilities (sub-components B1 and B2), and to research collaboration and networking (sub-component C2) and commercialization (sub-component C3).
Component/Intermediate outcome	**Outcome indicators**	**Use of outcome monitoring**
Component A: Development and Management of Human Resources The objective of this component is to enhance and strengthen the human resources capacity of IAARD By developing the technical, managerial and leadership skills of staff working in the core functional areas of the agency and creating an appropriate system of HR	A1: Percent of IAARD staff that are researchers, disaggregated by gender. A2: Percent of IAARD researchers with masters and doctorate degrees, disaggregated by gender. A3: Percent of IAARD budget devoted to research.	Indicator A1 tracks IAARD's capacity in the short to medium term to attract and retain researchers. Linked to activities under sub-component A.3 (human resource management). Indicator A2 tracks IAARD's capacity to improve the scientific skills of its research staff. SMARTD contributes to progress in this indicator through the scientific training of IAARD's researchers under sub-component A1 (scientific training and networking) and by improving IAARD's ability to retain researchers (sub-component A3). Indicator A3 tracks IAARD's incentive to focus its budgetary resources on research programs as result of its re-qualified scientific capacity that SMARTD supports through sub-components A1 (scientific training and networking), A2 (technical and management training), and A3 (human resource management).
Component B: Improvement in Infrastructure and Research Facilities The objective of this component is to enhance and strengthen the infrastructure and facilities of IAARD notably by enabling selected research facilities and infrastructure of IAARD to function at level that meet world standard as defined by ISO certification.	B1: Number of laboratories supported under SMARTD accredited nationally and internationally B2: Number of experimental stations supported under SMARTD accredited nationally and internationally B3: Number of laboratories supported under SMARTD involved in international research networking	Indicators B1 and B2 tracks IAARD's progress in bringing its research facilities to international levels of best practice. Underperformance of these indicators suggests that modernization of infrastructure through SMARTD is not proceeding as planned and/or SMARTD infrastructure investment needs to be refocused in order to support IAARD modernization. Indicator B3 tracks IAARD's ability to improve its international research networking through the modernization of its research infrastructure. Underperformance on this indicator suggests that

		either infrastructure investment program (sub-components B1, B2, and B3) is not on track or that not enough synergy with sub-component C2 (research collaboration and net-working) is being developed.
Component C: Research Management and Policy Support The objective of this component is to support increased efficiency, effectiveness and relevance of research carried at IAARD by improving resource use through enhanced and innovative research management strategies and instruments.		Indicators C1, and C2 tracks the relevance of IAARD's research to other national and international research institutions. SMARTD contributes to the performance of this indicator through sub-component C2 (research collaboration and networking). Indicator C2 tracks: (i) IAARD's capacity to generate research outputs that are commercially attractive to intermediate and end users; and (ii) the appropriateness of Indonesia's regulatory environment for the registration and licensing of technologies. SMARTD contributes to this outcome through the activities under sub-component C3 (commercialization of research). Underperformance of indicator C3 signals the difficulty within IAARD's system to set appropriate research priorities supported through effective planning and programming. Possible factor explaining lack of progress may include failure to update policies for institutional organization, to revise relevant procedures, or to appoint a scientific board to inform IAARD program setting process. SMARTD contributes to the performance of this indicator through sub-component C1 (research priority-setting, planning, and programming). Indicator C4 assesses the effectiveness of ICATAD's Multi-Channel Dissemination Program in disseminating agriculture technology that is relevant to stakeholders at the sub-national level. Failure to make progress on this indicator flags the need to strengthen coordination between AIATs and PTCs at the provincial level. SMARTD contributes to the performance of this indicator through sub-component C4 (improvement in technology dissemination systems).

Monitoring arrangements

Project Development Objective (PDO): **To improve IAARD's institutional capacity and performance in developing and disseminating innovative, demand-driven and relevant technologies, meeting the needs of producers and agri-food industries.**												
PDO Level Results Indicators*		Unit of Measure	Base-line	Cumulative Target Values**					Freq.	Data Source/ Methodology.	Responsibility for Data Collection	Description (indicator definition etc.)
				Y1	Y2	Y3	Y4	Y5				
P1: Percent of farmers that have adopted IAARD research results, disaggregated by gender.		Percentage	30	30	35	40	45	50	Baseline, End line	Field Survey	ICATAD and PMU	
P2: Number of technologies developed and/or refined and that are disseminated to users.		Number	32	32	42	52	62	72	Annual	IAARD MIS	IAARD Planning Department & PMU	
P3: Number of publications in internationally peer reviewed journals on agricultural R&D results developed by the IAARD system.		Number	9	9	17	25	33	41	Annual	IAARD MIS	IAARD Planning Department & PMU	
P4: Percentage of external funding in IAARD research budget.		Percentage of IAARD's research budget	3.8	3.8	5.0	7.5	10.0	12.5	Annual	IAARD MIS	IAARD MIS & PMU	
INTERMEDIATE RESULTS												
Component A: Intermediate Outcome Indicators												
A1: Percent of IAARD staff that are researchers.		Percentage of staff	25.23	27.00	28.5	30.0	31.5	33.0	Semi-annual	IAARD MIS	PMU	
A2: Number of IAARD researchers trained in MSc and PhD programs.		Number	1474	1497	1514	1597	1624	1624	Semi-Annual	IAARD MIS	PMU	
A3: Percent of IAARD budget devoted to research.		Percentage of IAARD's total budget	26.12	27.0	29.0	31.0	33.0	35.0	Annual	IAARD MIS	PMU	
Component B: Intermediate Outcome Indicators												
B1: Number of laboratories supported under SMARTD accredited nationally		Number of laboratories	17	17	17	17	19	21	Semi-Annual	IAARD MIS	PMU	

and internationally.												
B2: Number of experimental stations supported under SMARTD accredited nationally and internationally.		Number of experimental stations	0	0	0	3	5	8	Semi-Annual	IAARD MIS	PMU	
B3: Number of laboratories supported under SMARTD involved in international research networking.		Number of laboratories	0	0	0	6	8	10	Semi-Annual	IAARD MIS	PMU	
Component C: Intermediate Outcome Indicators												
C1: Number of national and international research collaborations.		Number (Use RENSTRA)	181	181	264	339	534	668	Semi-Annual	IAARD MIS	PMU	
C2: Number of inventions that have IPR patented or are licensed to industries.		Number of patents (Use Renstra)	29	29	31	33	35	37	Semi-Annual	IAARD MIS	PMU	
C3: IAARD Annual Program takes into account the results of the program and budget priority setting developed under SMARTD.		Dichotomous (Yes/No)	No	No	No	Yes	Yes	Yes	Annual	IAARD MIS	PMU	
C4: Number of dissemination areas under the Multi-Channel Dissemination Program that are priorities in accordance to PTC recommendations.		Number	A	A+0	A+10%	A+20%	A+30%	A+40%	Semi-annual	ICATAD MIS	ICATAD & PMU	

***Please indicate whether the indicator is a Core Sector Indicator (see further http://coreindicators)**
****Target values should be entered for the years data will be available, not necessarily annually.**

Annex 2: Detailed Project Description

INDONESIA: SMARTD

1. To achieve the PDO, the project will provide resources to upgrade the research capacity of IAARD through investment in training of researchers, facilities upgrading, and improvements in research management. The activities are grouped into the following four components: (i) Human Resource Development and Management; (ii) Improvement in Infrastructure and Facilities; (iii) Research Management and Policy Support; and (iv) Project Management and Monitoring and Evaluation.

Component A: Development and Management of Human Resources (US$40 million).

2. The objective of component A is to enhance and strengthen the capacities, and improve the management, of IAARD's human resources. It aims at strengthening the scientific, research and management capacities of IAARD's professional staff to carry out and deliver research results that are relevant for the end users (farmers, farmer groups, rural enterprises, agro-processors, traders, etc.). This objective will be achieved through a number of different programs and activities designed to meet quantitative targets in terms of trained researchers and support staff, while at the same time maintaining the agency's capacity to provide scientific and technological support to the country's agricultural and agro-industrial development needs. Activities in this component will address both the need to replace retiring research staff and at the same time adjusting the disciplinary profile of the new researchers to be more aligned with current trends and demands in science and technology. It will also seek to improve the research management capacities of researchers at all levels.

3. To this end, the project will support and combine various programs and activities: (i) an advanced long-term degree training program (MSc. and Ph.D degree program) in prominent overseas universities, (ii) a "sandwich" degree training program, (iii) a post-doctoral program to complement formal training and/or up-date the capacities of researchers that already hold a Ph.D., (iv) a scientific exchange program with international centers of excellence in areas of particular interest for the agency, (v) a training program on research and ITC management to promote increased efficiency in research management and project implementation, and (vi) activities aimed at improving HR management within IAARD in the areas of staff mobility, recruitment, incentives system and career development. In recent years, the degree training program for IAARD's researchers was funded by national budget (APBN) and done essentially in national universities. SMARTD will enable IAARD to train a strong contingent of researchers in prominent institutions abroad over the next five years. This focus on international training will help address the growing problem of insularity of Indonesian agricultural research. An advisory consultant of international caliber will be recruited to help IAARD screen and select the most appropriate training institutions abroad for its long-term degree training program, and assist in reviewing and improving approaches and methodologies for strategic staffing based on international experience.

4. ***Strategic staffing needs***. The current age structure of IAARD's staff, while posing a significant challenge in terms of the magnitude of the needed replacement of researchers (around 20% of the research staff is expected to retire in the next five years), represents at the same time

a great opportunity to move fast into a new situation. The total number of IAARD staff is currently 8,202 consisting of 1,689 researchers, 30 engineers, 211 extension staffs, 678 supporting staffs, and 5,594 administrative staffs. In the past four years, 113 researchers have retired. In addition, some 335 MSc and Ph.D. holders are over 55 years, and will be reaching retirement age in the next five years. The total number of IAARD personnel has been slightly increasing during the past five years. The number of staff with Ph.D degrees increased on average by 4.06%, with the highest figure in 2007 (13.4%), while Masters degree holders have had a lower growth with only an average of 0.6% p.a. Due to promotions from Bachelor to Masters Degree and to the limited number of new recruitments, the number of Bachelor's degree holders has registered a limited growth (+ 0.4%).

5. The relatively high increase in personnel holding Ph.D. degrees was due to the investment made in HR development, mainly through GoI budget. Over the last five years (2006-2011), IAARD, through government's budget, has been able to train 521 researchers in both Master and Ph.D. programs. Among the researchers trained during the period 2006 to 2011, more than 60% were women. Most of them received in country training and only 10 researchers were trained overseas. SMARTD project will enable IAARD to train overseas an additional 150 researchers at Ph.D. and MSc. levels to strengthen its research capacity. In parallel to SMARTD implementation, training in national institutions will be pursued on GOI resources so as to maintain the research potential of IAARD[13]. Currently, the number of research staff to undertake MS and Ph.D. training is determined through the calculation of the required critical mass in the respective research centers with some other considerations such as availability of funds, number of existing research staff to implement research programs, etc. The critical mass is calculated based on several variables such as the projected research programs of the respective research institutions for the period 2012–2015, number of existing research staff, number of researchers going to retire, number of researchers undertaking a long term training program, and number of newly recruited staff.

6. IAARD's management is well aware of the issues of management of HR and expects SMARTD to help address them, while recognizing that some of the factors are beyond the agency's span of control and depend on MoA or broader government policies and regulations. The first issue of HR management is the limited control by IAARD of the current HR management system, including recruitment process, salary structure, promotion and incentives system. Currently, recruitment is centralized at the MoA level and IAARD has relatively little control over the selection process. Research institutes put forward their staff needs which in turn are consolidated by IAARD before being submitted to MoA. MoA then includes those needs in their regular recruitment process for all MoA positions. Consequently, due to this "pooling" of recruitments by MoA, the profile of the new recruits assigned to IAARD are often not well aligned with the criteria set forth by IAARD.

7. Another issue is IAARD's salary structure for researchers and staff. The salary structure has two components. One is the base salary for government employees, which is similar for all civil servants within MoA. The second component is related to their functional position as researchers and is based on the technical guidelines emanating from of LIPI's Head Regulation No: 06/E/2009. This is common to all researchers in the country who are distributed in four

[13] IAARD plans to train another 200 researchers in national institutions over the next five years.

categories: Assistant Researchers (*Peneliti Pertama*), Junior Researchers (*Peneliti Muda*), Associate Researchers (*Peneliti Madya*), and Senior Researchers (*Peneliti Utama*). The functional component of the salary is determined by the level of education and by credit points such as number of scientific publications (journal articles, book chapters and scientific papers in general), and participation in courses, seminars and conferences. Take home pay of researcher results from both salary and functional incentives.

8. Researchers benefit from incentives in the form of career advancement, scientific benefits or recognition, and financial incentives. Financial incentives for researchers at IAARD are considered to be relatively limited. However, government has made efforts to provide incentives (Rp. 250 million) for the researchers who have received extraordinary intellectual property rights awards (*Anugerah Kekayaan Intelektual Luar Biasa*/AKIL). In addition, IAARD provides financial rewards for researchers who write a scientific article in an international journal (Rp. 3 million) or a national publication (Rp. 1 million).

9. Improvement of the existing human resources situation represents one of the key priorities for the future of IAARD. It is clearly stated in the agency's strategic plan that aims at making IAARD a world class agricultural research institution by 2014. It also implies that IAARD will need to have greater involvement in international agricultural research. A new national agricultural sector strategy for 2015-2045 is currently being drafted by the Ministry of Agriculture and is expected to feature a substantive transformation of the approach to the organization of agricultural activities and provision of agricultural services. IAARD's human resource structure should be transformed into one that features greater scientific depth and diversity, as well as greater capacity to interact and work with partners in Indonesia and abroad.

