Report Number: ICRR0022234

1. Project Data

Project ID	Project Name
P117394	VN-Science & Technology Innovation
Country	**Practice Area(Lead)**
Vietnam	Education

L/C/TF Number(s)	Closing Date (Original)	Total Project Cost (USD)
IDA-52570	30-Jun-2019	50,573,920.81
Bank Approval Date	**Closing Date (Actual)**	
31-May-2013	31-Dec-2019	

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	100,000,000.00	0.00
Revised Commitment	57,974,358.75	0.00
Actual	50,573,920.81	0.00

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2. Project Objectives and Components

a. Objectives

According to the Financing Agreement (page 4) and the Project Appraisal Document (PAD, page 3), the project objective was as follows:

- **To support science, technology, and innovation (STI) in Vietnam by designing and piloting of STI policies, enhancing the effectiveness of project-aided research and development (R&D) institutions, and encouraging the development of innovative-technology enterprises.**

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

No

c. Will a split evaluation be undertaken?

No

d. Components

1. Knowledge and Policy Development (Appraisal: US$ 13.0 million; Actual: US$ 7.8 million): This component aimed to attract talented experts living abroad, including Vietnamese overseas, in order to conduct scientific research and foster innovation in Vietnam; as well as to upgrade and modernize the collection, dissemination, and use of STI statistics in order to better inform policy. Activities included: developing networks abroad with government research institutions and innovative enterprises in Vietnam; providing Foreign Talent grants to scientific researchers or institutions; conducting STI surveys; publishing annual STI statistics; developing a monitoring and evaluation framework to measure effectiveness of R&D institutions; and technology mapping.

2. Supporting Government Research Institute (GRI) Reform and Enterprises Innovation (Appraisal: US$ 82.0 million; Actual: US$ 39.5 million): This component aimed to support the conversion of government research institutions (GRI) into more autonomous and market-driven entities and to promote innovative linkages between enterprises and the scientific community. Activities included: providing grants to approximately 15 GRIs to implement their conversion plans; providing New Enterprise grants for innovative technology enterprises; providing Research and Innovative Consortium grants for development of consortia; and establishing a National Core Technology Laboratory for Mechanical Manufacturing Automation and Embedded Technology, with the intent of pioneering a public-private partnership arrangement.

3. Project Management (Appraisal: US$ 5.0 million; Actual: US$ 3.9 million): This component aimed to strengthen institutional capacity of the Ministry of Science and Technology (MOST), in order to effectively implement the project.

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

Project cost

- The appraised project cost was US$ 110.0 million, subsequently revised to US$ 58.0 million. The actual project cost was US$ 50.6 million.

Financing

- The appraised project was financed by an IDA Credit of US$ 100.0 million, subsequently revised to US$ 58.0 million, of which US$ 51.2 million disbursed.
- US$38.5 million of the Credit was cancelled.

Borrower contribution

- The Borrower was expected to contribute US$10.0 million to the project. The project team confirmed that the actual government contribution was US$ 9.3 million.

Dates

- *April 2017*: US$22.0 million of the Credit was cancelled following simplification of the project design (cancellation of New Enterprise grants and the lab construction activities).
- *January 2019*: The project closing date was extended from June 2019 to December 2019, to allow time for completion of activities, particularly the sub-project grants. The wording of key project indicators was also revised to clarify measurement.
- *August 2019*: US$ 13.0 million of the Credit was cancelled due to unutilized funds. According to the Project Paper, these unutilized funds were due to the cost savings from the following sources: savings from competitive procurement processes, reduced "recurrent expenditures" on training and operating costs per government regulations, and dropping of seven Consortia sub-project grants, which were terminated due to changes in enterprise priority focus, funding secured from alternate sources, and unforeseen financial difficulties.
- *December 2019*: US$ 3.5 million of the Credit was cancelled to the unutilized funds, for the same reasons as stated above.

3. Relevance of Objectives

Rationale

Vietnam has transformed from an inward-looking agricultural economy to a middle-income export-oriented country. To continue economic growth and increase productivity, further transformation is needed in the science and technology sector, spurred by a focus on innovation to increase competitiveness in the global economy. As described in the PAD (page 1), global benchmarking indicators point to weak innovation performance of the country. Vietnam ranks 115 out of 146 countries according to the Knowledge Assessment Methodology Innovation Index and 51 out of 125 countries according to the INSEAD Global Innovation Index. Although manufacturing and service industries have grown and human capacity has improved through increased coverage of secondary education, along with government-initiated reforms in the STI sector, there remain low levels of private sector innovation, low investment in R&D, and low institutional capacity to support STI sector. Weak links between public and private sectors with regards to R&D have been identified as a specific barrier.

