



1. Project Data

Project ID P117243	Project Name Sustainable Management of Ag Research	
Country Indonesia	Practice Area(Lead) Agriculture and Food	
L/C/TF Number(s) IBRD-81880	Closing Date (Original) 30-Sep-2017	Total Project Cost (USD) 77,093,167.60
Bank Approval Date 02-Aug-2012	Closing Date (Actual) 30-Jun-2019	
	IBRD/IDA (USD)	Grants (USD)
Original Commitment	80,000,000.00	0.00
Revised Commitment	77,093,167.60	0.00
Actual	77,093,167.60	0.00

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2. Project Objectives and Components

a. Objectives

The Project Development Objective (PDO), as stated in both the Loan Agreement and the Project Appraisal Document (PAD) for the "Sustainable Management of Agricultural Research and Technology Dissemination (SMARTD) Project was "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."



b. Were the project objectives/key associated outcome targets revised during implementation?

No

c. Will a split evaluation be undertaken?

No

d. Components

Component A: Development and Management of Human Resources (Original allocation: US\$40 million, Actual: US\$17.93 million). This component aimed at strengthening the scientific skills and research capacities of IAARD's professionals for a total of close to 1,400 researchers, technicians, and support staff. Its four subcomponents were Subcomponent A1: Scientific training (degree and other) and networking; Subcomponent A2: Technical and research management training, and professional skills training to staff; Subcomponent A3: Human resources management: mobility program, incentives/promotion, and staff recruitment system.

Component B: Improvement in Research Infrastructure and Facilities (Original allocation: US\$35 million, Actual: US\$51.82 million). This component aimed at rehabilitating, improving, and upgrading the physical infrastructure of some of the operational units within IAARD and at developing a fully comprehensive strategic master plan to guide future investments in research infrastructure. Its three sub-components were: Sub-component B1: Laboratory improvement; Sub-component B2: Field station improvement; and Sub-component B3: Building construction and renovation.

Component C: Research Management and Policy Support (Original allocation: US\$15 million; Actual: US\$22.6 million). This component aimed at enhancing the efficiency and effectiveness in the use of research resources through the implementation of improved research management strategies, processes, and instruments. Its four sub-components were: Sub-component C1: Improvement of priority-setting, planning, and programming systems with more effective stakeholder participation; Sub-component C2: Scaling-up of competitive research funds to enhance research collaborative programs with other national and international research organizations and to foster local innovation; Sub-component C3: Support to the commercialization of research products, leading to the establishment of more diversified and sustainable research funding strategies; and Sub-component C4: Improvement of technology dissemination systems. SMARTD also assisted in the generation of information and studies in support of policy decision making.

Component D: Project Management and Monitoring and Evaluation (Original allocation: US\$10 million; Actual: US\$2.95 million). This component aimed at facilitating project management and implementation, providing the necessary administrative and technical advisory support (for Parts A – C), and carrying out monitoring and evaluation (M&E) activities.

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost:

The total project cost at approval was expected to be US\$100 million. The actual total cost at project closing was US\$95.3 million. The difference was due to a change in the scope of activities, especially in component A, and to a change in the value of local currency (US\$1 = IDR 9,000 in 2012 to IDR 12,000 in 2015 and IDR



13,640 in 2019), allowing more local investments for the dollars provided in the loan and a decrease in the contribution by IAARD.

Financing:

At approval, IBRD loan was to be US\$80 million. By the project's closing, the actual amount was US\$77.1 million.

During implementation, there was agreement that the Australian Center for International Agricultural Research (ACIAR) would provide cofinancing for an estimated US\$6.0 million, mainly to support key elements of enhanced research management systems and associated technical assistance; however, this cofinancing grant did not materialize.

Borrower Contribution:

At approval, the Borrower/IAARD contribution was supposed to be US\$20.0 million, but the actual amount disbursed decreased to US\$18.20 million.

Dates:

The project was approved on August 2, 2012, became effective on October 25, 2012, and the original planned closing date was June 30, 2017. A Mid-Term Review/MTR was carried out in March/April of 2015.

Restructuring:

Mid-Term Review (MTR) recommendations and conclusions of the follow-up Implementation Support Missions (ISMs) were reflected in a "level 2" project restructuring (June 2016). This included: an extension of the project closing date by 21 months (until June 30, 2019); and the revision of some activities which required a reallocation of funds between components and corresponding adjustments to the disbursement estimates and indicator completion dates.

3. Relevance of Objectives

Rationale

The project's objectives were 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." These objectives were highly relevant to the strategic elements of the Government's national and agricultural sector plans, supported by the Bank Country Partnership Strategies (over two periods), while remaining substantially relevant during the entire implementation period. This relevance to both Government and WB strategic priorities is evidenced below and in the ICR (paras. 20 - 23). On the other hand, it is not clear how the objective to "improve the institutional capacity and performance of the IAARD to develop and disseminate relevant and demand-driven innovative technologies" (the PDO) would be



assessed because the PDO indicators were vague in terms of the actual achievements expected. As the ICR noted, “PDO outcome indicators were not always clear or always directly relevant” (para 79). Notwithstanding the vagueness of the PDO statement regarding the meaning of “improvements”, the project’s results framework and most supporting indicators and targets adequately defined the meaning of “improvements”.

The main elements of the Indonesian Government development plans and World Bank assistance strategies before and during this project’s implementation were as follows:

(a) The National Development Plan for 2010- 2014 (*Rencana Pembangunan Jangka Menengah Nasional, RPJMN*);

(b) Indonesia’s Strategic Plan of Agriculture for 2009–2014 published in 2011, focused on key goals of agricultural development, including achieving and maintaining self-sufficiency of five strategic commodities and enhancing diversification in food production. In 2015, a new government shifted policy priorities, paying even greater attention to the goal of self-sufficiency in strategic commodities and introducing a revitalization program. The components/activities of this project (SMARTD) contributed to supporting the MoA with its ‘revitalization agenda’.

(c) The vision contained in Indonesia’s Strategic Plan of Agriculture for 2015–2019 included supporting MOA’s objectives to improve the availability and diversification of food toward food sovereignty, competitiveness, and to improve the quality of the performance of the government’s agricultural apparatus in terms of functions, systems and capacities. Accordingly, SMARTD Project was able to provide timely and well-structured support to MoA’s mission and objectives during this period.