10. Since 2010, the Ministry of Agriculture has been implementing a reform program called Bureaucracy Reform to improve the efficiency of its civil service. The objective of this reform is to have responsible and professional public servants that can fulfill the mandate of this service. The reform process has already produced various regulations that address recruitment, promotion, discipline, performance indicators, standard operating practices, work load analysis, article conduct, and management information system for staffing management. The reform process is part of a comprehensive approach by government to bureaucracy reform.

11. As implemented in other human resource development projects[14], the guiding framework for IAARD's capacity development is depicted in Figure A.1. The capacity of a government agency is a function of the resources of the agency — the number and skills (both technical and managerial) of staff, its infrastructure, technology, and financial resources -, and the quality of the internal operating environment, as defined by the incentives and rewards systems (to the extent that these are within the agency's control), the organizational climate or culture, organizational structure, the business processes and operating procedures, and shared norms and values. Capacity, however, is only partly determined by these internal parameters. It is also dependent, arguably even more importantly, on the external environment, which consists of the general civil service and other relevant regulatory frameworks, broader government policies and political environment, economic conditions, and other factors that are beyond the agency's control. Improving the agency's capacity will not necessarily translate into improved

[14] Like the SPIRIT Project funded by the World Bank.

performance (such as improved service delivery) as performance is in turn a function of both agency capacity and the external environment.

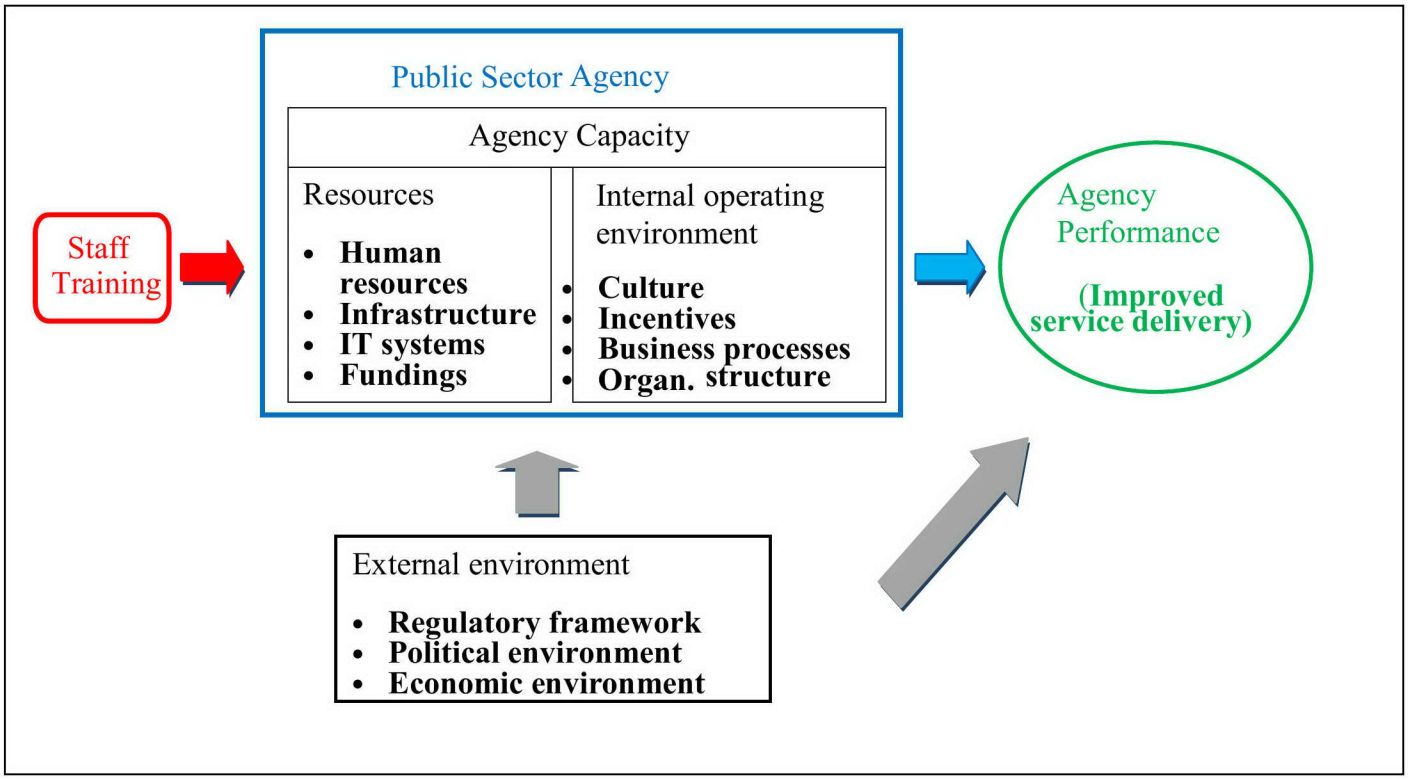


Figure A.1: A Framework for Capacity Building

12. Component A includes the following sub-components; (i) long-term degree training, (ii) technical and managerial training, and (iii) development and implementation of HR management tools (detachering program, incentives, recruitment processes). The first two sub-components aim to enhance the academic and technical skills of IAARD staff and will be implemented through the awarding of scholarships and grants. The degree training program will scale up the ongoing program of long-term training. Thanks to SMARTD, several hundreds of IAARD researchers and staff will benefit from various types of programs during the period 2012–2016. Details are shown in Table A.1. The enrolment in long term and short term training will be determined based on the respective roles of research centers, research institutes and AIATs in contributing to IAARD's strategic plan and on the priorities set for agriculture research by during the period 2010-2014. The training of staff of research centers and research institutes will be focused in the fields of study directed to the achievement of scientific recognition, while the training of staffs of the AIATs will be focused more toward the achievement of impact recognition.

Table A.1. Projected number of IAARD personnel for scientific training, technical and management training, and HR management improvement program from 2012 – 2015, to be funded by SMARTD

No.	Type of Training	Projected number of staff trained					
		2012	2013	2014	2015	2016	Total
A.1	**Scientific Training**						
	1 Long Term Training						
	a. Degree Training Program:						
	Master	13	7	34	11	0	65
	Ph.D.	10	10	49	16	0	85
	b. Sandwich system degree program:						
	- Six months program	2	2	18	15	13	50
	- One year program	0	0	7	7	6	20
	2 Short Term Advanced Training						
	a. Post Doctoral (6 months)	3	3	24	20	19	69
	b. Scientific Exchange (max 1 week)	22	10	34	30	32	129
	c. Visiting Indonesian Scientist	22	9	22	27	26	106
	3 Seminar, Workshop and Conference						
	a. Seminar	7	9	110	120	121	367
	b. Conference.	8	10	68	70	70	226
	c. Workshop	6	10	65	68	76	225
A.2	**Technical and Management Training (max 2 weeks)**						
	1 Technical and Research Management.	30	10	100	94	100	334
	2 Training on professional skill :						
	a. Information Technology	10	11	28	27	26	102
	b. Library Management	10	8	22	21	20	81
	c. IPR, leadership management, etc.	10	8	42	35	30	125
Sub-total of A.2		**30**	**27**	**92**	**83**	**76**	**308**
A.3	**Human Resources Management**						
	1 Detachering (mobility program) for mentoring						
	a. On the job training for junior scientist	17	14	36	34	20	121
	b. Pilot project for mentoring	0		2	2	0	4
	c. Workshop on mentoring	1	0	1	1	1	4
	2 Improvement in conditions of service through promotion and incentive						
	a. Pilot project	0	4	5	3	0	12
	b. Workshop	1	1	1	1	0	4
	3 Improvement in recruitment procedures						
	Coordination meeting	0	0	1	1	0	2

Sub-Component A.1: Scientific training ($ 35.7 million)

13. The first activity under sub-component A.1 consists, through the awarding of scholarships, in implementing scientific degree training programs, as well as enhancing research networking. SMARTD will fund the training of 150 young researchers at PhD (85) and MSc. (65) levels, mainly abroad. This activity was initiated in 2010, when a pool of candidates proposed by the research centers and eligible for the scholarships to be funded by the SMARTD project was identified. The disciplines of study and degree specialization are determined on the basis of the strategic needs of IAARD and on nominations made by the NRIs, CRIs and AIATs. In turn, the candidates have the possibility to chose the university with which they are already in relation. In parallel to the degree training program funded by SMARTD, IAARD plans to pursue

during SMARTD implementation its training program in national institutions through funding by the national budget (APBN).

14. The second activity of sub-component A.1 is short-term advanced training. The objective of this post-doctoral program is to enhance the research skills of young Ph.D. degree holders, especially those who graduated from national universities. Under this program, candidates will benefit from awards to enable them to conduct research in prominent national and international research institutions for a period of a maximum of 12 months. The research should lead to international scientific publications. Under the same program, a limited number of senior and experienced researchers will benefit from advanced training for up to 6 months in national and/or overseas universities. The Scientific Exchange (SE) program will consist in sending IAARD researchers and research managers to world class research institutions to improve their skills and management capacities.

15. The third activity of sub-component A.1 aims at enhancing participation by IAARD research and management staff to seminars, workshops and conferences at international level. The objective of this activity is to enable researchers to present research papers and thereby improve their communication and interact with international scientists. Participation to international workshops is expected to help IAARD research staff to exchange information and experience with other international researchers, particularly in new research areas. National seminars and workshops will also be conducted. They will include sessions with external review panels selected in consultation with a broad range of stakeholders, including the Ministry of Finance, BAPPENAS, RISTEK, KEMENPAN-RB, other relevant Ministries, and research institutes as well as private sector.

16. ***Management of training programs and selection of scholarship beneficiaries.*** In order to get the most out if this important investment in degree training for researchers, IAARD will need to ensure that it sends its staff to the best and most suitable institutions in the world, and that the students receive appropriate support and coaching during their stay abroad. To that effect, a specialized advisory consultant of international caliber will be recruited to help IARD screen systematically, analyze, compare and select the most appropriate training institutions abroad for its degree training program. The consultant will also help the agency review/update its strategic staffing plan. A provision is made in SMARTD budget to cover the cost of this assistance. The management of the scholarship program including providing guidance, coaching and logistics support to the researchers sent for training will be done by the agency, as was done in the past and building on the agency's experience in this area.

17. Ensuring transparency in the selection process is essential to achieving program outcomes and maintaining credibility. Selection procedures of candidates and provision of pre-departure language training to selected candidates are spelled out by IAARD in specific internal guidelines entitled "Selection Procedures for Degree Programs". The selection procedures for the program consist of the following stages: eligibility, testing, interviews, pre-departure training, and application to university. Those who pursue advanced degrees in Indonesia are provided the opportunity to conduct research in an international institution through a "sandwich system" that enables them to carry out advanced research under the guidance of experienced professors in their field of study. IAARD research staff currently enrolled in MS and Ph.D. programs in prominent Indonesian universities will be selected.

18. Selection of the candidate for the SE program will focus on the alignment of the proposed training program with the needs within each research centers within IAARD. Selection procedures for non-degree programs will be more streamlined than for degree programs. Candidates will need to be nominated by their employing unit for a non-degree program in an eligible field of study as identified in the agency; be below the maximum age limit of 50-55 years; and meet the requirements specified by the agency and have a minimum grade point average. The visiting scientist program will send senior scientists to conduct research, approximately for 6 month period, collaboratively with other scientist in national or international research institutions in order to improve their capacities as researchers.

19. All of the above provisions on the selection of candidates for the various training programs to be funded under SMARTD will be clearly spelled out and documented in the project's operations manual.

Sub Component A.2. : Technical and management training ($ 3.1 million)

20. The objective of sub-component A.2 is to improve the capacity of researchers and research support staff through technical and management training. This sub-component consists of the following activities: (i) technical and research management, and (ii) training on professional skills.

21. The first activity under sub-component A.2 (Technical and research management training) consists in training for researchers and research technicians to improve their skills in areas such as biotechnology, food processing, molecular biology, bio-energy, nano-technologies, animal reproduction, climate science. This activity will also provide opportunities for research managers and staff, including field and laboratory technicians to acquire advanced knowledge and skills on management including field station management, laboratory management, monitoring and evaluation, public-private partnerships, commercialization of research results, etc. This activity will be implemented through collaborative program with relevant national and overseas institutions. The program will include tailor made courses which have been designed to fulfill a specific need within the IAARD and off-the-self courses which are generic courses by a training provider. Those trainings will be delivered either by Indonesian or overseas institutions.

22. The second activity under sub-component A.2 (Training on professional skills) entails training to improve the professional skills of IAARD staff in cross-cutting areas such as IPR, regulatory issues, management leadership, ICT, librarianship, etc. The ICT training will improve staff skills in knowledge in areas such as information management, security management, database management, networking, website development, programming technique, and statistical modeling. The training for librarianship will be focused on digital library and online dissemination of information and technology.

Sub-Component A.3: Human resource management ($ 1.2 million)

23. The objective of sub-component A.3 is to strengthen the capacities of IAARD to manage its human resources, and thereby improve the performance of IAARD as an institution. The third sub-component of the HR development component aims to develop HR management and

improve the human resource system. In this area, IAARD is facing multiple constraints, due to both internal processes and external constraints.