The government has initiated reforms in the STI support to spur its growth, including several laws and decrees to define legal frameworks, clarify the role of the Ministry of Science and Technology (MOST), and support the transformation of government research institutions (GRIs) into more financially autonomous (i.e. less reliant on state budget) and market-driven entities. This project is highly consistent with these government actions, as well as the government's Science and Technology Development Strategy (2011-2020).

The Bank's current Country Partnership Framework (CPF, FY18-22) also identified relevant Focus Areas/ Objectives including enhancing competitiveness, promoting private sector and agribusiness sectors, and developing stronger and more competitive labor force by working in the tertiary education sector. The CPF Objective Indicators included "increase in innovative activity by beneficiary organization."

Rating
High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective
To support science, technology, and innovation (STI) in Vietnam by designing and piloting STI policies

Rationale
The theory of change was overall sound, although the articulation of the compound project objective statement was broad and vague (to support science, technology, and innovation). The intended outcomes, inferred from the project description and results framework, led to three specific objectives discussed in this ICR Review. Outcomes included the following: advancing of STI policies, increased knowledge transfer; increased capacity and effectiveness of STI institutions; and increased innovation. Project activities - including provision of grants to attract foreign STI talent and support research and innovative technology enterprises, and upgrading of the STI data collection system - were likely to contribute to one or more of these intended outcomes, with some overlap, and all likely to contribute to the overall stated objective to "support science, technology and innovation in Vietnam."

Outputs

- Provision of 38 Foreign Talent STI grants to 23 universities and research institutions for collaborative R&D projects, in order to attract foreign talent including overseas Vietnamese (target:50). These grants intended to connect existing global and local STI networks with Vietnamese GRIs and local enterprises, thereby removing informational and institutional bottlenecks that were hindering full exploitation of overseas talent. Online surveys administered through these networks matched foreign talent with Vietnamese organizations. Grants to the beneficiary institutions enabled foreign talent to visit Vietnam and to collaborate, teach, mentor, and conduct joint research.
- Modernization, collection, dissemination, and use of STI statistics through implementing R&D and Innovation Surveys (with participation from over 8,000 medium and small enterprises). The STI survey results were published, an M&E framework was developed to assess effective functioning of GRIs, and a STI database was developed and operationalized. However, technology mapping was not implemented as planned, as MOST used its own funds to finance this activity.

Outcomes

- *Policy development:* The ICR (page 15) reported that MOST was "active in creating an environment conducive to attracting talented overseas experts and facilitating knowledge and technology transfer." This was evidenced by two draft decrees (appreciation of individuals engaged in S&T activities and attracting of overseas Vietnamese and foreign talents engaged in S&T activities) and an annual international forum for talented overseas Vietnamese.
- *Strengthen capacity for STI policy implementation and assessment:* Three Ministerial circulars were issued by MOST on STI indicators and surveys, which were intended to serve as guides for the implementation of STI policy in Vietnam. Also, STI survey data was used to as background data for the Bank's analytic work informing the government's national STI strategy (2021-30).

However, the PPP model was not tested as planned. The ICR (page 23) noted that "there still appears to exist the mindset within the government that downplays the role of private sector enterprises as the central force for innovation. Even after the MOST's adoption of the streamlined approval process, the current administrative system still does not appear to fully accommodate a rapid shift to a private-sector driven innovation process through PPP."

Rating
Substantial

OBJECTIVE 2
Objective
To support science, technology, and innovation (STI) in Vietnam by enhancing the effectiveness of project-aided research and development (R&D) institutions

Rationale
The theory of change is discussed under Objective 1.

Outputs

- Provision of 38 Foreign Talent STI grants to 23 universities and research institutions for collaborative R&D projects, in order to attract foreign talent including overseas Vietnamese (target:50). These grants intended to connect existing global and local STI networks with Vietnamese GRIs and local enterprises, thereby removing informational and institutional bottlenecks that were hindering full exploitation of overseas talent. Online surveys administered through these networks matched foreign talent with Vietnamese organizations. Grants to the beneficiary institutions enabled foreign talent to visit Vietnam and to collaborate, teach, mentor, and conduct joint research.