(d) The World Bank Country Partnership Strategy (CPS) for FY09–FY12 included a core theme of ‘Investing in Indonesia’s Institutions’, which sought to address some of the country’s critical governance and institutional challenges, while supporting ‘success stories of replicable institutional reform’. This focus continued in even more depth during the CPS for FY13-FY15, which saw the World Bank contributing to improve the performance of public institutions and enhance HR capacity and providing advice to “improve the public R&D institutes’ performance and science, technology, and innovation.

(e) The FY16-FY20 Country Partnership Framework (CPF) of the World Bank, which was in effect at the time of project completion, included promoting the effectiveness of public institutions, improving service delivery and responsiveness and accountability to citizens at the local level. In this context, IAARD remained a relevant institution for WB support.

Based on this evidence, this review has assessed that this project’s development objectives were “substantially relevant” to the main elements of the Government’s development plans and of the World Bank’s assistance strategies.

Rating

Substantial

4. Achievement of Objectives (Efficacy)



OBJECTIVE 1

Objective

To improve the institutional capacity and performance of the Indonesian Agency for Agricultural Research and Development (IAARD).

Rationale

Theory of Change. The project's design and implementation rationale was generally driven by the 'reverse flow' of a generally sound Theory of Change (ToC) which was reconstructed in the Implementation Completion Results Report (ICR), and includes explicit assumptions for each level of change (see the ICR, Figure 1 for an illustration of the ToC and key assumptions). The theory of change presented in the ICR links the project's inputs to outputs such as improved staffing and equipment to the development of new agricultural technologies, and links key outputs to outcomes (e.g., improved technical packages being adopted by farmers and generating increased yields). The theory of change assumes agricultural researchers would have enhanced and adequate incentives to generate improved technical packages.

The section below highlights selected evidence from the ICR to illustrate the manner and extent to which Objective 1 was achieved through strategic and aligned activities, outputs and outcomes. The ICR provides further details on both in paragraphs 27 – 53.

Outputs.

Strengthened Research Capacities: Many of the technology packages, which were among the key outputs, developed within IAARD over the last six years have been generated by SMARTD's R&D partnership collaboration initiatives/activities, which contributed to IAARD's human research capacities (outcomes). Measured against the original target of 72 technology packages to be developed every year by project completion, and starting from a baseline of 32, by 2018 the project generated 119 technology packages for priority crops.

Improved Research Management and Planning: In the context of contributing to improve IAARD's performance, SMARTD improved research management (under Component C), encouraging an enhanced orientation toward results through a renewed focus on end-users and clients. One perceived shortcoming at the time of appraisal was the lack of clear priority setting and sound planning and programming mechanisms within IAARD. Through the project, technological needs and priority commodities were successfully identified in all provinces and guidelines prepared on 'priority setting in agricultural research and development programs'. SMARTD also supported the drafting of two 'grand design' reference documents: one titled 'Human Resource and Development at IAARD', finalized in 2015; and a second document titled, 'Facilities for IAARD', a forward-looking strategy covering the period from 2015 to 2045 (study still in process). During the interview with the Bank task team IEG was that "a pending action involving the finalization of the guidelines for prioritization of the agricultural research agenda was on the desk for signature and issuance by the Director General of IAARD".

Research Partnership Collaboration: With a view to foster technology innovations, as outputs, 1,098 national and 44 international R&D research partnership collaborations were implemented over the lifetime of the project – PDO indicator P3 refers to the "number of articles in internationally peer reviewed journals and



publications on agricultural R&D results developed by the IAARD". The national partnership collaboration activities were funded entirely by the SMARTD Project until 2015 (by which time there were 111) and thereafter by the Government of Indonesia.

Competitive Research Grants: The allocation of competitive research grants (as key outputs) followed clearly communicated selection criteria that were transparent and unambiguous. The criteria were applied as part of a well-conceived process, which constituted a thorough project contribution to the improved governance of agricultural research in Indonesia. Development partners and foundations, as well as private sector corporations (corporate social responsibility and commercial) interested in providing research funding to IAARD are expected to benefit from these improvements supported by the SMARTD Project.

Addressing Key Structural Constraints on Collaboration: The ICR correctly recognizes that some structural issues impeded even stronger performance by IAARD on certain collaborative partnership initiatives, especially involving laboratories. Interviews conducted during ICR preparation with resource persons across the IAARD hierarchy confirmed that since the onset of SMARTD, 'collaboration has become the name of the game', and that this motto has effectively been 'exported' from the central level to the provincial/district levels, through decentralization of some competitive funding schemes.

IAARD Researcher Capacities: The above achievements refer to IAARD's scientific and intellectual capacity. The intermediate outcome indicator A1 'percent of researchers in IAARD' sought to gauge the extent to which the institution can count on a large enough pool of researchers who are capable of developing innovative technologies for dissemination, and to attract and retain them in the short to medium term. This percentage has remained stable at about 26 percent throughout the project implementation period. The ICR recognizes that there has been a general decline in staff numbers (about 20%) because a general public sector hiring freeze in Indonesia has affected IAARD.

IAARD Research Collaboration and Strengthening: By providing a budget earmarked specifically for the purpose of enhanced collaboration, SMARTD pioneered collaboration between IAARD and institutions inside and outside of the MoA. Through the many technical and managerial training sessions arranged and facilitated by SMARTD, the ICR concludes that SMARTD has done an excellent job of helping researchers adjust to the new situation. Interviews and anecdotal evidence generated by the ICR suggest that SMARTD trainee researchers are getting a head start in what has become a more competitive, transparent, rigorous, and accountable agricultural research environment. In addition, it is noteworthy that the original target of number of agricultural research collaboration activities/outputs was significantly surpassed (37 vs. 586).

Improved Research Infrastructure: Project activities on infrastructure upgrading (under Component B) can be conceived of as contributing to the part of the PDO relating to expanding IAARD's physical infrastructure capacity. This consideration is based on the assumption made at project appraisal that once more and better facilities—upgraded and accredited—would be available to IAARD centers, these would enable the increase of the quantity and quality of their research collaboration initiatives at the national and international levels.

Expanded Laboratory Infrastructure: The project enabled improvements in the capacities of 19 laboratories. Data show the steady increase of laboratories and experimental stations accredited through SMARTD, from a baseline of 15 to 36, vs. a target of 21 laboratories. See ICR for further details (para. 50).



Enhanced Experimental Stations: Further results include the updating of ISO 9001 certification from the 2008 to the 2015 version for 41 experimental stations. The total number of improved stations at completion exceeded the original target of 8 stations.