24. The first activity under this sub-component (Activity 3.1) consists of implementing a detachering (mobility) program for mentoring to optimize the use of available research capacities. IAARD is facing the challenge of retiring experienced and skilled researchers while recruitment and training of young researchers takes time before they can be fully on board. As a consequence, IAARD is likely to lose skilled and experienced staffs with new staffs being able to replace them only after a certain period of time. In order to minimize this potentially negative impact of this lag effect, a mobility system (detachering) will be designed and then institutionalized to allow skilled and experienced staffs to move easily from one institution to the other in the framework of a knowledge transfer program. It will be designed and established drawing from the experience of an existing scheme in the Directorate of Higher Education in the Ministry of National Education.

25. The objective of the detachering program is to facilitate the exchange of knowledge and skills across IAARD. The benefits of such a scheme are as follows: (1) it will be possible to transfer junior scientists to institutions where there is a critical mass of researchers so that they can benefit from on-the-job training with experienced researchers, and (2) mentoring can be provided by assigning resources persons for 3 to 6 months to another institution to share knowledge. The mentoring activity is aimed to assist junior researchers in planning, implementation and reporting of research programs. Mentors will be selected through the Research Professor Communication Forum (RPCF) whose mandate is to guide young researchers to develop and enhance their skills in their areas of expertise. Mentoring will also assist newly recruited staff in acquiring the necessary research skills in their selected disciplines. Staff returning from overseas advanced training will also be mentored by RPCF to become acquainted with IAARD's ongoing activities through the re-entry program. Approaches to be used by mentors include direct consultation, hands-on training, and thematic workshops. RPCF will develop guidelines for the mentoring. Individualized immersion or mentor training will also be conducted, where an individual researcher is placed in an organization to acquire practical experience by working along with a mentor. This mentoring can be conducted in either in domestic or in overseas institutions. In case of the latter, the project will recruit the mentor as a short-term consultant.

26. The guidelines for the program will be designed during the first year of implementation using expertise from within the Ministry of Agriculture (with support from the RPCF for example) and support by a national expert. The allowances for the deployed officers and cost for the host institutions will be defined during the design of the program. The services of the external expert will be retained for two months per year for the first three years of the project for monitoring implementation and drawing lessons that will be presented and discussed during an annual workshop. 128 on the-job and mentoring placements will be funded in total, with 8 placements in 2012 and 30 placements per year for each subsequent year.

27. The second activity under sub-component A.3 (Activity 3.2) consists in carrying out an in-depth analysis and providing recommendations to improve the current system of staff evaluation, promotion and incentives. The current incentives system will be reviewed and proposals for improvement will be developed during the first two years of the project, with the

assistance of external experts. The review will include comparisons with international best practices. The goal is to make the conditions of service at IAARD more competitive in relation of those of the private sector. IAARD will seek to bring significant adjustments in the conditions of service of its staff in order to improve its competitiveness and attractiveness. Such adjustments are likely to entail the implementation of a new incentives system that would include not only non-financial incentives but also financial incentives for researchers who have made significant achievements.

28. The evaluation of staff performance will be conducted through a pilot project in one national research center and one AIAT. The past and current staff performance will be used as a basis for evaluation. The standard criteria for performance evaluation, such as those used to assess the functional level of researchers (P2JP), as system adopted from LIPI, will be reviewed first. More adapted and more development oriented criteria will be introduced. An improved and transparent staff assessment framework will be developed for the evaluation of staff performance. The recommendations will be validated during a consultation process and submitted to IAARD's management for approval at the end of 2013. A distinction must be made between the promotion system and the internal incentives system. The former can only be modified as a result of the ongoing bureaucracy reform process; the latter can be established as an internal IAARD pilot project from 2014 onwards, and reviewed and discussed in annual workshops with the aim of institutionalising the new incentives system in 2016. The criteria for promotion and incentives will be developed taking into consideration the targets and indicators developed to assess the performance of IAARD as an institution (see the institutional assessment framework in component C). As part of this activity, national and international consultants will be needed to review and develop the criteria for the evaluation of staff performance, and help shape up the proposals for improvement of the promotion and incentives system.

29. The third activity in sub-component A.3 is the improvement in recruitment procedures for new researchers and staff. Even though the recruitment process is currently in the hands of the Secretary General of the MoA, it is expected that better recruitment procedures can be designed and implemented with the support of this project. During the first two years of SMARTD implementation, a national expert will be hired to review the full set of procedures and institutions involved in the recruitment process and provide recommendations as to how to improve the current system and ensure that the profile of IAARD's new recruits is really aligned with its needs. The recommendations will be discussed during a workshop that would formulate a draft policy and lay out the new proposed procedures. These new procedures would then be implemented as a pilot by IAARD and reviewed annually to discuss lessons learnt and improvements to be brought. Finally, the revised procedures and recruitment system will be institutionalized throughout IAARD. This activity will require the hiring of a domestic consultant who can be recruited among experienced specialists in recruitment systems in Indonesia with special experience in research.

Component B: Improvement in research infrastructure and facilities (US$35 million).

30. The objective of Component B (Improvement in research infrastructure and facilities) is to enhance the infrastructure of some of the research units (NRIs, CRIs, AIATs) within IAARD in terms of laboratory equipment, equipment of experimental farms, as well as construction and improvement of selected research facilities. IAARD owns and manages a set of laboratories

(166) and field stations (119) spread all over Indonesia. The vision of IAARD is that if the agency is to become a lead agricultural research organization, as set forth by Renstra, then it must have properly equipped facilities including laboratories and field stations. Laboratory and field station equipment is often old (procured in the 1970s to 1990), and partly out of date, and/or out of service. The results of a recent comparative study of several laboratories, as well as a visit of different laboratories and field stations, revealed that most of them do not comply with the standards of good quality laboratory and field stations.

31. The needs for improvement of research infrastructure and facilities (renovation, reconstruction, and new construction) have been assessed based on the agency's strategy, national priorities such as food security and focus toward basic and strategic research in NRIs/CRIs and more adaptive research in AIATs. To support basic research, improvement of biotechnology including gene bank and bio-safety, food nanotechnology, and animal pathology and toxicology laboratories are among important laboratories to be upgraded to meet world standards. Besides, some of those laboratories are genetic and breeding laboratories that are essential to support the continued process of producing quality seeds, improved varieties and higher quality of livestock. Due to the need for more accurate and faster data processing and rapid result delivery, especially coming from the private sector, there is an increasing demand year after year to perform various types of laboratory analysis (soil, water quality, foods, biotechnology, environment, crop and livestock pests and diseases, etc).

32. Following a thorough analysis and benchmarking of different laboratories and field stations, as well as assessments by external consultants, it was decided that no more than 20% of the existing laboratories and field stations would be improved through SMARTD. Nevertheless the capacity improvement of the laboratories and field stations is classified as a priority in the IAARD's strategic plan for 2010-2014. At the laboratory level, although the focus will be on the modernization of the equipment, the investment will be complemented by an extended program of accreditation of all laboratories under Indonesian National Standard: SNI 19-17025/2009. Networking of all laboratory facilities will be encouraged in order to assure a higher efficiency of resource use, particularly with regards of equipments of high complexity. The improvement of the experimental farms will entail the renovation and/or provision of appropriate irrigation infrastructure, green-houses, screen-houses and other required facilities, such as seed processing facilities and warehouses, depending on their specific functions.

33. Component B includes the following three sub-components: (i) laboratory improvement, (ii) field station improvement, and (iii) building construction and renovation.

Sub component B.1. Laboratory improvement (US$14.7 million)

34. The first sub-component of component B (sub-component B.1) is laboratory improvement. Its objective is to improve the capacities of some of IAARD's laboratories to operate at level that meet ISO 9001:2008 or 17025:2008 standards. Improvement of laboratories will be focused on 35 of 166 laboratories that have been selected based on a priority scale. The selection criteria aim at ensuring to comply with international standards for laboratories, are based on the provisions of SNI-ISO/IEC 17025: 2008. They were combined with the results of a study visit to some of the more advanced laboratories in Jakarta (Eijkman lab, Sucofindo lab, Lakesda lab, Mutu Agung Lestari lab) and in Bandung (LIPI chemistry lab).

35. The improvements aim at bringing those laboratories to a level of performance in line with world standards, specifically the implementation of SNI-ISO/IEC 17025:2008 standards, through modernization of the lab equipment, application of laboratory safety systems, application of waste management systems, application of rapid services laboratory, improved competences of laboratory personnel and implementation of laboratory information systems. The proposed laboratories that are currently classified as non reference (non-ref) will be improved to become reference labs and the current reference (ref) labs will be capacitated, technically as well as in terms of skills of management and administration staff. Accreditation is one important step to be accomplished for certain labs to reach world standards. By the end of the project, most of IAARD labs at NRCs and NRIs will be categorized as national reference labs.

36. The first activity in sub-component B.1 is the improvement of selected laboratories through the procurement of laboratory equipment. Improvement of the equipment of the laboratories aims at raising their level of performance to world standards through the implementation of SNI-ISO/IEC 17025:2008 standards, ISO 9001: 2008 and SNI ISO 14064 for Green House Gas (GHG) lab. It also entails modernizing the equipment, applying safety systems, applying waste management systems, increasing the level of capacity and competence of laboratory personnel and putting in place better information systems. As stated earlier, the targeted improvement of laboratories is based on IAARD's vision and missions. The list of proposed laboratory improvements to be funded by SMARTD has been established by IAARD and is given in table A.2 below.

37. The second activity in sub-component B.1 is the provision of consultant services to provide the expertise required in the various aspects of laboratory management and in the various scientific and technical disciplines.

Table A.2. List of proposed laboratories for improvement and current status

No.	Name of Laboratory	Institution	Accreditation	Category*
1	Food Chemistry	Balitkabi (ILETRI)	Accredited	Reg
2	Agronomy/Eco-physiology	Balitkabi (ILETRI)	Accredited	Reg
3	Pest Parasitology	Balitkabi (ILETRI)	Not yet	Reg
4	Soil Microbiology	Balitkabi (ILETRI)	Not yet	Reg
5	Soil	Balitkabi (ILETRI)	Accredited	Reg
6	Plant breeding and seed production	Balitsa (IVEGRI)	Accredited	Reg
7	Hydroponic Tissue culture	Balitsa (IVEGRI)	Not yet	to be Ref
8	Pest and Disease	Balitsa (IVEGRI)	Accredited	Reg
9	Quality testing lab	Balitsa (IVEGRI)	Accredited	Reg
10	Fertilizer testing	Balitsa (IVEGRI)	Accredited	Reg
11	Tissue culture and Somatic embryogenesis	Balittas (ITOFCRI)	Not yet	Reg
12	Bio-control	Balittas (ITOFCRI)	Not yet	Reg
13	Bio-processing	Balittas (ITOFCRI)	Not yet	Reg
14	Plant breeding and biotechnology	Balittri (ISICRI)	Not yet	Reg
15	Eco-physiology	Balittri (ISICRI)	Not yet	Reg
16	Plant Disease	Balittri (ISICRI)	Not yet	Reg
17	Plant Pests	Balittri (ISICRI)	Not yet	Reg
18	Plant breeding, tissue culture and biotechnology	Balitka (ICOPRI)	Not yet	Reg
19	Eco-physiology	Balitka (ICOPRI)	Not yet	Reg
20	Technology Lab	Balitka (ICOPRI)	Not yet	Reg
21	Phytopathology Lab	Balitka (ICOPRI)	Not yet	Reg
22	Entomology	Balitka (ICOPRI)	Not yet	Reg
23	Engineering workshop	Balitka (ICOPRI)	Not yet	Reg
24	Integrated lab of hydrology, GIS, telemerty, remote sensing and bio chemistry	Balittra (ISARI)	Not yet	Reg
25	Food Nano technology	BB Pasca Panen (ICAPOSTRD)	Not yet	to be Ref
26	Gene bank	BB Biogen (ICABIOGRD)	Not yet	Ref
27	Engineering	BB Mektan (ICAERD)	Not yet	Reg
28	Mechantronic	BB Mektan (ICAERD)	Not yet	Reg
29	Testing lab	BB Mektan (ICAERD)	Accredited	Ref
30	Design lab	BB Mektan (ICAERD)	Not yet	Reg
31	Post harvest	BPTP West Papua (AIAT)	Not yet	Reg
32	Tuber processing	BPTP West Papua (AIAT)	Not yet	Reg
33	Seed management unit (UPBS)	BPTP West Papua (AIAT)	Not yet	Reg
34	Plant Breeding	BPTP West Papua (AIAT)	Not yet	Reg
35	Plant breeding and Quality testing	Center for Seed Production of Tropical Fruits, Subang	Not yet	Reg

* New lab; Ref : Reference Lab, Supp = Supporting lab. Reg : Regional lab; according to Gillman *et al.* categorization (2011)

Sub component B.2. Field station improvement (US$ 6.8 million)

38. Field stations (FS) are part of IAARD's important assets to support the process of generating improved scientific and technology applications to be disseminated by the AIATs. Their role is to support research, technology assessment, dissemination, and seed and livestock production activities. Field stations fulfill the following functions: (1) establish pilots for the dissemination of research results, (2) display innovative technologies resulting from research, (3) showcase technologies for demonstration and training purposes, (4) produce quality seeds, (5) maintain collections of germplasm or genetic resources of plant and livestock, (6) manage parent seed production (UPBS), and (7) implement adaptive research through collaboration with private sector and other research institutions in order to generate additional funding as non-tax revenue (PNBP).