- Provision of grants to 16 government research institutes (GRIs) in four priority sectors (10 in Agriculture/ Biotechnology, others in Mechanics and Automation, New Materials, ICT and Public Goods) to implement strategic plans (already approved by government) to support ongoing conversion from traditionally managed organizations towards becoming more autonomous market-driven institutions (original target: 6 GRIs). Grants were used, for example, to upgrade laboratories and equipment, train researchers, strengthen linkages with enterprises, and accelerate process for becoming financially autonomous.

Outcomes

- *Increased knowledge transfer:* 102 foreign experts participated in the Foreign Talent STI grants, surpassing the original target of 50. Through the participation of these foreign experts, 76 advanced technologies were shared with the research institutions.
- *Improved effectiveness of the R&D sector:* 105 journal articles were published (target: not comparable due to differing units of measure from original baseline figure). According to the grant holder survey conducted as part of the project's impact evaluation, the respondents also reported the development of new research skills (80 percent), improved research facilities (60 percent), and new skills in working with research institutes (60 percent). Also, the ICR (page 17) reported that the 16 GRIs successfully completed the sub-projects and transitioned into "financially autonomous market-driven institutions in accordance with their GRI conversion plans." According to the project team, GRI sub-project grant agreements included signing of contracts with enterprises on commercialized products or on payment of royalty fees on technology/knowledge transfer, with verification of revenue generation and reduced dependency on government for recurrent expenditures. Examples of verified revenue generation included: i) The Cuu Long Delta Rice Research Institute produced new varieties of rice with high-yields, developed new technology for rice breeding, and upgraded laboratory facilities for R&D, resulting in revenue increases from US$0.8 million in 2015 (pre-project) to US$1.3 million in 2017 and US$1.7 million; ii) The Research Institute for Aquaculture produced fish products, through modern technology on marine fish farming, resulting in revenue increases from US$1.14 million in 2017 (pre-project) to US$2.9 million in 2019 and expected to increase to US$3.8 million by 2021; and iii) The Maize Research Institute produced high-yielding maize varieties, upgraded 2 ISO certified labs, and increased capacity of its research staff, resulting in revenue increases from US$2.0 million in 2018 to US$2.3 million in 2019 (14% growth) and expected to increase to US$ 2.8 million in 2021.

Rating
Substantial

OBJECTIVE 3

Objective
To support science, technology, and innovation (STI) in Vietnam by encouraging the development of innovative-technology enterprises.

Rationale

The theory of change is discussed under Objective 1.

Outputs

- Provision of 27 innovation grants to strengthen partnerships among enterprises, research institutions, and universities, including through the formation of research-innovation consortia (target: 32). These included 3 new start-up enterprises (Education technology, HR technology and medicinal supplements) and 11 consortia between enterprises and research institutes (agriculture/ biotechnology, new materials, mechanics and automation, ICT).
- However, the construction of a National Core Technology Lab was not completed as planned.

Outcomes

- *Increased innovative activity:* 108 activities (original target: not comparable due to differing units of measure from original baseline figure) were implemented by grantee organizations. These included 46 patents, 10 trademarks and 5 registered industrial designs, 42 copyrights. Examples of activities included: high-yielding plant or seed varieties, high-quality lab testing, sale of innovative products in domestic and international markets.

Rating

Substantial

OVERALL EFFICACY

Rationale

The specific objectives of designing and piloting of STI policies, enhancing the effectiveness of project-aided research and development (R&D) institutions, and encouraging the development of innovative-technology enterprises were all rated Substantial due to evidence of increased knowledge transfer, capacity of key institutions in the STI sector, and innovation among STI enterprises. Therefore, overall Efficacy is rated Substantial.

Overall Efficacy Rating

Substantial

5. Efficiency

The PAD economic analysis referred to global literature on productivity gains from innovative activity in the discussion of economic benefits, while also pointing out the lack of readily available data linking R&D and innovation in Vietnam. Therefore, no quantitative analysis was conducted during project appraisal.