Improved Laboratories: In terms of ISO 17025 accreditation for non-accredited laboratories, out of 159 laboratories located in research institutes and AIATs, 46 laboratories were supported by the project and had finalized this process at project completion. Available evidence in the ICR point to good usage and maintenance of the facilities funded under SMARTD.

Expanded Research Infrastructure and Collaboration: The ICR presents details on the project investments made in expanding needed and priority research infrastructure, generally surpassing the targets, including infrastructure at the decentralized level (ref. the Assessment Institutes of of Agricultural Technology/AIATs). As part of the field-level focus, attention was paid to seed production units and machinery, further allowing the project to enhance its impact within farming communities throughout Indonesia. The ICR concludes that the physical upgrading of IAARD infrastructure through the project has played an important role in expanding research collaboration initiatives and technology packets.

The ICR also highlighted a number of key outputs which were not generated or completed by project completion ("Pending Issues", Table 9) and several key assumptions which did not materialize by project closing (e.g., enough funding from the national budget for O&M of infrastructure and equipment, further consolidate and nurture its newly established international research collaboration networks).

Outcomes

IAARD Researcher Capacities: The above achievements refer to IAARD's scientific and intellectual capacity. The intermediate outcome indicator A1 'percent of researchers in IAARD' sought to gauge the extent to which the institution can count on a large enough pool of researchers who are capable of developing innovative technologies for dissemination, and to attract and retain them in the short to medium term. This percentage has remained stable at about 26 percent throughout the project implementation period. The ICR recognizes that there has been a general decline in staff numbers (about 20%) because a general public sector hiring freeze in Indonesia has affected IAARD.

IAARD Research Collaboration and Strengthening: By providing a budget earmarked specifically for the purpose of enhanced collaboration, SMARTD Project pioneered collaboration between IAARD and institutions inside and outside the MoA. Through the many technical and managerial training sessions arranged and facilitated by SMARTD Project, the ICR concludes that SMARTD Project has substantially assisted researchers adjust to the new situation. Interviews and anecdotal evidence generated by the ICR suggest that SMARTD Project trainee researchers are getting a head start in what has become a more competitive, transparent, rigorous, and accountable agricultural research environment. As noted already, the original target of the number of agricultural research collaboration activities/outputs (37) was significantly surpassed since 586 were achieved. It is not known whether some of these collaborations were the result of negotiations and agreements before this project became effective but it is assumed that the significant increase was largely attributable to the SMARTD Project

Enhanced Researcher Incentives: The SMARTD Project's support for innovation through research collaboration and competitive grant-funded projects contributed to improving its ability to register intellectual property rights (IPRs), which triggered a policy debate and the establishment of a dedicated working group, leading to the passing of the Ministry of Finance (MoF) Regulation No. 72 in 2015 (ICR, para 36). This



regulation states that royalties should accrue to the individual researcher(s) who has (have) developed an innovation for which a patent has been issued. Although relatively recent, the regulation is already affecting positively the incentive structure, motivation, and work style of researchers, prompting them to pay much attention to the quality and marketability of their research results. Also, the ICR reports that networking has become more prominent in IAARD, to foster closer ties with the private sector with a view to attract private financial, technical, and human resources for commercialization or further R&D. The ICR provides data on the significant increase in royalties accruing to IAARD and its researchers (para. 37 and Table 3).

This review assesses the achievement of improving the institutional capacity and performance of IAARD as substantial.

Rating

Substantial

OBJECTIVE 2

Objective

To develop and disseminate relevant and demand-driven innovative technologies, meeting the needs of producers and of the agri-food system

Rationale

Theory of Change. The TOC for achieving this objective involves two aspects, namely (a) strengthened performance of IAARD to develop, manage and disseminate relevant, prioritized, innovative and demand-driven technologies, which resulted from the research outputs and outcomes; and (b) the long-term impact of prioritized, innovative and adopted agricultural technologies, resulting from increased number of dissemination areas under the Multi-Channel Dissemination Program

In retrospect, it may have been useful for the project to have provided support to strengthening the extension system and research-extension linkages, especially considering the varying levels of effectiveness across the 11 Indonesian provinces. This was not, however, part of the theory of change for the project at appraisal.

Outputs

Responsiveness to Demand for Enhanced Technology: According to the ICR the technologies generated an enhanced prioritization process involving key stakeholders stimulating the project's competitive research grants represented a significant contribution to influencing agricultural research priorities through better articulation between supply and demand; (iii) The available evidence shows relatively high adoption rates among farmers (80%), including female farmers, and high adoption rates among 'non-cooperator' farmers in and outside the community; (iv) a high number of technologies were patented and licensed, and there was a demonstrated willingness by agribusiness operators to pay royalties.

Private Sector Role: With respect to the private sector is concerned, the ICR states that the strongest indication of IAARD technologies meeting the needs of the agri-food system comes from the successful commercialization of its research products. A corresponding activity promoted under the project (under Sub component C3) had the objective of increasing funding levels and diversifying funding sources—with the explicit aim of boosting non-tax revenue for IAARD. This was meant to take place through the identification of



technology/knowledge commercialization opportunities, the development of a business plan for IAARD's research product commercialization, and support to the implementation of strategies that sought to better disseminate research products to the benefit of end-users.

Commercialization of IAARD Products: By project completion, IAARD commercialized its products through 586 Intellectual Property Right (IPR) certificates, well above the baseline of 29 and an original target of 37 patents or licenses. The ICR correctly recognizes that this IPR achievement was not attributable to SMARTD Project alone. Rather, the achievement should be viewed as part of the project's significant "leverage effect" across IAARD as an institution. The increasing number of patents received by IAARD are indicative of some of the potential for further commercialization of innovative technologies and other research products through the private sector.

Diversifying Funding Sources: Business plans for research product commercialization were prepared annually as planned, and this was part of a broader quest for diversifying the funding sources of IAARD (as captured by the fourth PDO outcome indicator P4 'percentage and number of sources of external funding in IAARD research budget' and indicator A3 'percentage of IAARD's operational budget allocated to research and dissemination').

External Funding of IAARD: At project completion, external funding available to IAARD was 9.9 percent of its total budget, a figure that is lower than the original appraisal target of 12.5 percent. Part of the explanation for this was that not long after SMARTD Project became effective, the government passed a new MoF Decree—often referred to as the 'one-door' regulation—requiring all external funds to be channeled through the national budget system.