39. IAARD has 118 field stations with a total area of 5.747 hectares, consisting of rice fields (804.40 Ha), swamp (235.30 Ha), tidal swamp (207.13 Ha), upland (2.251.27 Ha), rain fed (480,19 Ha) and others (1,685.24 Ha). An assessment of field stations carried out by CRI revealed that there were significant differences in performance between national centers and AIAT field stations. Management of national field stations is generally good. Even though equipment for field work and support facilities (workshops, plant handling, drying, storage, etc.) is usually rudimentary or old, most is still functioning. Management of AIAT field stations ranges from good (unusual) to poor (usual). Some activities clearly aim at generating income. Another assessment done in 2011 by ACIAR found that many of the stations were generally in a steady state of decline, mainly because of a lack of funding and clear purpose.

40. According to this recent review[15], field stations can be classified into three categories depending on the type of activities they carry out (research, seed production, demonstration), their size, the range and complexity of operations conducted at or within the infrastructure. These operations can be ranked as follows: (i) category 1: high intensity and complexity, (ii) category 2: moderate intensity and complexity, and (iii) category 3: low intensity and complexity. Based on the above classification and on a priority scale, only 16 field stations out of 118 will be upgraded during SMARTD. The list of these stations/experimental farms is given in table A.3 below.

[15] B. Winters report for IAARD (July 2011).

Table A.3. List of field stations to be up-graded

No.	Name of Field stations (FS)	Institution	Area (ha)	Proposed	Activity*)
1	Karang Ploso	Balittas (ITOFCRI)	17.9	Jatropha & cotton	1
2	Muktiharjo	Balittas (ITOFCRI)	74.5	Jatropha	1
3	Pasirian	Balittas (ITOFCRI)	4.4	Jatropha & cotton	1
4	Sumberrejo	Balittas (ITOFCRI)	17.9	Tobacco & cotton	1
5	Asembagus	Balittas (ITOFCRI)	40.2	Jatropha & cotton	1
6	Jakenan	Balingtan (IAERI)	30.9	Environment	1
7	Subang	Balitsa (IVEGRI)	146.9	Fruits	1
8	Kayuwatu	Balit Kelapa (ICOPRI)	39.2	Coconut	1
10	Kima Atas	Balit Kelapa (ICOPRI)	60.1	Palm & coconut	1
11	Banjarbaru	Balitrawa (ISARI)	52.8	Wetland Rice	1
12	Sitiung	AIAT West Sumatera	102	Multi Purpose	2
13	Gowa	AIAT South Sulawesi	145.5	Multi Purpose	2
14	Jeneponto	AIAT South Sulawesi	27.6	Multi Purpose	2
15	Pandu	AIAT North Sulawesi	97.0	Dryland	1
16	Andai	AIAT West Papua	20.0	Dryland and wetland	1

41. The objective of sub-component B.2 is thus to improve selected field stations to enable them to operate at a level that meets the ISO 9001:2008 standards. The sub-component consists of the following two activities: (i) improvement of field station for research stations, and (ii) improvement of field stations for seed production (UPBS).

42. The development of field stations for the research stations will entail improvement of land area, application of field station security systems, construction of a new glasshouse and/or glasshouse renovations, improvement of plant growth facilities, improvement of plant handling buildings (Seed Production-UPBS), and improvement of irrigation systems. A detailed list of investments has been established. As far as activity # 2 is concerned, the development of field stations for seed production (UPBS) will consist of improvement of land area, improvement of office and accommodation, modernization of field station equipment (including equipment maintenance program), application of field station security systems, construction of a new glasshouse and glasshouse renovations, improvement of plant handling buildings (seed production-UPBS), improvement of animal house, improvement of workshop and improvement of irrigation systems. A detailed list of investments has also been established for this activity.

43. For those field stations whose improvement or upgrading is not considered as part of SMARTD (93 field stations), several options can be envisaged. Selling or renting those field stations is not easy, due to the fact that they are government assets and also because of potential impacts on employment. A more reasonable approach is to try to optimize those assets. This question can be foreseen through research commercialization activities in those field stations that will be potentially managed by BATP. This point is in accordance with Component C, Sub-Component 3, and the development of IAARD's business plan for technology/knowledge commercialization.

Sub component B.3. Building construction and renovation (US $ 13.5 million)

44. Agricultural development based on innovation is expected to respond to the current and future challenges faced by government. One such challenge is food/rice sufficiency, in view of the fact that food production growth lags behind population growth in Indonesia. IAARD, as an important source of agricultural innovation, has to carry out its research in line with the latest trends in technology development, like nano-technology, in order to be able to provide the advanced technologies that are needed by end-users (farmers, rural communities and agro-food industries).

45. Currently, there are 33 AIATs in IAARD, distributed in all provinces of Indonesia. AIATs are decentralized units of the Technical Operational Unit (UPT) of the central agency (IAARD) in each Province (Regional level). They have a mandate to carry out permanent assessment of technologies in order to adapt them to local conditions. The role of AIATs in delivering technology is very important, combined with their role for synergizing central government programs with the regional and local government programs. Some AIATs offices have problems (land status, distance to the center of activities, and/or poor state of construction) that require that they be reconstructed, relocated, and/or renovated, in order to provide quality support to local agricultural development.

46. Sub-component B.3 has two activities: (i) construction of new laboratories and relocation of some AIAT offices and, (ii) renovation of some AIAT and IAERI facilities and infrastructure. The activities include the construction of four new laboratories for food nano-technology (ICAPOSTRD); gene banks (ICABIOGRD), and integrated technology (ISARI, ISICRI, ICOPRI IVEGRI). In addition, due to legal issues regarding land occupation, offices and facilities of three AIATs (Jambi, North Sulawesi, and West Papua) need to be relocated to new and more suitable areas. Currently it lacks some appropriate facilities to bring it to the required standards. Finally, facilities and infrastructure (especially the main building and the fence) of a few AIATs (South Sulawesi, North Sulawesi, and West Papua) and IAERI, who are in a severely damaged condition, are in need of immediate renovation.

Table A.4 List of New Buildings and Renovations

No.	Name of building	Institution	Remarks
1	Gene Bank laboratory	BB Biogen (ICABIOGRD)	New
2	Food Nano laboratory	BB Pasca Panen (ICAPOSTRD)	New
3	Integrated laboratory	Balittra (ISARI)	New
4	Integrated laboratory	Balittri (ISICRI)	New
5	Integrated laboratory	Balittas (ITOFCRI)	New
6	Integrated laboratory	Balitka (ICOPRI)	New
7	(a) Vegetable breeding and seed production laboratory	Balitsa (IVEGRI)	Renovation
	(b) Hydroponic vegetable laboratory	Balitsa (IVEGRI)	Renovation

	(c) Pest & Disease laboratory	Balitsa (IVEGRI)	Renovation
	(d) Quality Testing laboratory	Balitsa (IVEGRI)	Renovation
	(e) Fertilizer testing laboratory	Balitsa (IVEGRI)	Renovation
	(f) Research Dissemination	Balitsa (IVEGRI)	Renovation
8	Office building & infrastructure	AIAT North Sulawesi	New
9	Office building, house and research station	AIAT West Papua	New
10	Office building & infrastructure	AIAT Jambi	New
11	Laboratory, office building and housing	Center for Seed Production of Tropical Fruits, Subang	New

Component C: Research management and policy support ($15 million)

47. The objective of the research management and policy support component is to foster increased efficiency and effectiveness in the use of research resources through improved research management strategies and instruments. It aims to enhance IAARD's performance and relevance. It includes the following four sub-components: (i) improvement of priority-setting, planning and programming systems to ensure more effective stakeholder participation; (ii) support for increased research collaboration and networking with other national and international research organizations thanks to the establishment or scaling-up of competitive funds to enhance collaborative programs and local innovation; (iii) support to the commercialization of research products, including the implementation of a more diversified and sustainable research funding strategy; and (iv) improvement of technology dissemination systems. As far as policy support is concerned, the project will assist in the generation of information and studies in support for strategic policy decision making, both with respect to MOA's policies and programs and with respect to IAARD's management and positioning within the national innovation system.

48. It is necessary for a research organization to be objectively able to assess and demonstrate its performance. The two main parameters of performance of IAARD are scientific recognition and impact recognition meaning that all research activities of IAARD should be scientifically recognized and implemented, and have broad-based and measurable impacts for the end users. In order to meet these two requirements, centres of excellence within IAARD, whether local, national, regional, or having international status, should strive to have their research results adopted widely by end users. The vision for reform proposed in SMARTD is to provide the foundations for an increased performance of the research system. With the establishment of a truly collaborative research agenda based on innovation criteria and the development of a robust output and outcome monitoring system, IAARD should have the tools it needs to demonstrate its effectiveness. Component C also responds to the need to develop a system for applying widely the mature technologies developed by the research system, increase the uptake by farmers and improve acceptance and backing by local government institutions. This component will support a demand-driven, private-sector friendly approach through the use of competitive grants that cover a wide spectrum of "public goods" in order to induce both technical and institutional innovations. IAARD has experience with competitive grants from previous Bank projects. SMARTD would provide grants that cover the risk of introducing a new technology and overcome the "public good" bottleneck of high coordination costs needed to reach a critical mass of farmers. The Bank

will draw on its experience from the ongoing China Agricultural Technology Project to inform the design of this component. The component will also support the implementation of improved systems of research management, including prioritization, budgeting processes, international partnerships and sustainable financing.

Sub-component C.1. Research priority-setting, planning and programming ($1.1 million)

49. The objective of sub-component C.1 is to enhance the relevance and effectiveness of IAARD's R&D programs. It will seek to improve the existing priority-setting, planning and programming system to better reflect technology needs and innovation demands from all of IAARD stakeholders through increased stakeholder participation. SMARTD's priority-setting should also take into account both domestic and global priorities, such as: (a) food security (with emphasis on rice, corn, soybean, sugar, and beef), (b) climate change (local, regional and global), (c) poverty alleviation, (d) value-added improvement, and (e) institutional transformation, such as formal integration between AIATs and CRIs. This should be accompanied by the adoption of a multi-year programming cycle. Sub-component C.1 will entail the following activities: (i) data base collection and analysis, (ii) improvement of performance assessment processes by strengthening IAARD's internal control system (SPI) and by establishing and testing the assessment framework for selected IAARD institutions, and (iii) revision of the current priority setting, planning and programming system.

50. Activity C 1.1 focuses on the collection of reliable information on needs and demand for IAARD technologies and services and identification and quantification of farm-level productivity gaps and barriers to technology adoption. International and national experts will be hired to provide support in the design of the survey, analyze the data collected during the first and second year of implementation, and provide recommendations to link the data information system with existing systems in IAARD. The results will be presented and validated at a workshop to be held during the second year of implementation and used to prioritize activities for IAARD's R&D programs.

51. Activity C.1.2 is directed toward improving performance assessment processes by strengthening IAARD's internal control system (SPI) and by establishing and testing an assessment framework on selected IAARD institutions. Models for the institutional assessment will be developed during the first two years of implementation. The development of an institutional assessment framework will be based on the methodology developed by ISNAR The *Sistem Pengendalian Internal* (SPI) introduced by IAARD will be upgraded, standardised and the upgraded system will implemented during two years in selected institutions and centres (one NRI/CRI and one AIAT). It will then be evaluated internally, improved and rolled out to all working units in IAARD.

52. The three components of the assessment are the output assessment, the management accreditation system, and the outcome monitoring. The main purpose of the output assessment is to determine the organization's productivity in terms of research and service outputs. The management assessment aims at ensuring the efficiency of IAARD's operations. The starting point for IAARD is to be able to objectively assess and demonstrate its organizational performance. Organizational performance may be defined as the ability of an organization to use its resources efficiently and to produce outputs that are consistent with its objectives and relevant

for its users. For agricultural research organizations, performance refers to the need to generate technologies relevant to producers and agro-industries and contribute to the agricultural innovation system (ISNAR, 2003). IAARD's institutions are gradually receiving ISO certification from a national accreditation scheme (*Badan Akreditasi Nasional*) i.e. ISO 9001:2008 certification. SMARTD will support the continuation and expansion of the standardized accreditation scheme to all working units. Finally, the last and the most important step of the performance assessment will be the establishment of an outcome monitoring system to assess IAARD's effectiveness. It is currently the missing link institutionally for IAARD. It is designed to indicate the extent to which institutional outputs contribute to IAARD's objectives. IAARD has started implementing such a system in selected AIATs with various degrees of success. The outcome monitoring will be performed annually in each institution. A SMARTD team should focus specifically on this issue during the first two years of the project, gather lessons learned and, based on the outcome data collected, produce annually a report on effectiveness using case studies. In 2013, the outcome monitoring system will be established across most of IAARD's research centres and institutions.

53. During the first two years of SMARTD, institutional targets for the three components will be developed for the selected centers and AIATs. An externally facilitated exercise will be undertaken to set indicators and targets at output level early 2012, and from mid 2012 initiate baseline data collection. Institutional outputs, outcome indicators and respective targets in line with RENSTRA and at least one outcome per institution must be on technology dissemination or adoption of technology by industry or farmers. The development of a robust assessment system will be useful to show the value of IAARD's research programs to the wider community. In a competitive marketplace, where salaries and other rewards may be more attractive in other activities, an improved assessment system should help IAARD attract the brightest researchers and demonstrate to customers and stakeholders (both within and outside government) how exciting and innovative its work is. An external expert will be contracted for a duration of one month per year to support and review its implementation, provide recommendations for improvement of the models, as well as strengthen the SPI.