The ICR carried out a cost-benefit analysis (with reasonable assumptions and sensitivity analysis) and also relied on economic research literature to attempt to estimate social rates of return to investment in STI, taking the low range value of a 200 percent return after a four-year lag. Calculating project investment in STI (in the form of STI grants) as US$47.8 million, with an additional US$ 5.8 million invested in strengthening M&E systems and project management, the gross benefits (private returns in the form of incremental productivity and knowledge transfer) are thus calculated as $128.0 million. This resulted in estimated net present value of US$87.68 million and an IRR of 112 percent.

Successful leveraging of private sector financing through matching grants. As reported in the ICR (page 20), research consortia that won the Consortia STI grants financed the sub-projects with their own funds (US$ 11.2 million) in collaboration with universities and/or research institutions, with the Bank project providing funds (US$ 8.5 million) as matching grants that were disbursed in the form of reimbursement under the project.

There were significant implementation delays and low disbursement levels for the first three years of the project period, due to low borrower capacity (lack of familiarity with Bank processes) and highly centralized approval processes. These likely resulted in some opportunity costs for beneficiaries, due to delayed disbursement of grants. However, overall Efficiency is rated Substantial due to favorable returns on investment and the generation of significant savings in certain project interventions.

Efficiency Rating

Substantial

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		0	0 ☐ Not Applicable
ICR Estimate	✓	112.00	89.00 ☐ Not Applicable

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

6. Outcome

The overall outcome is rated Satisfactory due to High Relevance, Substantial Efficacy, and Substantial Efficiency, with minor shortcomings in the achievement of objectives and efficiency of project implementation.

a. Outcome Rating
Satisfactory

7. Risk to Development Outcome

The increased capacity of MOST, research institutions and universities, and other subproject beneficiary organizations is likely to be sustained, particularly through the institutional arrangements developed by the project such as formal collaborations, partnerships, and networks formed. The M&E framework for the STI sector was also institutionalized to support policy decision making. Policy directions will also continue to be supported through forthcoming analytic work from the Bank, which will be used to inform the government's new STI strategy and economic development plan. Research institutions have also increased financial sustainability by becoming more autonomous.

8. Assessment of Bank Performance

a. Quality-at-Entry

The project design drew upon analytic work, namely the joint study by the Organisation for Economic Co-operation and Development (OECD) and the World Bank ("Science, Technology and Innovation in Vietnam"), which informed the project's specific areas of focus. These areas of project support were selected according to the Bank's comparative advantage, namely attracting foreign talent and strengthening results measurement for the STI sector. There was, however, duplication with ongoing donor and government programs that led to eventual dropping of some activities and partial cancellation of the Credit. Implementation capacity risk was appropriately assessed as Substantial due to MOST's limited prior experience with Bank projects (this was the first Bank project implemented by MOST) and the inherent complexity of science and technology interventions. Risk mitigation measures focused on providing additional training from Bank specialists on fiduciary functions; however, the ICR (page 22) noted insufficient implementation readiness and reported that the originally approved Project Implementation Manual was "not sufficiently detailed and specific to enable the CPMU and the beneficiaries to carry out the project activities as intended." Although the borrower utilized the Project Preparation Technical Assistance Facility project (P118610) to operationalize the project management unit ahead of project implementation, there was still a lengthy delay (27 months) between project concept and decision review, followed by implementation delays in the initial project period.

Also, as discussed in the ICR (page 24), the statement of the PDO precluded a meaningful outcome evaluation because both "STI" and "support" are broad concepts, and therefore inference of specific objectives/expected outcomes was necessary. Measurement of the key project indicators also had

shortcomings, as there was lack of clarity in the establishment of the original baselines and targets of the key project indicators.

Quality-at-Entry Rating
Moderately Satisfactory

b. Quality of supervision
The Bank team provided intensive implementation support to the borrower, given significant capacity constraints in fiduciary areas. The transition from HQ-based to Vietnam-based TTL along with other key staff based in country, further helped improve project implementation, particularly following project restructuring. The project team utilized multiple project restructuring to simplify project design to support achievement of objective and to improve disbursement levels. Fiduciary arrangements were simplified by decentralizing procurement and financial management to the grant beneficiaries, resulting in a revised PIM (prepared with support and guidance of the Bank team) that helped create less cumbersome processes for enterprises and research communities, as well as enhance ownership and capacity of beneficiary organizations. Several activities were dropped along with partial Credit cancellations. The New Enterprise grant activities were dropped for the additional reason of avoiding duplication of similar interventions that had been implemented in parallel with the project (a national government-supported program and the second phase of the Viet Nam-Finland Innovation Partnership Programme, both of which were designed to foster entrepreneurship and innovation).