Outcomes

Overall, the ICR presents strong evidence in terms of key performance indicators involving strategic outputs and outcomes and activities to substantiate the improved performance of IAARD (ICR, paras. 27 - 39). Two outcome indicators were designed to assess the extent to which the PDO was achieved, namely "the percentage of farmers adopting IAARD research results" and "the number of technologies developed and/or refined and that are disseminated to users"

Adoption of IAARD Research Technologies. The ICR noted (para 30) that "Adoption rates of IAARD technologies were measured in two phases of technology development funded under SMARTD Project: (a) the Multi-Channel Research, Development, and Innovation Model (Multi-Channel Pengembangan Pertanian Perdesaan Model berbasis Inovasi, MP3MI), a preexisting flagship initiative promoting a "model of rural agricultural development through innovation", implemented from 2013 until 2015; and (b) an enhanced MP3MI and the "Jarwo Super Program", a strategic priority initiative by the MoA focusing on integrated rice cultivation techniques, implemented in 2016. The ICR explained (para 30) that the former MP3MI applied an approach combining various methods of technology dissemination with a 'multi-channel dissemination spectrum' that had been piloted by IAARD since 2011. It consisted of on-farm participatory demonstrations implemented not only by extension workers and local agricultural service (Dinas Pertanian) staff, but also by private sector actors and progressive ('cooperator') farmers. SMARTD Project scaled up this program, reaching 33 locations in all 33 Indonesian provinces in which IAARD could count on the presence of its outreach centers, namely the Assessment Institutes for Agricultural Technology (AIATs, or 'BPTP' by their Indonesian acronym). These institutes have the mandate of adapting and fine-tuning research results to local conditions by 'repackaging' them in collaboration with different stakeholders (as happened under MP3MI) or, at a minimum, through close interaction with 'lead' farmers. As Annex 6.3, para 3 states, in the second



phase "a new approach was developed in 2018 that covered both the MP3MI and the Jarwo Super dissemination programs" which meant a heightened focus on food crops.

Adoption Rates: At project completion (2019), adoption rates reached 73–81 %, with a near even percentage between males and females. This compared with general agricultural technology adoption rates throughout the world that tend to be below 50 percent on average (see, for example, G. Kuehne et al. 2017. "Predicting Farmer Uptake of New Agricultural Practices: A Tool for Research, Extension and Policy." *Agricultural Systems Volume* 156: 115–125, for a discussion of the many factors determining farmers' decisions on technology adoption. Available at <https://doi.org/10.1016/j.agsy.2017.06.007>.) Therefore SMARTD Project was able to achieve significantly higher adoption rates than world wide averages, even without providing direct technical/financial support to the local extension system.

Number of IAARD Research Technologies Adopted. By midterm (2015), these performance indicators had achieved good progress: 49 percent of technologies available were adopted (starting from a baseline of 30 percent in 2012), with 95% males; 350 technologies were adopted up to 2015, (starting from a baseline of 32 in 2012); in 10 areas (last measured in 2015 after which that specific dissemination measure was discontinued, and starting from a baseline of zero as this indicator was not measured in 2012).

Improved Technology Dissemination Systems: The project included support for additional activities aimed at further improving technology dissemination systems (under Sub-component C4, e.g., periodic events at provincial and local levels for showcasing and demonstration purposes). IAARD took advantage of these occasions to strengthen the agricultural research system in the field and as vehicles to mobilize funding from local governments and partners. The dissemination system strengthened by SMARTD Project also was enriched by further diversifying and multiplying the different formats deployed for communication with IAARD beneficiaries and clients, notably placing more emphasis on using electronic media (see ICR, Table 5), consistent with good practices in Indonesia.

This review assesses the achievement of disseminating relevant and demand-driven innovative technologies, meeting the needs of producers and of the agri-food system as substantial.

Rating
Substantial

OVERALL EFFICACY

Rationale

The progress toward achievement of the overall PDO to improve the institutional capacity and dissemination performance of the IAARD which were both rated substantial. While these 'substantial' ratings were justified based on the available evidence, the ICR is correct in concluding that "a 'high' efficacy rating cannot be justified due to limitations in the project's ability to generate a fully comprehensive evidence base that tracked all aspects of the (complex) PDO" (para. 54).



This review assesses the overall efficacy of the achievements of this project as "substantial".

Overall Efficacy Rating

Substantial

5. Efficiency

Methodological Aspects: The ICR considered various complementary methodological perspectives/approaches for assessing the efficiency of SMARTD Project. The methodology used to assess the efficiency of SMARTD Project considered two aspects of the project: (1) the causal chain and time frame for the returns on investment for SMARTD Project are longer than in most projects; (2) the challenges of isolating the returns of SMARTD Project activities, from the broader activities of IAARD and the extension system. The process of developing and mainstreaming a technology involves different steps --- the research to develop the technology, the dissemination of the technology by AIATs, and the mainstreaming of the technology through the extension networks. The SMARTD Project did not systematically finance all these steps in the process (from beginning to end), and therefore the total investment costs of a particular technology development did not correspond to SMARTD Project investments (ICR, para 55).

Accordingly, the ICR assessed the returns of SMARTD Project activities based on project-specific evidence of financial and economic impacts, which were assessed based on a subset of SMARTD Project investments and their expected outcomes. The ICR used several methodological approaches, including: (i) value of incremental margins; (ii) "break-even" analysis; (iii) cost of producing technology packages; and (iv) using the same results of a study carried out in 2011 regarding an estimated economic rate of return on investments in agricultural research in Indonesia. Each of these approaches are summarized below, together with their limitations for reaching meaningful conclusions on assessing the efficiency of the SMARTD Project.

(i) Value of Incremental Margins: IAARD developed a wide range of technologies, ranging from new seed varieties to the development of products based on nanotechnology. IAARD's participating AIATs will typically disseminate a package of different technologies. The technologies modelled for the ICR analysis were constrained by available data, but nonetheless represent different sub-sectors and types of technologies for different crops. The first step in the analysis was to establish the financial "attractiveness" of adopting a new/improved technology by farmers, and from the farmer perspective, because the "financial attractiveness" is a precondition for adoption and for generating benefits from the research. The ICR made the core assumption that the producer margin for the new technology must be greater than the producer margin with the old technology. The ICR (Table 8) summarizes several incremental margins per technology or technology package, based on various assumptions for the technology packages, technical assistance and access to inputs, and subsidies, to generate several scenarios of producers' incremental margin for different crops, which may or may not be sufficient to motivate farmer adoption. While the approach has merits, there is an element of judgement regarding the margins needed to ensure adoption by farmers. The M&E system did not generate the ex-post data to validate the actual margins achieved by adopting farmers. Also, on their own, values of incremental margins are not possible to interpret as reliable evidence of productivity increases or of their efficiency attributable to the project.