54. Activity C.1.3 focuses on reviewing and revising procedures and institutional arrangements at national and local level for priority setting. This activity will develop guidelines and procedures to modify the current priority setting system in IAARD. IAARD has to create a stronger link between monitoring and evaluation and year-to-year programming, so as to make the cycle less time-consuming. The required condition is the willingness to change through integrating the monitoring and evaluation procedures and planning procedure as an integral part of program/project. The current system will be reviewed with the help of external experts during the first year of implementation. The recommendations provided in the review will be discussed at a workshop involving senior IAARD management. A new policy for institutional organization and procedures will then be drafted, and submitted to IAARD's senior management for approval. The aim is to implement a multi-year project cycle system that takes into consideration national and local-level stakeholder priorities. Once the procedures and institutional set up are approved, a program for implementation will be developed and a scientific board appointed to oversee the process of change. The scientific board will be composed of stakeholders from selected private sector, public sector and farmer organizations.

Sub-Component C.2. Research collaboration and networking ($10.6 million)

55. The objective of sub-component C.2 is to improve the quality and effectiveness of IAARD's research implementation by strengthening links to other institutions and more extensive use of consortia, collaborative activities and networking opportunities, in order to promote and to develop collaborative research consortia with other national and international research institutions on issues of high priority. It will seek to achieve this objective by establishing or scaling up competitive funds that will be used to award research grants for projects that will enhance research collaboration and local innovation. In addition to increasing funding, an important objective of this sub-component is to build the capacity of IAARD to develop relevant research proposals. The sub-component includes providing resources for two competitive research funds: (i) establishment of a fund to develop international research partnerships, and enhance collaborative research (KKP3T) between IAARD and national research institutions, and (ii) scaling up of the existing competitive fund to foster innovation at local level.

56. ***Establishment of a research collaboration fund.*** Activity C.2.1 entails the establishment of a fund to develop research partnerships at international and national levels. This activity will establish a competitive fund to provide financial resources to develop proposals and implement collaborative research activities with international research centers and national research agencies in the region. The fund will have two windows, one for international partnerships, the other one for national partnerships. An international expert will support the development of the scheme for two months during the first year of implementation. The services of an external expert will be retained for one month per year during implementation to review progress and analyze capacity building needs for IAARD.

57. The first objective is the development of collaborative research consortia with other national and international research institutions on high priority issues. To be a world class research institution, IAARD should develop its capacity to conduct agricultural research with partners from other countries to generate research products. While some limited partnerships have been established between research centres and institutes in IAARD with the private sector, farmer organisations and international and national research institutes in the region, the limited number and scope of these partnerships has been identified as a challenge for IAARD Issues/topics tentatively identified for international research collaborative and networking include: (i) research and development of transgenic crops and exchange of genetic material, (ii) research aimed at the development of strategies for adaptation or mitigation of climate change impacts on the agricultural sector, (iii) research for development of plant material potential to bio energy and its processing technology, (iv) research dealing with bio-technology and nano-technology development for improving agricultural production, (v) research on strategic issues such as global food price and availability, (vi) research on trade liberalization and agreements, (vii) research on sustainable agriculture, and (viii) other specific topics which are mutually beneficial. The fund will also seek to enhance collaborative research (KKP3T) between IAARD and national research institutions. IAARD will review and update the guidelines used for KKP3T during the first year of implementation and SMARTD funds will be added to current funding provided under the regular IAARD budget.

58. In the management of the competitive R&D funding scheme, IAARD will adopt a multiyear funding cycle, where, for example, funds for collaborative projects (involving NRIs and AIATs in IAARD) could be earmarked for multiyear funding. Every year, the "multiyear" project will not go through a full assessment, but will follow a simple evaluation process based on its performance at output level as well as indication of change at outcome level. Such evaluation will be based on a review of the project annual report and standard reporting from field monitoring missions. The standard for reporting should be drawn from indicators form the institutional framework. In order to benefit from multiyear earmarking, the collaborative projects should have clear methodologies for impact assessment and include co-funding by at least one external partner.

59. Some successful examples of partnerships can be found for commodities that have good potential markets such as rice and estate crops. In South Sulawesi, there have been several good examples of partnerships among government, cocoa farmers and external assistance providers, most of them funded by projects such as SADI, SUCCESS and IFC-PENSA. Another good and successful example is the partnership between the Indonesian Coffee and Cocoa Research Institute (ICCRI) with Nestle on technology development. Under the program Creating Shared Value (CSV) of Nestle, both ICRRI and Nestle get not only economic benefits but also and long-term and sustainable social relations between beneficiaries and company/research institutes. PPPs should be further explored either through CSR, CSV, or other forms of collaborations.

60. ***Scaling up of the competitive local innovation fund***. Activity C.2.2 entails the scaling up of the current competitive fund to foster innovation at local level. A pilot competitive research and development funding mechanism to promote improved research - private sector – extension linkages will be set up. Since 2010, the Indonesian Centre for Agricultural Technology Assessment and Development (ICATAD) has established a competitive research fund, enabling competition among AIATs and requiring AIATs to partner with other research institutions. This innovation was introduced as an alternative to the linear, top-down approach to technology transfer. This fund will be under the responsibility of the executive secretary (or the DG) of IAARD to ensure that no institute is favoured. The fund awarding process will be governed by current regulations.

61. ICATAD's current competitive funding mechanism will be reviewed with external support, and the guidelines for scaling up the current scheme will be presented to IAARD for approval at the end of the first year of implementation of SMARTD. The first call for proposals will be made in the second half of 2012 and projects will be funded as of 2013. IAARD should consider mobilizing external expertise for reviewing concept notes and proposals as well as reviewing implementation and analyzing capacity building needs based on the strengths and weaknesses of the proposals.

62. The objectives of this fund are: (i) to promote more formal and improved interactions with key stakeholders in the technology development and transfer process to improve the effectiveness of dissemination and (ii) to increase IAARD's impact recognition in areas with near the market research results. The fund consist in a R&D grant scheme with pre-established criteria and a multiyear project cycle, specifically in order to enhance linkages and involvement of local stakeholders (particularly private sector and farmers). In this activity, farmer groups will have the opportunity to make proposals for agricultural or agribusiness research projects.

63. ***Management of the funds***. The management of the competitive R&D funds will be under the responsibility of the executive secretary (or DG) of IAARD to ensure that no institute is favoured. The management and administration of the partnership fund will be entrusted, either to the heads of echelon 2 centres (*Balai Besar* or *Pusat*) or echelon 3 units (*Balai*). Potential beneficiary under the research grants program would be IAARD's research centers. Partners would be research institutions, national or international satisfying eligibility criteria to be clearly defined for each fund. The fund awarding process will be governed by current regulations and supported by a panel of peer reviewers that will include internal and external members. The reviewers will review both concept notes and full proposals and provide quality assurance and advisory services to IAARD, as well as feedback to the scientists. Clear guidelines will be provided in the Project's Operations Manual on selection processes, procedures and criteria, as well as on the governance structure of the funds.

64. The allocation of funds for research projects should allow planning of multi-year collaborative activities. A multi-year project cycle system has already been adopted by the Ministry of Research and Technology for competitive research projects (RUT, RUK, and others) and even by IAARD for collaborative research and development programs with Indonesian universities (KKP3T). With this system, once a research project proposal is approved by an independent evaluator (technically and financially) in the first year, then the project will be funded until completion. Progress of the multi-year research projects is still subject to an annual evaluation, based on its performance at output level, as well as indication of change at outcome level, and on standard reporting from field monitoring missions. The selection of activities should follow simple criteria such as: (i) the budget allocated by the partner organization, including contributions in kind, (ii) the objectives of the project are in line with at least one objective defined in the institutional assessment framework, and (iii) a monitoring and evaluation system is part of the project and indicators are consistent (or identical) to indicators for specific research outputs in the institutional assessment framework.

Sub-component C.3: Commercialization of research products ($1.2 million)

65. Sub-component C.3 aims to strengthen commercialization of research products, and thereby increase the amount of non-tax and other revenue in IAARD, as part of a broader strategy to diversify funding. Other efforts include increasing external research funds as a result of improvements to the relevance of IAARD programs, the skills of its researchers, and the provision of matching grants to foster partnerships. This sub-component includes three activities: (i) identify technology/knowledge commercialization opportunities (Activity C.3.1.); (ii) develop and update IAARD's business plan for technology/knowledge commercialization (Activity C.3.2.), and (iii) conduct regular feasibility analysis and commercial dissemination activities of agricultural technologies with the private sector (Activity C.3.3.)

66. The objectives of activity C.3.1 are: (i) to review selected research programs, projects and activities in the different centres and institutes using marketing potential criteria (two programs per year), and (ii) to identify a pipeline of technology products of different types. This activity will be carried out by a team through surveys, review meetings with management and individual researchers. The output indicator of this activity will be information on on-going programs and

activities at different centers and institute that can be commercialized and recommendations for improvement.

67. Activity C.3.2 will support the preparation/updating of IAARD's business plan for technology and knowledge commercialization. An assessment of IAARD's past and current performance in technology and knowledge commercialization by *Balai Pengelola Alih Teknologi* (BPATP or Technology Transfer Institute) has been initiated and should be pursued, particularly through bench making with other world-class research institutions. The ultimate objective of this activity is to help define and implement an institutional policy and strategy for technology/knowledge commercialization (products, clients, market segmentation strategies, negotiation instruments, procedures, management of income proceedings, etc.). It will be conducted through review meetings with relevant stakeholders. A policy document will be prepared based on existing laws and regulations and make recommendations for improvements in order to provide better incentives and greater flexibility in the utilization of funds from non-tax income such as royalty payments and other.

68. To increase the use and commercialization of innovative research results, BPATP should be strengthened and empowered not only in the management of intellectual property rights and licenses, but also on promotion, pre-licensing and PPP activities, and development of information systems. The role of BPATP in technology transfer will be strengthened and focused as the spearhead in assembling data and carrying out assessments on marketability of research products as well as through promotion campaigns for commodity production technology. These lessons are part of what was learned through the study tour done by IAARD to Embrapa in Brazil. Embrapa could be further used as a benchmarking model in technology transfer.

69. The objective of activity C.3.3 is to accelerate commercial agricultural technology dissemination and uptake through better linkages between research and the private sector. This activity will be carried out by a team through identification and selection of IAARD technologies developed by research centers using technical and economical analysis. The selected promising technologies will be promoted and commercially disseminated to the private sectors through road shows, exhibitions and business meetings with prospective private sector.

Sub-component C.4. Improvement of Technology Dissemination Systems ($2.1 million)

70. The fourth sub-component (Sub-Component C.4) aims at improving the technology dissemination systems within IAARD. Two activities are included in the sub-component: (i) organization of events at provincial and district levels to share and disseminate research activities and results in the form of available technologies, and (ii) strengthening of the multi-channel dissemination system currently used by IAARD (MP3MI), as well as improvement of coordination mechanisms between AIAT and provincial/local rural support services. Until now, IAARD's strategy for technology development and transfer involved national research centres undertaking strategic research and passing their findings on to the AIATs to test them in each province. The AIATs then provided the adapted technologies to extension services and/or directly to farmers ensuring, in theory, a quick adoption of these new technologies. This linear top-down technology transfer approach has shown its limitations and IAARD is now shifting to a true collaborative demand-driven research system, involving all stakeholders as early as possible

in the research process and using innovative practices to achieve its development objectives. SMARTD component C will support this change.

71. The first activity (activity C.4.1) under sub-component C.4 will provide resources to organize provincial events that will showcase the technologies developed and give an opportunity for end-users and stakeholders to get familiarized with the research activities carried out by the AIAT. The objective would be to have four workshops/fairs organized per year. The organization would be led by AIATs with support from SMARTD awarded on a competitive basis to the most innovative and dynamic proposals, including in terms of their ability to raise funding from local governments and private sector sponsors. It should help IAARD develop a strategy to assist other actors to become more effective in the performance of their roles as well as promoting improvements in the interaction pattern within IAARD itself.

72. The second activity (activity C.4.2) will seek to strengthen the dissemination system currently used by IAARD, i.e. the multi-channel dissemination (MP3MI) which entails on-farm participatory demonstration areas to facilitate innovation at local level. Based on the experience of previous projects, such as Prima Tani, FEATI, SADI, and P4MI, an effective way to improve technology dissemination is through demonstration areas (Dem-Areas) similar to the agricultural development model supporting agricultural innovation (known as M-P3MI).

Component D: Project Management and Monitoring and Evaluation ($10 million)

73. The Project Management, and Monitoring and Evaluation component includes activities that will support project implementation, provide administrative support during implementation, and ensure monitoring and evaluation and supervision related to project implementation. To this purpose, the component will include: (i) staffing, operational costs, and equipment of the Project Management Unit (PMU) to be established in IAARD, (ii) a team of contractual staff (international and national) to support the PMU, and (iii) funding of external audits, independent reviews and other external services.

74. Supervision and guidance throughout SMARTD implementation will be provided by a Steering Committee (SC) to be established within a month following effectiveness. The Steering Committee would be chaired by the DG of IAARD and include representatives from other relevant Ministries, academia, private sector and stakeholders like Chambers of Commerce and provincial research-extension commissions. The SC mandate, composition and rules of operation will be defined by a decree from the MoA, and fully spelled out in the Project's Operations Manual.

75. As far as MIS is concerned, IAARD will implement the action plan resulting from the study/assessment done in 2011 by a consulting firm. Funding has been provided to that effect by APBN. It will aim at achieving greater integration between applications and business processes, establishing a clear policy on ICT management, and improving the linkages with PUSDATIN.