(ii) “Break-even Analysis”: For the economic analysis, the technology-level analysis assesses adoption needed (in terms of hectares planted) to break even on the investment costs. The break-even analysis considers the full cost of development and dissemination of a technology. The cost of investment is the key variable in this analysis, because it is the most difficult to estimate and the results are very sensitive to assumptions. The cost used is the average cost for R&D and dissemination for each technology package disseminated through an AIAT in one province. The average cost per disseminated technology package was IDR11.6 billion, corresponding (according to the ICR) to US\$0.51 million (para 59).

The benefits from the SMARTD Project investments correspond to the incremental producer margin determined in the financial analysis. Because a lag can be expected from the moment the research is conducted until the technology is more widely disseminated and adopted, the ICR discounted the adjusted additional margin by four years, using an economic discount rate of 8 percent, on the basis of an annual rate of interest of 7.23 percent for Indonesia 10-year treasury bonds.

The ICR analysis shows that the research technology packages assessed are likely to bring significant returns. For the models assessed, the adoptions needed per dissemination (and corresponding cropped areas) are rather low (ICR, para. 61 and Table 9) but on their own, without comparisons against break-even analysis for crops researched by other agricultural research institutions, the cost effectiveness of research in IAARD is uncertain.

(iii) Cost of producing technology packages: The ICR estimates the cost at IAARD of producing a “technology package” in three ways.

(a) Total cost per technology copyright granted: The cost was estimated at US\$0.84 million per copyright

(b) Total cost per technology package produced: The cost of packages reported at both IAARD and the AIATs was estimated at US\$0.26 million per technology, between 2014 and 2018;

(c) Total cost per technology package produced through R&D and dissemination and only through AIATs was estimated at US\$0.51 million.

Again, on their own, without some comparison with similar calculations under similar conditions for agricultural research work in other national or international agricultural research institutions, it is not possible to assess the extent of IAARD's research efficiency based on this measure.

(iv) Study by ACIAR: A study was carried out by the Australian Center for International Agricultural Research (ACIAR) and published in 2011. Using available data, the study estimated that the annual real rate of return on investments in agricultural research in Indonesia was 13%. This analysis and the results were used as the basis for projecting the efficiency of SMARTD Project at the appraisal stage. This estimated economic rate of return (ERR) was not updated for this project and hence this same result was used in the ICR as the default measure of SMARTD Project's efficiency. There are many other empirical estimates available of economic rates of return (Bank and other publications) for other similar agricultural research projects in developing countries which show much higher ERRs (typically more than 30%). In the event there is another phase of SMARTD Project, it would be useful if the appraisal document would endeavor to generate an updated estimate of economic returns to agricultural research in Indonesia, based on an ex-post analyses of the SMARTD Project.

Other Considerations:



Given the limitations of the efficiency analysis as outlined above, the ICR identified and provided other positive benefits generated by the project, including the following (although not all of them were measures of efficiency; for further details, see ICR, paras. 65 and 66):

(1) Revenues from licenses and royalties and IAARD non-tax revenues. The significant increased revenues show that IAARD is increasingly successful at developing technologies that are ultimately licensed and commercialized and at directly commercializing research services;

(2) Procurement Reforms: The project stimulated reforms in the procurement system of IAARD, which was decentralized to the different research agencies (January 2016), thereby increasing the efficiency of procurement throughout IAARD.

Conclusion: The ICR recognizes the limitations of the methodologies used and of the reported results (see ICR, paras. 58 - 64). The reported marginal financial returns to farmers, high farmer adoption rates, the low adoption rates (with respect to benefitted crop areas) required for achieving break-even levels of investments on technologies generated under the project, and the broader/macro-level and “historical” 13 percent ERR, demonstrate to some extent the project’s cost- effectiveness, but not its economic efficiency. In retrospect, it would have been useful if the M&E system had included appropriate indicators, data and analyses to assess more directly the project’s “value for money” through comparative returns of the project activities and investments, an impact evaluation, and an updated ex-post ERR. Although the implementation period was extended by 21 months, the realization of almost all of the end-of-project (EOP) targets and the dramatic increase in IAARD royalties and non-tax revenues (see above) were additional indicators of effective project implementation but not its efficiency.

This review concluded that, based on the evidence available, the rating of the project’s overall efficiency was modest.

Efficiency Rating

Modest

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	13.00	0 <input checked="" type="checkbox"/> Not Applicable
ICR Estimate	✓	13.00	0 <input checked="" type="checkbox"/> Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome



Based on the combined ratings in the project's relevance (high), efficacy (substantial), and efficiency (modest), and considering the IEG guidelines for deriving the overall outcome rating of a project (Table 9.1), the overall outcome rating of the SMARTD Project in this review is 'Moderately Satisfactory'.

As assessed in the above sections, the rationale for the ratings of the 3 core elements can be briefly summarized as follows:

- i) **Relevance:** A "high" rating reflects the project's design: being strongly aligned with the Government national and sectoral development strategies, and the strong alignment with the Bank's CPS for Indonesia (at appraisal and up to closing); and playing a role in contributing to key sectoral targets of agricultural growth, reduced poverty and more competitive and diversified agricultural economy.
- ii) **Efficacy:** A "substantial" rating reflects good progress toward meeting the PDO and the 2 core outcome components, while also making substantial progress in meeting their corresponding strategic intermediate outcomes, which were generated through the effective implementation of sound and prioritized strategic research. These elements were consistent with a sound theory of change which was reconstructed for the project in the ICR.
- iii) **Efficiency:** A "substantial" rating is not justified, based on the various measures and evidence presented in the ICR. Some of the analysis aims at demonstrating the project's cost effectiveness but without any national or international comparisons; this does not provide the basis for an assessment of the project's efficiency.

a. Outcome Rating
Moderately Satisfactory

7. Risk to Development Outcome

This review concluded that there is a **modest** risk to sustaining the expected and realized outcomes of the Project as outlined above.

Both the Project Management Unit's (PMU) Project Completion Report (PCR) and the Bank's ICR recognized the importance of helping to ensure adequate priority measures to help ensure sustainability of the strategic outcome achievements of SMARTD Project. In the PCR, the PMU prepared a "sustainability strategy", with a strategy that is divided into immediate and medium- to long-term recommendations. In the ICR, the Bank team prepared essentially a sustainability action plan for SMARTD Project, naming the table: "Pending Issues, their Link to Outcomes, and Possible Mitigation Measures" (Table 9). While this table reflects relevant required ten "unfinished actions" by SMARTD Project to help ensure project sustainability, the proposed mitigation measures are vague, with an absence of time-bound actions; also, four of the ten required actions are blank. Eight of the ten required actions within the direct control of IAARD, thereby reducing the uncertainty of being able to achieve the actions. The other two actions that are outside the direct control of IAARD involved budgetary allocations from the Ministries of Finance and Agriculture for advanced training and adequate funding of O&M of infrastructure and equipment. Given the strategic importance of IAARD to contributing to Indonesia's food security requirements of a growing population, the Bank may wish to pursue a more explicit follow up action(s) to help ensure the pending actions are fully implemented. This follow up could be included in the Bank's country/portfolio dialogue, and a proposed



follow up operation/Phase 2, to consolidate, deepen and expand the support to IAARD. The ICR made no reference to a follow up operation. However, during an interview with the Bank's task team, IEG was informed that the Government was expected to request the Bank for support for a follow-up phase of SMARTD Project.

8. Assessment of Bank Performance

a. Quality-at-Entry

The ICR recognizes that the Bank's PAD was well written, and most importantly, reflected a strong rationale for the proposed project, in terms of being timely and forward looking, of the soundness of the project's main components, and of the implementation arrangements. Also, the SMARTD Project was correctly designed to "leverage other IAARD funds, with a vision of a 'sum that is greater than its parts' because the intended major leap in IAARD's capacity was expected to position the institution on a higher plane of effectiveness and sophistication" (ICR, paras. 112 and 113).

The ICR also recognized that one of the main weaknesses in project design was the relatively weak Results Framework containing several questionable baseline indicators. Similarly, some of the definitions were not agreed upon and were left open to ambiguity (for example, how to define a 'researcher'). Also, the ICR noted that some of the details on the outputs, outcomes, and results to be achieved by SMARTD Project and the indicators to be used to measure them, were left to be decided upon later, to be included in the Project Options Manual (POM). In addition, given the importance of ensuring adequate budgetary allocations to IAARD, project design did not include securing formally a Government commitment to provide "adequate" increased budgetary allocations to help ensure sustainability of the research activities and infrastructural investments, which was included in the "pending actions" at project closing. Finally, as discussed in the next section of this review, the design of the monitoring and evaluation system was inadequate for a research project in which the accurate documentation of research results were crucial to assessing its efficiency and overall outcome.

This review rates the project's Quality at Entry as Moderately Satisfactory.

Quality-at-Entry Rating

Moderately Satisfactory

b. Quality of supervision

According to the ICR the World Bank "provided regular implementation support on both technical and fiduciary aspects through monthly meetings (with the PMU) and 12 Implementation Support Missions (ISMs). According to the ICR the Bank's ISM Aide Memoires were "timely and candid, providing enough detail on action points, with roles and responsibilities clearly spelled out" (para 114). The World Bank facilitated participation of PMU staff at a procurement training program. Fiduciary issues and financial management have performed up to expectations and ISMs have always led to timely actions on jointly preparing and revising disbursement projections. In sum, no major problems arose during the life of the



project, except for the quality of M&E, which represented one area of longer-lasting concern. By the seventh ISM (in 2016), the Bank project team made the correct decision to address separately the M&E challenges during a second phase of the ISM mission, to allow for the M&E aspects to be reviewed more closely, together with fiduciary issues. "The MTR in 2015 represented an opportunity that was used successfully, leading to agreement on component and budget reallocations and updated performance indicators. These adjustments have allowed the project to achieve most of its results, while making efficient use of loan resources" (ICR, para. 114).

From the ICR, it is not clear that the Bank's project supervision missions devoted adequate attention to engaging in dialogue with other key ministries (e.g., Finance, Agriculture, Public Sector Reforms) to help address some of the strategic sustainability issues outside the direct control of IAARD, especially involving the incentive structure for researchers, budgetary allocations (especially for O&M of the infrastructural investments). The interview with the TTL/team revealed that the Bank project team did arrange to include in its annual portfolio discussions strategic sustainability issues cited in the pending issues of the ICR. It is not clear the extent to which the Bank project and/or portfolio teams took systematic follow-up actions following these portfolio reviews.

This review has rated the quality of supervision as Moderately Satisfactory.

Quality of Supervision Rating

Moderately Satisfactory

Overall Bank Performance Rating

Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

The ICR recognized that one of the major weaknesses of project design involved the Project's results framework, including the absence of baselines, an explicit theory of change and supporting results chain in the PAD, which in turn, contributed to the resulting weak design of the project's M&E system. Accordingly, the underlying weaknesses of the M&E system were due to a combination of reasons: conceptual, methodological and consistency; and the lack of required data. However, some of these M&E design weaknesses were gradually addressed during implementation, especially during the mid-term review mission. Overall, the ICR provided a sound assessment of these M&E system design shortcomings and how the project endeavored to rectify the design shortfalls during implementation (ICR, paras. 89 – 96).

b. M&E Implementation

The ICR highlighted the main design and implementation challenges involving the project's M&E system. The ICR also presented a candid assessment of the M&E implementation challenges and responses, as summarized below.