Annex 3: Implementation Arrangements
INDONESIA: SMARTD

Project Institutional and Implementation Arrangements

Institutional and Implementation Arrangements

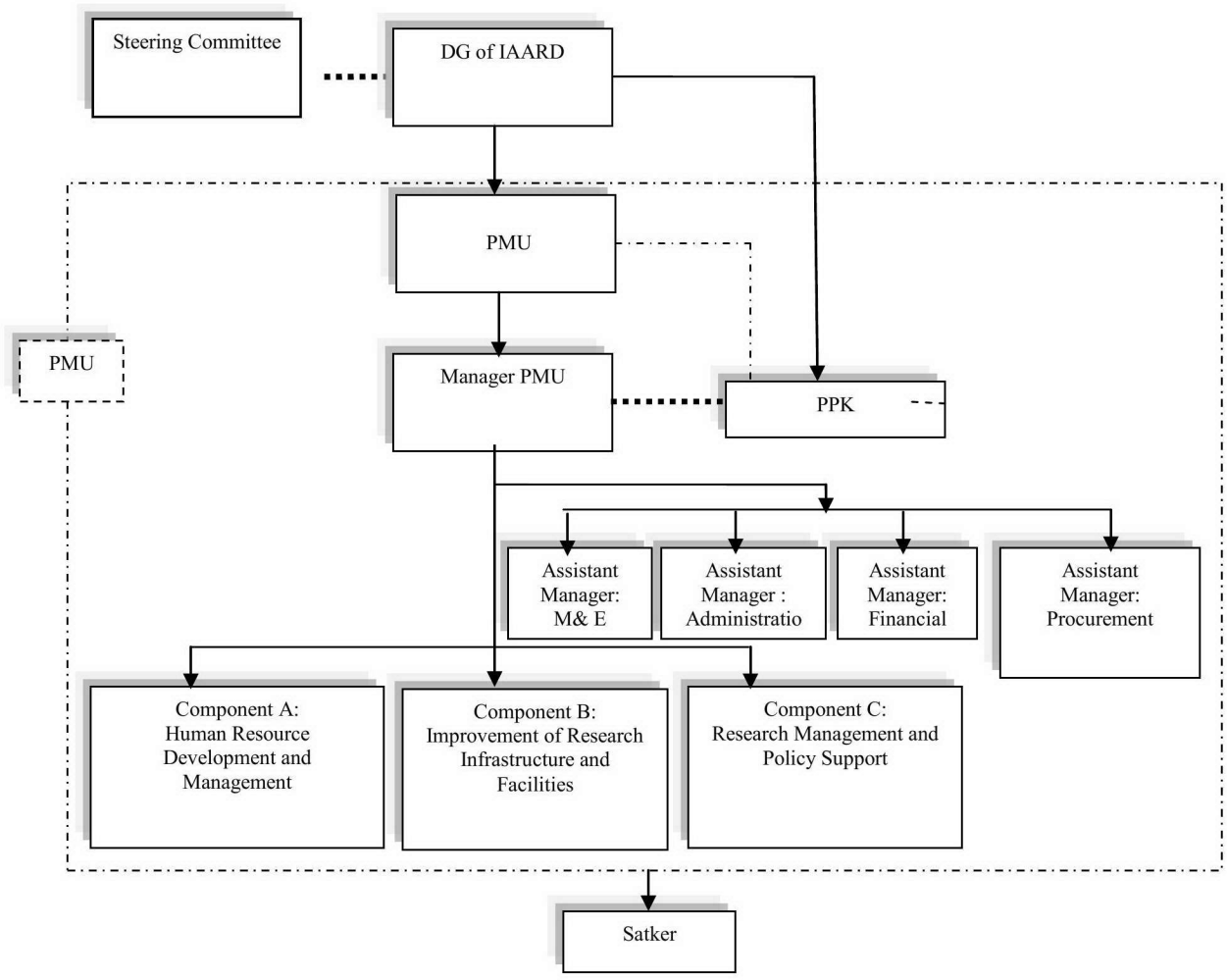
1. The Ministry of Agriculture (MoA) will be the implementing agency of the SMARTD Project. The executing agency will be the Indonesian Agency for Agriculture Research and Development (IAARD). IAARD is a department of the Ministry of Agriculture created in 1974 and given the mandate by GOI to carry out agricultural research and agricultural technology dissemination. IAARD is composed of 14 research centres, 19 research institutes, 2 supervisory institutes, 32 assessment institutes, and several research stations and research localized farms, spread across the country. A Steering Committee (SC) will be established at the national level and will be headed by the Director General of IAARD/Secretary General of MoA, with the following members: (a) Director of Debt Management, Ministry of Finance (MoF), (b) Director of Food and Agriculture, *Badan Perencanaan Pembangunan Nasional (BAPPENAS),* (c) Director of Technical Cooperation, Secretary of Cabinet, (d) Director of Bureau of Planning, (MoA), (e) Inspector IV of General Inspectorate (MoA), (f) Director of International Cooperation Center (MoA), (g) four Directors of IAARD Research Centers, (h) one representative of KADIN, and (i) two representatives of the Provincial Technical Commissions (PTCs). The SC will be responsible in the formulation of national policies and plans, and coordination work arrangements required among inter-government agencies to effectively implement the project at the national and provincial levels.

2. The Director General of IAARD will appoint the Director of the Project Management Unit (PMU) at the Secretariat of IAARD, as well as the staff to be formally appointed to coordinate the overall project implementation and carry out and supervise the activities under the project. The PMU will be the central unit responsible in coordinating and implementing the necessary activities, as well as the collection, monitoring and evaluation, and consolidation of the required data and information to prepare and submit reports for both the World Bank and the Government of Indonesia.

Organizational Chart For Project Implementation

3. The PMU will be headed by a PMU Manager. There will be a Commitment Holder (PPK) acting as financial manager and reporting to the PMU Manager. The day-to-day project coordination will be supported by additional contractual technical assistance, in areas such as financial management, program management, M&E, reporting, safeguards compliance, procurement, etc. These project administrators will be part of the PMU secretariat, and will report to the Project Manager (Figure 3).

Figure 3. Organizational Chart for Project Implementation



Implementation Schedule

4. The SMARTD Project is scheduled to start in September 2012 for a duration of 5 years. The detailed implementation schedule is shown in the following table (Table 9).

Table 9. Project Implementation Schedule

No.	Project Component and Key Activities	Initiation	Year-1				Year-2				Year-3				Year-4				Year-5			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1.	Project Coordination and Management																					
1.1.	Establish PCMU																					
1.2.	Establish project website and update																					
1.3.	Prepare guidelines for project implementation																					
1.4.	Establish M&E System for SMARTD																					
1.5.	Prepare Annual Budget and Workplan																					
2.	Development and Management of Human Resource																					
2.1.	MS Program: -1st batch - 2nd batch - 3rd batch Ph.D. Program: - 1st batch - 2nd batch																					
2.2.	Scientific Exchange																					
2.3.	Post Doctoral program																					
2.4.	Short Term Training &Specific Program																					
3.	Improvement in Infrastructure and Facilities																					
4.	Research Management																					
5	Project Management and Monitoring & Evaluation																					
6.	Semi Annual Report																					
7	Annual Report																					
8.	Mid Term Review																					
9.	Project Completion Report																					

Financial Management, Disbursements and Procurement

Financial Management

5. The purpose of this project financial management assessment is to determine whether the financial management system of the executing agency, the IAARD under the MoA, is capable of producing timely, relevant, correct and reliable financial information on project activities, and whether the accounting system for project expenditures and underlying internal controls are adequate to meet fiduciary objectives, satisfy the Bank's OP/BP 10.02 and allow the Bank to monitor compliance with agreed implementation procedures, and evaluate progress towards its objectives.

6. The main risks the project is due to (i) significant amounts of soft expenditures (aggregating to about 62% of the total project cost), mainly on training and incremental operating costs that are vulnerable to misuse, and (ii) the fact that IAARD has not implemented a World Bank project for quite some time. To overcome these risks, the following arrangements has been requested (i) a Project Operations Manual (POM) to guide project implementation, which should cover additional mechanisms for improving internal control over accountability for soft expenditures; (ii) inclusion of the internal audit of project activities by the MoA Inspector General (IG), and (iii) provision of training on the POM to all PIUs.

7. Overall, the assessed project financial management risk is considered *Substantial* before mitigation and *Moderate* after mitigation. The assessment concluded that with the implementation of the action plan, the risks will be substantially mitigated and the proposed financial management arrangements will satisfy the Bank's minimum requirements under OP/BP 10.02.

8. *Budgeting* The Project will adhere to the government budgeting mechanism based on the issuance of budget warrants (DIPA). Project activities will be included in the DIPAs of all the Satkers.

9. A failure to include all activities in the respective Satker DIPAs will delay project implementation in the relevant year. To minimize this risk, IAARD will need to coordinate with MoA planning unit and MoF to ensure that project activities are included in the respective Satker DIPAs for the relevant year. IAARD will also coordinate with each Satker to ensure all project activities are included.

10. The budgeting process will be described in greater detail in the SOP referred to in the POM.

11. *Accounting and Reporting.* All Satkers adhere to the government accounting system (SAI). However, since there are no specific codes for donor / loan project implementation, there is a risk that project expenditures will not be able to be differentiated from government's own expenditures. The PMU and Satker finance units apply the Government Accounting Standards (Government Regulation No. 24 of 2005) and SAI (Minister of Finance Regulation No. 59/PMK.06/2005). Government accounting software is used to record all transactions. Manual

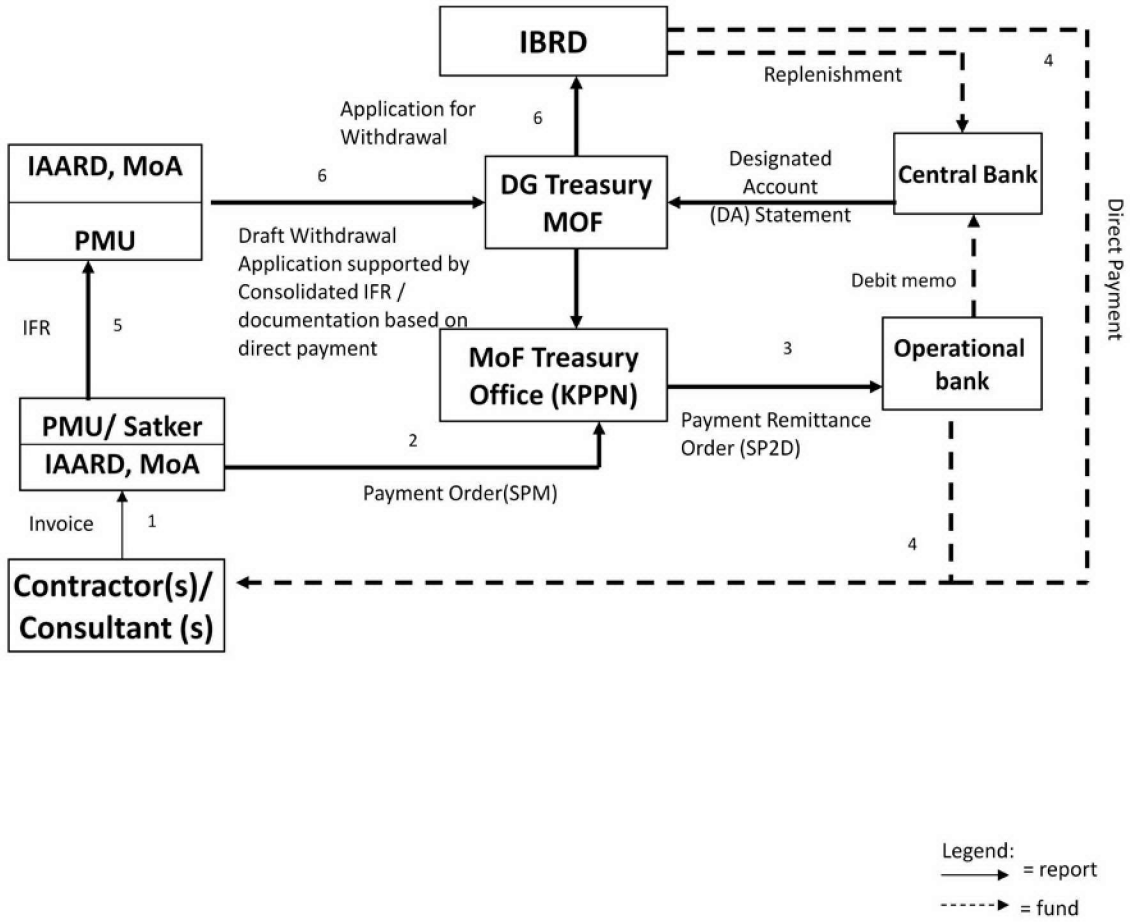
back-up (general cashbook and supporting books) is still carried out in finance bureaus / sub-units and the KPPN.

12. The Chart of Accounts used by the SAI does not include specific codes to identify funding sources (e.g., donors). Therefore, PMU, with inputs from satkers, will use a simple accounting system to record project expenditures. Data collection, recording and reporting procedures will be addressed in the POM.

13. Special purpose financial statements for annual reporting, and unaudited interim financial reports (IFR) will be submitted in an agreed format on a quarterly basis as part of the project reports within 45 days of the end of the reporting period to the Bank through the Ministry of Finance.