The ICR highlighted key aspects of M&E implementation, especially emerging from the MTR mission, especially the reports providing key information on progress in implementation, the outputs of each component, the progress on procurement and disbursement; as well as proposals for project adjustment and reallocation of funds to improve project performance (paras 89 and 90). The ICR also mentioned that no M&E officer had been recruited until project closing, which contributed to the poor performance of the M&E system during implementation. Although project reports tended to have been submitted to the Bank on time, the ICR noted that the quality of their contents was uneven, and data inconsistencies required a major effort of 'reconciliation' during the ICR mission to Indonesia (para 95).

c. M&E Utilization

The ICR noted that the design and implementation weaknesses of the M&E system as outlined above limited the envisioned vital role of the M&E system to inform and guide project management by the PMU management team, and higher-level operation managers and policy makers was difficult (para 91). It is therefore somewhat surprising that the ICR concluded "there is no evidence of any major shortcomings in terms of delayed or 'wrong' decisions taken by the PMU". The ICR also noted that "Information collected as part of M&E (and ISMs), and subsequent analysis, was able to guide and adjust project planning and implementation", and also "facilitated increased disbursements following the MTR and restructuring of the project" (para 92)

The ICR also mentioned that "The financial management dashboard of the MIS did work well enough to allow for a timely reallocation of funds at midterm, based on cost savings". This functioning MIS prompted IAARD management to decentralize SMARTD Project implementation. The MIS can, according to the ICR, "be retrieved from the pulldown menu on the SMARTD Project website", which was fully embedded in the IAARD institutional website and accessible to IAARD staff, although it was reported to have some formatting and software problems (para 93).

Finally, the ICR provides a positive closing note regarding the above challenges, namely that "the World Bank's insistence on the development of a project-level M&E capability did leave some positive impact on organizational development within IAARD in general, and on its work culture, in particular. The importance of measuring and reporting both quantitative and qualitative results has been recognized by a larger group of professionals within IAARD, beyond the PMU. Especially the many discussions on how to measure technology dissemination and adoption have contributed toward an enhanced results-orientation and accountability, as well as an enhanced awareness of why 'value for money' should be one of the main preoccupations of research management" (ICR, para. 96).

Nevertheless, one of the pending issues involving the sustainability aspects of SMARTD Project (see section above) is that "IAARD should ensure lessons learned from SMARTD Project are applied, especially on M&E and accountability" (ICR, page 39, Table 9).

M&E Quality Rating

Modest

10. Other Issues



a. Safeguards

The project was rated as a Category B project due to the scale of potential environmental impacts and triggered the Bank's Operational Policy (OP) 4.01 on Environmental Assessment. Other Bank safeguard OPs were not applicable to the project. Potential environment impacts would have come from the improvement of research infrastructure (civil works for new laboratories, rehabilitation and/or the upgrading of laboratories, and field stations). The project's environmental and social risk rating was assessed between "Moderate" and "Low", depending on the scale of construction and upgrading works. The ICR concluded that the environmental impacts associated directly with the project were insignificant, site specific, and noncumulative due to the scale and scope of the investments. Investments were below the Indonesian environmental permission threshold and, therefore, no environmental permits were required under the project. The project did not require a stand-alone environmental impact assessment or Environmental Management Plan (EMP) (ICR, para. 99).

The ICR provided a detailed assessment of safeguard compliance, including identifying the main safeguard issues arising during implementation, which were related primarily to project management. The ICR outlined the specific and "substantial" management actions taken by the PMU to strengthen project safeguards in the project and IAARD (see the ICR for further details on the issues and actions, paras 101 - 103). Also, the ICR indicated that the Bank provided to the PMU technical support in the form of guidance, mentoring, and supervision to improve the PMU's safeguards management. From the ICR, it was not clear if these improvements have been adopted and sustained by IAARD.

b. Fiduciary Compliance

Financial Management:

The ICR provided relevant evidence and concluded that the project generally maintained good financial management performance standards during implementation. All financial management covenants were met, including timely submission of audit reports and interim financial reports. The audit reports consistently provided an unqualified opinion on the project's annual financial reports. The project also followed up on the findings noted in the audit report on time, including the refunding of ineligible expenditures. The internal control system was sufficient. Adequate supporting documents were generally available to support the reported expenditures as indicated from the World Bank's supervision mission and audit reports. Accordingly, the 12 ISMs conducted by the World Bank team during the project's lifetime accorded consistently "Moderately Satisfactory" ratings for the project's financial management performance; this performance was upgraded to "Satisfactory" during the last two missions (ICR, p. 3).

During the MTR, there was agreement between the Bank and the PMU to reallocate funds between components. Coupled with some improvements in procurement arrangements, the PMU took some positive measures to address financial management aspects after the closing date, including the provision of GoI budget to cover scholarship-related expenditures for recipients who had not concluded their studies at the closing date and for the maintenance of facilities/equipment under Component B. With the generally good financial management performance of the project, it is also worth acknowledging that financial management under the project was entirely conducted by government staff without support from external



consultants. SMARTD Project twice earned an award from the MoF for “good financial management”. The ICR was not clear whether this financial management performance carried over to IAARD.

Procurement:

Although Project implementation complied with the World Bank’s Procurement Guidelines, the ICR highlighted various procurement-related issues which arose during implementation, and which adversely affected overall project implementation and disbursements. These procurement issues included: lack of familiarity with World Bank procurement guidelines; delays in the procurement of vital technical assistance for SMARTD Project; concentration of budget management at IAARD’s head office; limited capacities of procurement staff at the local level. During the MTR, there were agreed procurement-related actions (ICR, p. 35) which were subsequently implemented, and thereby resulted in improved procurement performance for the remainder of the project’s implementation.

c. Unintended impacts (Positive or Negative)

The ICR highlighted 5 other positive impacts from the project, while recognizing the challenges of proving direct attribution to the SMARTD Project, namely:

- (1) Gender Benefits;
- (2) Institutional and Procurement Strengthening;
- (3) Improved incentives for researchers;
- (4) Mobilizing Private Sector Financing; and
- (5) Contributing to Poverty Reduction and Shared Prosperity.

For further details of supporting evidence, see ICR, paras. 70- 76. The ICR did not identify any negative unintended impact, nor does this IEG review.

d. Other

The discussion between the IEG reviewer and the Bank’s current TTL and some members of the Project’s team was held on March 17, 2020. The discussion was based on 10 guide questions which were sent by the ICRR evaluator to the TTL. The discussion highlighted the following 6 major conclusions:

- Overall, all of the TTL/team member responses were concise and relevant;
- Core themes arising from the discussion included the strategic importance of:
 - strengthening research-extension linkages;
 - ensuring a strong and effective M&E system from the outset of project design;
 - developing an explicit sustainability strategy and supporting actions during implementation and by the end of the mid-term review, to help minimize “pending issues” by the end of the project closing;



- using proactively Government-Bank portfolio reviews at the higher level to address strategic issues which are outside the direct control of the Project Implementation Team and Bank Project team.
- The discussion provided additional evidence and insights which will be useful to incorporate in the final version of the draft ICRR. See below for the guide questions, TTL written responses prior to the discussion and the main points/information arising from the discussion;
- There were no points of substantive disagreement; rather, the discussion provided the TTL/team an opportunity to elaborate on their initial written responses;
- The Government’s intention to formally request the Bank for financing a follow-up project underscores the Government’s and Bank’s recognition of the strategic role of completing the identified “pending actions” and of expanding/scaling up the Project, with a strong sustainability strategy; and
- The Bank team’s perspective is the “glass is half-full”, implying the scope and sound basis for filling the “other half”, through the proposed follow-up project.