14. Flow of Funds. The flow of funds arrangements for the project are as described below:

1. Contractor/consultant submits invoice to commitment officer in PMU/PIU. PMU/Satker reviews and verifies the invoice.
2. PMU/Satker then forwards the invoice to finance staff / unit for issuance of SPM (payment order).
3. Based on the SPM, the KPPN than checks the availability of funds and issues an SP2D to the KPPN's operational bank and issue a debit memo to Central Bank to debit DA.
4. The operational bank transfers the funds directly to contractor's / consultant's account.
5. On a quarterly basis, each Satker should contribute to the IFR prepared by the PMU. On a biweekly basis, the Central Bank issues a DA statement. DG Treasury then forwards the DA statement to PMU for preparation of IFR.
6. IFR to be submitted to the Bank by PMU through DG Treasury, MoF.



15. *Internal Control*. 62% of the project funds will finance soft expenditures, including training and incremental operating costs. The use of a designated account mechanism to finance soft expenditures will give rise to a higher level of risk for the project.

16. There will be additional mechanisms put in place to strengthen internal control, which will be reflected in the POM, such as:

a. Involvement of the legal department in drafting agreements with fellowship recipients so as to provide for clear accountability on both sides.
b. Agreement to serve IAARD or a related research unit after the completion of studies should be reflected in the fellowship agreement.
c. Clear penalties for non-compliance with fellowship agreements.
d. Payment verification in respect of soft expenditures will have to be supported by sufficient documentation (contracts with fellowship recipients, contracts with research grant recipients, reports from universities, reports of workshops, training, tickets, boarding passes, hotel receipts, etc).

17. Project internal control will adhere to the government internal control mechanism. To improve project implementation, a POM will be prepared for the project. The POM will refer mostly to the existing SOPs and cover aspects such as:

18. Organizational structure, job descriptions, implementation and project requirements as regards recordkeeping and documentation, budgeting, procurement, financial record management, asset management, flow of funds, payment verification – with additional verification processes for Bank-financed expenditures, simple accounting for the project, reporting (IFR format, how to prepare IFRs, and timeline for preparation at each level), annual audit arrangements (internal and external), supervision plan, governance / anti-corruption and disclosure requirements, sanctions & remedy procedures, audit report publication and complaints mechanisms, and monitoring and evaluation mechanisms (including training and supervision plan) for project implementation.

19. Training on the POM will be provided to CPMU and all Satkers so as to ensure better coordination and project implementation.

20. *Internal Audit.* Internal audits are to be systematically undertaken at regular intervals at the central and local levels based on TOR acceptable to the Bank. IAARD should issue letters to their respective IGs requesting them to conduct internal audits on the project. Copies of the audit reports should be provided / made accessible to the Bank.

21. *External Audit.* Annual special purpose project financial statements will be audited by the BPK. IAARD shall prepare the annual consolidated project financial statements and submit these to the BPK for audit. The annual audit reports shall be furnished to the Bank not later than six months after the end of the government fiscal year (June 30 of the following year). Audits will be conducted in accordance with audit terms of reference acceptable to the Bank and agreed by negotiation. The project will make the annual project audit reports available on its website.

Project Financing

22. The total project cost estimated at USD 100 million will be funded by an IBRD loan for USD 80 million, and by counterpart funds from the government of Indonesia for USD 20 million that will finance those activities being excluded from the Bank financing.

Disbursements

23. The disbursement table below shows the disbursement categories for eligible expenditures under the project by source of funding, the allocations of the loan proceeds to each category and percentage of expenditures to be financed under each category::

Category	Amount of the Loan Allocated (expressed in Dollars)	Percentage of Expenditures to be financed (inclusive of Taxes)
(1) Non-consulting services and training for Part A of the Project, except for Parts A.3 (b) and (c) of the Project, and training scholarships and training awards for the Project (Parts A.1 (a) and (b) of the Project, respectively)	39,525,000	100
(2) Goods, works, non-consulting services, and training for Part B of the Project	34,025,000	100
(3) Research funds for the Project (Part C.2 of the Project)	5,600,000	100
(4) Consultants' services for Part D.2 of the Project	850,000	100
TOTAL AMOUNT	80,000,000	

24. The applicable disbursement methods are (i) advance payment, (ii) reimbursement and (iii) direct payment.

25. When the advance method is authorized, one single Designated Account (DA) in USD will be established for the project at the Bank of Indonesia and used to finance eligible project expenditures. The DA will be under the name of DG Treasury at the Ministry of Finance and denominated in USD. The CPMU will be responsible for reconciling the DA and preparing applications for withdrawals, duly approved by DG Treasury, before submission to the Bank. Copies of the designated bank account statements will be provided to the CPMU by the Directorate for Cash Management at DG Treasury, MOF. The ceiling for advance(s) to the DA is US$ 8 million.

26. DG Treasury will authorize its relevant Treasury Offices (KPPNs) located nearby the implementation units to authorize payments of eligible project expenditures through the issuance of SP2Ds (remittance orders) charging the DA. For this purpose, DG Treasury shall issue a circular letter to the relevant KPPN Offices providing guidelines and criteria for eligible project expenditures in accordance with the Grant Agreement.

27. Applications for reporting of the use of DA funds will be supported by: (i) list of payments together with records evidencing such expenditures, against contracts that are subject to the Bank's prior review; or (ii) statement of expenditures (SOEs) for all other expenses, and (iii) DA reconciliation statement. Reporting of use of DA funds and applications for advances to the DA may be submitted in a single application. Applications for reimbursements will be supported by the same documentation (i) and (ii) referred to earlier and (iii) evidence that payments were made, such as bank statements. Applications for Direct Payments will be supported by records evidencing eligible expenditures, e.g., copies of receipts and supplier

invoices. Frequency of application reporting expenditures paid out of the DA will be submitted on a monthly basis.

28. The CPMU, based on input received from the Satkers, will prepare and submit quarterly Interim Financial Reports (IFRs). When the IFRs are produced on a timely basis, the applications for reporting on use of DA funds will be based on the IFRs and an advance to the DA will be made for six-monthly projected expenditures. The Bank will notify MOF of this change as appropriate.

29. All documentation for expenditures submitted for disbursement will be retained by the implementing unit and be made available to the auditors for the annual audit, and to the Bank and its representatives, if requested.

Procurement

30. Procurement for the proposed project shall be carried out in accordance with the World Bank's "Guidelines : Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers" dated January 2011, and "Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers" dated January 2011 ; and the provisions stipulated in the Loan Agreement, including the provision for National Competitive Bidding (NCB) to be carried out in accordance with GOI's national Procurement Decree 54/2010 subject to the improvements listed in the NCB Annex to the Loan Agreement.

31. Procurement of goods/equipment and consultant services, except design and supervision services for the construction of buildings, will be carried out under the responsibility of PMU/IAARD Secretariat with support from the Satkers. Procurement of works and design and supervision services for the construction of buildings will be carried out under the responsibility of each Satker with support from PMU/IAARD Secretariat. The PMU/IAARD Secretariat and the Sakters have limited experience in Bank-financed procurement and the Bank had advised that the Project should consider engaging procurement consultants at least at the PMU/IAARD level to provide support to PMU/IAARD Secretariat and the Satkers, but IAARD confirmed that it was confident of being able to satisfactorily manage the procurement under the Project with their own procurement staff and in case they face difficulties during implementation they would then engage the consultants. The Bank will also monitor procurement compliance and performance and an updated procurement capacity assessment will be conducted within the first year of project implementation to confirm any additional support that may be needed.

32. To mitigate the risk associated with low capacity of PMU/IAARD and the Satkers in the Bank's procurement procedures, the following measures have been agreed:

(i) The Procurement Committees in the PMU/IAARD and the Satkers will comprise of qualified procurement staff, and in addition one government staff experienced in at least government procurement and preferably Bank-financed procurement will be assigned in the PMU/IAARD Secretariat and each Satker to serve as the focal person for procurement matters. Procurement consultants will be engaged based on need which will

be reviewed within the first year of project implementation, for which funds have already been set aside under the contingency budget of the Project.

(ii) The Bank will provide procurement training before Project effectiveness and during project implementation.

(iii) The Project Operational Manual (POM) will include a procurement section providing guidance through cross-reference to the applicable procurement procedures and also details of the organizational structure, responsibility and accountability for carrying out procurement under the Project and for oversight of procurement compliance and performance monitoring by the Government. The POM will also specify measures to mitigate the risk of fraud and corruption, including specifying the complaint handling mechanism, procedures for checking and following-up remedial actions in cases of suspected collusion, fraudulent and corruption based on the existing regulations under Presidential Decree No. 54/2010. Contract award information will also be published in IAARD's website, in addition to the publishing requirements of the Bank's Procurement and Consultant Guidelines.

33. For NCB procurement of goods and works, GOI's national standard bidding documents will be used subject to incorporation of the improvements listed in the NCB Annex to the Loan Agreement and ensuring consistency with the Bank's Procurement Guidelines. The Bank is currently preparing the modified model NCB bidding documents which will be discussed and agreed with LKPP before being used under the Project. Until such time that the modified NCB bidding documents are agreed the existing model NCB bidding documents that are in use on all Bank-financed projects in Indonesia will continue to be used. For ICB procurement of goods and works, and for the selection of consultants, the Bank's mandatory standard bidding/Request for Proposal documents will be used.

34. However the scholarships to be awarded under the first two activities under Sub-component A.1 and the research grants to be awarded under Sub-component C.2 will not be subject to the Bank's Procurement Guidelines. The scholarship program has, however, been designed to ensure that the Bank requirements of the application of funds towards the purposes intended and on the basis of the principles of economy and efficiency are satisfied. The major proportion of the scholarship monies will cover the scholars' tuition/research fees at approved academic institutions, which will be paid directly to the concerned institutions. The balance of the scholarship monies will cover the scholars' living expenses, travel and supplies, and will be paid out as lump sum allowances with a basis in cost.

35. The existing e-procurement system will not be used on Bank-financed procurement under the project. The e-procurement system is still at an initial stage of implementation and is being further improved by LKPP. The Bank will undertake a comprehensive review of the e-procurement system later in 2012 with a view to discuss and agree with LKPP on the way forward for using the system on Bank-financed NCB procurement in Indonesia.

36. The residual procurement risk under the Project after mitigation is Substantial.

37. Detailed procurement documentation will be maintained and updated in the project files. The detailed Procurement Plan for at least the first 18 months of the Project, once agreed between the Bank and IAARD will also be published in the Bank website in accordance with the Procurement and Consultant Guidelines as well as in IAARD's website. The procurement packages and schedule as well as the thresholds for methods of procurement and for the Bank's prior review and ex-post review will be specified in the agreed procurement plan.

Environmental and Social Aspects (including Safeguards)

38. Due to the nature of the project, very limited impacts are expected at both at social and environmental levels.

39. SMARTD's main objective is to improve the institutional capacity and performance of the Indonesian Agency for Agricultural Research and Development (IAARD) in developing and disseminating innovative technologies. During project design, it was identified that no major social issues involved in the proposed investment. It is expected that the proposed project will enhance the performance and effectiveness of the Indonesian Agency for Agricultural Research and Development (IAARD) in the development and dissemination of farmer and market demand-driven technologies.

40. Social participation will be promoted during project implementation, it is anticipated that approximately 1,393 civil servants will participate in the program from 2012 to 2016, with approximately 220 in degree training (60 MScs, 90 Ph.Ds, and 70 participants in a linkage/sandwich program), approximately 245 in non-degree training, and 600 involved in seminars, workshops and conferences

41. Regarding indigenous peoples, the proposed project activities will not finance activities that directly or indirectly will affect indigenous peoples; the activities are related to agricultural research and will be site specific and localized activities to be developed in the research centers for improving the human resource development, facilities and mobility improvement. Indigenous peoples are "neither present in nor have a collective attachment to the project area"; for this reason the OP 4.10 is not triggered for this project.

42. The project does not trigger the Bank's involuntary resettlement policy (OP/BP 4.12), as the project sites will be located on land owned by the Ministry of Agriculture or by the authorities at local and provincial level, so that there is no need for acquiring land for the proposed constructions. For the North Sulawesi IAAT, there is a decree from the Governor of North Sulawesi Province (Decree No. 179/1984 of 30th October 1984) that allows the use of the land by the Ministry of Agriculture/IAARD. Also, IAARD has issued a letter, dated 14 February, 2012, confirming that all activities to be undertaken under SMARTD will be on land belonging to the Ministry of Agriculture or to local government authorities.

Environment (including Safeguards)

43. The project is rated as a Category B project due to the scale of potential environmental impacts and triggers the Bank's Operational Policy (OP) 4.01 on Environmental Assessment. Potential environment impacts may likely come from the improvement of research infrastructure

(Component B involves civil works for two new laboratories, the rehabilitation and/or the upgrading of laboratories, and field stations). Laboratories and field stations will be designed and or improved and its management system shall be meeting world standards (ISO 17025) as shown by some IAARD laboratories that had already been certified. Civil works contracts will follow the current government regulations such as Permit to Build (*IMB = Izin Mendirikan Bangunan*) that considers technical and environmental standards and include clauses on proper housekeeping, waste management and occupational health and safety.

44. In using the laboratories, research activities may use chemicals that may have potential chemical impact. However, use of chemicals will be very small scale and limited. In addition, there are existing standards for laboratory operations, among others include waste management and safety. With regards to the construction of civil works, the adverse impact will be very minimal since: (i) buildings are simple and small (including new buildings); (ii) most constructions are within the existing IAARD's facilities; (iii) follows the current regulations on construction permit (IMB).

45. The project will not require a stand-alone environmental impact assessment or Environmental Management Plan (EMP). Instead the project will apply environmental codes of practices (ECOPs) for construction activity that addresses construction-related impacts including clauses on proper site management, waste management and occupational health and safety. The environmental safeguards compliance process (implementation, monitoring and reporting) and ECOPs will be included and outlined in the Project Operations Manual (POM).

46. During the appraisal mission, safeguard institutional capacity assessment was conducted; the organization chart of SMARTD project has been reviewed and discussed. There are three institutions for monitoring and evaluation of the environmental impacts of the project, i.e. (1) the Project Manager of Component B, (2) the Assistant PMU of M & E (Monev), and (3) the Head of Satkers (Satuan Kerja). The PMU Manager has entrusted the Assistant PMU of Monev to be responsible of ensuring that the institutional safeguards requirements are met. In addition, a safeguards consultant will be hired in year 2, 3 and 4 for which a budget allocation has been made. The safeguard training shall be conducted in line with other workshop (procurement, FM etc) prior to year 2. The Project Operations Manuals clearly explains the role and responsibility of the Assistant PMU for M & E in conducting monitoring and evaluation at every stage of the project and also in ensuring that contractors follow the ECOP.

47. In addition, IAARD has also been familiar with the application of quality management and audit system (manuals, Standard Operating Procedures, and technical guidelines or juknis) related to the IAARD business processes and their laboratory management under ISO 17025 for BIOGEN and ICAERD. In other words, the institution has the capacity and experience to ensure that the safeguard policies will be followed, monitored and evaluated.

Monitoring and Evaluation

Quality assurance

48. Quality assurance is done by carrying out of annual technical audits of the program's compliance with scholar eligibility, selection, and implementation procedures. Annual operation

report of the SMARTD Project is based on the Project Operations Manual by the auditor statement of the program's compliance with scholar eligibility, selection, and implementation procedures.

Monitoring and Evaluation

49. The M&E implementation plan for SMARTD includes: (i) organizational arrangements, (ii) monitoring of progress in the implementation of activities, (iii) M&E staffing and cost estimates, (iv) M&E of outcome/results, and (v) M&E of early impact. The M&E function is envisioned as part of the overall institutional development and capacity building of the project implementing units at the central, national and provincial levels. The PMU, established within the Secretariat of IAARD, will have the overall responsibility for the M&E and the dissemination of its results. Formal M&E reporting mechanisms will be established at all levels of project implementation, while still maintaining the supervisory function of the PMU. The PMU will be responsible for monitoring implementation progress (physical and financial), verifying and consolidating data. It will also be responsible for monitoring of overall project implementation progress, outcome/results, evaluations, data entry/import into the MIS, commissioning and supervision of baseline study, impact evaluation and other surveys as necessary.

Role of partners

50. AusAID plans to make available a grant to provide TA to support SMARTD implementation.

Annex 4: Operational Risk Assessment Framework (ORAF)
INDONESIA: SMARTD
Stage: Board presentation

<table>
<tr><td>Project Stakeholder Risks</td><td colspan="4">Rating: Moderate</td></tr>
<tr><td rowspan="2">Description : The public institutions in the agriculture sector of Indonesia, to which IAARD belongs, are known to be numerous, fragmented and with generally with a low level of capacity. Other stakeholders and potential users of research results and products are also scattered and generally unorganized, which means that they have little weight to exercise in case of policy reversal or fading commitment to the project by the national government. The context of decentralization makes it particularly challenging due to the multiple levels of decision.</td><td colspan="4">Risk Management :
• Constant and sustained dialogue with other parts of government such as MoF and Bappenas throughout implementation - particularly through the Project Steering Committee (PSC) - to ensure that support for the project does not vanish over time
• Lobby by MoA and IAARD to retain support and momentum
• Leverage partnerships including TA from other international or bilateral organizations (GFAR, Ausaid, ACIAR, CIRAD) to avoid backsliding on reforms of research management</td></tr>
<tr><td>Resp: MOA/IAARD</td><td>Stage: Implementation</td><td>Due Date : Periodic</td><td>Status: Pending</td></tr>
<tr><td colspan="5">Implementing Agency Risks (including fiduciary)</td></tr>
<tr><td>Capacity</td><td colspan="4">Rating: Moderate</td></tr>
<tr><td rowspan="2">Description :
IAARD, the implementing agency, is not a new institution for the Bank, but it still lacks recent and updated experience and capacities in preparing and implementing a large Bank funded project. It may lack some skills that are necessary for proper implementation of the project and familiarity with the Bank's guidelines and procedures.</td><td colspan="4">Risk Management : It is expected that AusAid through ACIAR (and maybe other external partners) will make available a grant to fund TA during SMARTD implementation to make sure that the appropriate technical expertise can be mobilized at all times to support the research management reforms. A provision for training on project management and Bank procedures has been included in component D (Project management).</td></tr>
<tr><td>Resp: IAARD</td><td>Stage: Implementation</td><td>Due Date : Periodic</td><td>Status: Pending</td></tr>
<tr><td>Governance</td><td colspan="4">Rating: Moderate</td></tr>
<tr><td rowspan="2">Description :
The research personnel at IAARD like in other public institutions in Indonesia does not benefit from a compensation system that would provide the appropriate incentives to perform. Inadequate status and disincentives may lead to inefficient use of human resources, particularly of those researchers that will have been trained abroad.</td><td colspan="4">Risk Management: The project will facilitate and foster discussions within GOI to identify and agree upon the kind of measures that could be implemented by IAARD to improve the management of its human resources, including an incentives system acknowledging and rewarding performance.</td></tr>
<tr><td>Resp: IAARD</td><td>Stage: Implementation</td><td>Due Date : MTR</td><td>Status: Pending</td></tr>
<tr><td colspan="5">3. Project Risks</td></tr>
<tr><td>3.1. Design</td><td colspan="4">Rating: Moderate</td></tr>
<tr><td>Description: Project design involves - and project implementation will require - a set of structural measures to improve the management of resources (staff and facilities management, incentives systems, partnerships, diversification of</td><td colspan="4">Risk Management: Arrangements were made during project preparation to secure adequate expertise and support for detailed design studies and implementation support. Strong linkages are established with the international agricultural research network that will provide support to implement the GCARD road map in Indonesian agricultural research. Finally, a phased approach</td></tr>
</table>

research funding, etc.).	has been adopted for some investments like research infrastructure and facilities. Project design allows for adjustments at mid-term.			
	Resp: IAARD	**Stage:** Implementation	**Due Date :** Periodic	**Status:** Pending
Social & Environmental	**Rating:** Low			
Description: The social and environmental risks involved in this institutional and capacity building project for agricultural research are very limited**.**	**Risk Management:** An annual assessment is requested from the project management unit, to be reviewed by the World Bank during annual supervision missions.			
	Resp: World Bank	Stage: Implementation	Due Date : 1/15/2012	Status: Pending
Program & Donor	**Rating:** Moderate			
Description: It will be important for SMARTD implementation to secure the resources for technical assistance and expertise that will be required throughout project implementation, in addition to what the IBRD loan will be able to provide.	**Risk Management:** The commitment from the other potential partner (AusAID/ACIAR) will have to be confirmed at effectiveness stage in the form of a multi-year agreement covering SMARTD implementation period. Communication with key development partners during the preparation process, and harmonization of support during the implementation period will be ensured.			
	Resp: IAARD	**Stage:** Implementation	**Due Date :** Effectiveness	**Status:** Pending
Delivery Monitoring & Sustainability	**Rating:** Moderate			
Description: MIS in IAARD have not been very performing so far. Thus it may be difficult to assess the efficiency of use of the resources provided by SMARTD financing.	**Risk Management:** An appropriate provision is made for M&E in component D (Project Management). Sustainability will depend on the ability of the institution to secure research funding through partnerships with private sector, international research institutions and local governments. SMARTD will help the research agency implement an investment program aimed at improving its capacities and management systems, but sustainability of IAARD after project completion is not contingent upon external funding. Assurances have been given by the agency and GOI that the part of the training programs that will still be ongoing at project closure will be funded by the national budget assigned to IAARD.			
	Resp: IAARD Bank	**Stage:** Implementation	**Due Date :** Periodic	**Status:** Pending

Overall Risk During Implementation	
The overall risk rating is Substantial.	**Comments:** Government and implementing agency commitments, as well as the strong research management component and the provision of technical assistance expected from AusAID and ACIAR, are important factors that will limit the risks during project implementation. Nevertheless the challenges of reforming and modernizing a public research institution in the country context cannot be underestimated.

Annex 5: Implementation Support Plan

INDONESIA: SMARTD

Strategy and Approach for Implementation Support

1. The strategy and approach for implementation support (IS) has been developed based on the nature of the project and its risk profile. It aims at making implementation support to the client both more flexible and more efficient, and will focus in particular on implementation of the risk mitigation measures laid out in the ORAF The strategy and approach for SMARTD implementation will also rest on the following:

- Build on ownership through the preparation process
- Planning and delivery reinforced by national and international consultants
- Benefit from technical support from specialized international institutions like FAO and ACIAR
- Link-up with international and regional networks on agriculture research
- Link up with RISET and the broader S&T agenda in Indonesia

Implementation Support Plan (ISP)

2. The ISP is an indicative and flexible instrument that will be revisited during implementation, and adjusted based on lessons learnt during implementation as well as the existing and developing capacities in IAARD. Most of the Bank team members will be based in the Indonesia country office to ensure timely, efficient and effective implementation support to the client. The implementation support plan for the project includes the following:

- *Technical:* Specialized national and international consultants will be recruited to provide support as required for the design of specific components or activities or to assist in their implementation. It is foreseen that SMARTD will contract consultants and advisory services during the first eighteen months of implementation (see table 1 below): two consulting firms, seven national consultants and three international consultants to provide the necessary technical support
- *Operational*: A shadow team of technical advisers will reinforce key positions in the SMARTD PMU to ensure an efficient delivery of the program. For example the PMU Manager will be supported by an international implementation specialist (Co-team leader); each component leader will as well be supported by an expert in the specific component themes. Provisions have been made in the contingency budget of the Project to recruit procurement consultants as needed to support SMARTD procurement processes. A total of eight international and national consultants will be recruited to support the implementation of the project.
- *Partners:* The Australian aid agency (AusAID) will support SMARTD through a grant to be channeled through ACIAR as part of their ongoing Australia- Indonesia Partnership for Reconstruction and Development (AIPRD) - rural component. SMARTD and Australia's investments in agriculture aim at incorporating end users needs and demands in the national research agenda.

- *Financial management.* Each supervision mission will review the project's financial management system, including but not limited to, accounting, reporting and internal controls. Supervision will also cover key activities such as the management of the scholarship program and research grants on a random sample basis.
- *Environmental and Social Safeguards.* The Bank team will monitor compliance with the ECOPs and introduce best practices in managing research projects. The Bank team will also provide timely guidance to IAARD to address any issues that may arise during implementation.
- *Procurement.* The Bank will maintain close monitoring and supervision including on the pending issue of consultants to be recruited to support IAARD's procurement team and make sure that procurement processes are managed efficiently.
- *Anti-Corruption.* The Bank team will supervise the implementation of the agreed Governance Action Plan, and provide guidance in resolving any issues that may be identified.

3. The main focus in terms of support to be given during implementation is shown in the tables below:

Time	Focus	Skills Needed	Resource Estimate
First eighteen months	Academic placement and strategic staffing	Firm/ Company with expertise in screening, analysis and selection of institutions abroad for degree training Firm/ Company with advisory services in strategic staffing	Lumpsum amount included in Costab for 173 000 USD (component A.1)
	Human Resource Development	Individual consultant with practical experience in mentoring and placement of junior staff (such as retired IAARD officer)	6 months included in cost tab (Component A.3 4)
		Individual consultant in Human Resource Development with specific knowledge on conditions of service and recruitment procedures	8 months included in the cost tab (Component A.3. 4)
	Strategic budgeting for investment in ag. research infrastructure	Firm/ Company or individual consultants to provide advisory services for preparation of grand design study and assessment of building/ renovating /upgrading research facilities based on research program priorities	Budget allocation of 235 000 USD allocated in Costab. Component B.1 11
	Procurement	Individual consultant specialized in procurement in Indonesia	Included in the contingencies in the costab (Component D)
	Agriculture information system	Individual consultants (one national and one international) specialists in designing survey and analyzing information on agriculture system	4 months included in the cost tab (Component C.1 1)
	Planning and assessing agriculture research	Individual consultants (one national and one international) specialized in the assessment of Agric. Research institutes and planning of agricultural research programs	8 months included in the cost tab (Component C.1 3)
	Research collaboration and innovation	Firm company or Individual consultants (one national and one international) specialized in competitive grant schemes	9 months included in the cost tab (component C.2)
	Research commercialization	Individuals (One national and one international) with expertise in business plan development and technology	8 months included in the costtab (component C.3)

		commercialization	
	Extension	Individual with expertise in technology dissemination system	1 month per year included in the costab
	Implementation support	International team leader with expertise and agriculture research and extension	4 month per year included in the costab and FAO support missions
18-48 months	Technical advisory/technical support		FAO implementation support missions
	Procurement	Individual consultant specialized in procurement in Indonesia	Included in the contingencies in the costab (Component D)
Other			

4. The skills mix required is summarized in the following table:

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Agricultural Economist	10	2/year	
Research management Specialist	6	2/year	
Research Institutions Specialist	4	1/year	
M&E Specialist	4	1/year	

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