See Attachment 1 for further details on the guide questions, written responses from the TTL/team and key additional points/information arising from the discussion.

11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Moderately Satisfactory	The different rating of Outcome by IEG reflects IEG's rating of the project's efficiency as "modest" rather than the "substantial" rating in the ICR.
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	
Quality of M&E	Modest	Modest	
Quality of ICR	---	Substantial	

12. Lessons

The following **six lessons** are drawn largely from the ICR (paras. 119 – 124), together with a number of adjustments of both substance and language in order to sharpen the nature and implications of the lessons:

1. Integrate a Theory of Change, a Results Framework and an M&E System in Project Management: The ICR highlighted the shortcomings and supporting evidence of the project design in not formulating a sound results framework and operational M&E system (with realistic targets and data collection methodologies) from the outset. Also, the ICR recognized the shortcoming of not fully embedding the PMU of SMARTD Project in IARRD by the end of the project. Accordingly, the lesson is that a successful project is based on a logical and comprehensive theory of change and



supporting results framework, a sound and operational M&E system, and solid integration of the capacities of the PMU in the overall institutional management of a project.

2. Balanced Reliance on Local Staff and Consultants: Generally, this project demonstrated a sound balance in the reliance on government staff with selective consultant support (especially short term) for strategic activities and for which there was weak local capacity, rather than over reliance on external consultants. This included the PIU being comprised of senior and experienced staff from the IAARD, thereby enabling close collaboration between IAARD and PIU technical staff. The ICR showed how this balance contributed to enhanced sustainable local research capacity and a platform for research management development. At the same time, the project benefited from adopting relevant international practices introduced by consultants. The lesson is that there are considerable benefits for a research organization's sustainable development from a balance of local and international technical research staff.

3. Strategic Importance of Knowledge Management Strategy: The SMARTD Project demonstrated a project that generated less immediately 'tangible' outcomes which take time to materialize and whose impact did not become visible in the field until later phases of implementation. Moreover, the SMART Project lacked an explicit knowledge management (KM) strategy, and did not show evidence of influencing key institutions such as the Ministry of National Development Planning and the MoF. This is exacerbated in the case of agricultural research, which often suffers from low visibility among decision makers who give priority to 'value for money' and to expecting short-term results. Although short of an economic and financial analysis, the success stories presented in the GoI Project Completion Report/PCR, for example, do show that much thought was given to showcasing a good sample of technologies covering a range of Indonesia's many different agro-ecological settings. The lesson from this project's experience is that a sound KM strategy in which success stories are presented clearly and shared widely, based on a strong and effective M&E system, will generate evidence on the benefits from agricultural research and generate the rationale for continued financial support for such research

4. Projects can Foster Institutional Reforms: The SMARTD Project demonstrates how a project can contribute to and catalyze strategic institutional changes. Public sector institutions, such as IAARD, from the outside may look too large and too entrenched to be influenced successfully through time-bound interventions such as the SMARTD Project. By focusing on transparency and fair competition among researchers and using various mechanisms (e.g., an earmarked budget for competitive grant-funded schemes), SMARTD Project managed to find the right incentive mix that nudged IAARD out of its relative isolation. The lesson is that this project demonstrated the success of a different way of doing things among the country's community of agricultural researchers, based on active multi-stakeholder collaboration that puts farmers and agri-food system actors in the driver's seat. Such good practices have become ingrained in the daily routines of research and extension staff working in the field, who are expected to continue to follow up on both centrally determined and locally determined agricultural research priorities.

5. Strengthening Agricultural Research-Extension Linkages: Cross-country experiences, strongly confirmed by SMARTD Project, reaffirms the strategic role of a project to strengthen synergies and functional links between public agricultural research and decentralized extension systems. Notwithstanding the reported farmer high adoption rates (about 80%), the SMARTD Project assumed the existing and decentralized extension system was adequate to provide the needed linkages to channel effectively to the different types of farmers the improved technologies



generated by the project, for a wide range of commodities. SMARTD Project managed to contribute to further bridge the institutional divide between research and extension through several modest project-supported activities (e.g, opportunities for extension staff to get international exposure by attending seminars and workshops, allowing them to take stock of good practice and latest developments in approaches to extension). Drawing on relevant international experience, the lesson is the benefits from agricultural research projects to take a proactive role in strengthening effective research-extension linkages, from the outset of project design through measures such as assessing the status of research-extension linkages; and identifying key successful actions which could be scaled up.

6. Sound M&E Systems are Necessary for Economic Analysis and Sustained Financing of Agricultural Research: The analysis of this project's efficiency highlighted the shortcomings of the project's relatively weak M&E system and the absence of an impact assessment for the project. Accordingly, one lesson from this project is the crucial importance of ensuring a project's M&E system including arrangements for conducting a sound impact assessment of the project, especially for an agricultural research project such as SMARTD which addresses a strategic sub-sector in the economy and which will require continued investments in the future. The other lesson is that without regular assessments of a research project's efficiency continued financing in agricultural technological development will be severely jeopardized.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

Overall, the ICR is well written, analytical, candid, results-focused, and almost all sections were supported by relevant evidence.

While it is a considerable conceptual and empirical challenge to establish clear results (outputs, outcomes and impact) which are attributable to a specific project such as SMARTD, it could have been useful had the ICR endeavored to establish stronger attribution to SMARTD Project interventions, including a more rigorous use and analysis of the results chain and relevant performance indicators, and an updated and evidenced-based impact evaluation. Accordingly, M&E systems and the ICR could have included a stronger efficiency analysis, including an updated economic analyses, rather than relying on a rudimentary "break-even" analyses", and on the macro-level estimated economic rate of return made in 2011, and also from deriving an appropriate assessment of "value for money". Finally, the lessons outlined in the ICR, while generally relevant, warranted further sharpening, as suggested above.

Nevertheless, despite some shortcomings, the quality of the ICR is rated "Substantial"..

a. Quality of ICR Rating



Substantial