Wording of key project indicators was also revised for more clarity and measurability, while also adding intermediate indicators to clarify the results chain and intended outcomes. However, baseline figures were not updated accordingly.

Quality of Supervision Rating
Satisfactory

Overall Bank Performance Rating
Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design
As noted in the ICR, the statement of project objective was too broad, which is a significant shortcoming in the design of M&E. The original results framework also had shortcomings, particularly the two key project indicators ("increase in the number of international scientific publications made by beneficiary organizations" and "increase in innovative activity by beneficiary organizations") both measured by percentage increases from a baseline of 0. The intermediate results indicators were more clear and

measurable, with clear linkages to project activities and intended outcomes, albeit still largely measuring outputs.

b. M&E Implementation

A project M&E team was appointed by the borrower and developed an M&E system to closely monitor sub-project grant activities and identify issues such as procurement delays and misalignment with sub-project objectives. According to the ICR (page 24-25), project M&E was effectively carried out as planned throughout the project period, with the CPMU preparing detailed implementation progress reports biannually, including data from sub-project beneficiaries, that contributed to improved project implementation. For evaluation, a beneficiary survey was carried out as part of MOST's impact evaluation, undertaken by an independent firm, which indicated MOST's commitment to learning from project experience. The results framework was also revised to improve project monitoring.

c. M&E Utilization

The ICR (page 25) noted that project M&E was used by the Bank team for constant follow-up and close monitoring to identify delays and provide timely solutions. The impact evaluation identified beneficiary reporting issues, and the ICR noted that interim and final reports used by sub-project grant beneficiaries had shortcomings: the report format could have been improved with clarification of each sub-project's objectives and linkages to the overall project objective (thus also presenting a challenge in assessing achievement level), large amounts of scientific and technical results reported which presented a challenge, including for CPMU staff, to comprehend and link the impact to the overall project objective and synthesize results for project management purposes. At the same time, the ICR (p. 25) stated that in spite of these beneficiary reporting challenges, the CPMU and the Bank team’s regular supervision through site visits and phone calls to grant holders to assess the performance and progress of their sub-projects, as well as to provide hands-on advice, allowed for course correction.

M&E Quality Rating

Modest

10. Other Issues

a. Safeguards

The project was classified as an Environmental Category "B" project. The safeguard policy on Environmental Assessment (OP/BP 4.01) was triggered due to planned construction of the technology lab and other potential minor rehabilitation and civil works by enterprises or GRIs. An Environmental and Social Management Framework was prepared to support compliance with Bank safeguard policies and national regulations. No other safeguard policies were triggered.

According to the ICR (page 26), safeguards performance was satisfactory throughout the project period, with no significant social or environmental problems. The construction of the technology lab was dropped

as a project activity. Sub-projects underwent environmental screening and were required to comply with safeguard requirements before receiving funds.

b. Fiduciary Compliance

As noted earlier, the initial project period was marked by significant fiduciary challenges and project implementation delays due to lack of counterpart experience with Bank procedures as well as cumbersome and highly centralized fiduciary decision-making processes. However, subsequent revisions, including streamlining fiduciary arrangements and delegating decision-making authority to sub-project beneficiaries, resulted in improved implementation progress and fiduciary performance.

Financial management: Despite initial challenges, the project was in compliance with all fiduciary requirements. According to the ICR (page 26-27), interim financial reports were submitted in a timely and satisfactory manner, and audited financial statements were of satisfactory quality without any qualified opinions.

Procurement: According to the ICR (page 26-27), procurement activities were carried out satisfactorily with no major shortcomings or misprocurement cases and there were no ineligible expenditures identified.

c. Unintended impacts (Positive or Negative)

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d. Other

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11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Satisfactory	
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	
Quality of M&E	Modest	Modest	
Quality of ICR	---	Substantial	

12. Lessons

Lessons drawn from the ICR (pages 29-30), adapted by IEG:

- Given the nature of the STI sector and the emphasis on fast-paced innovation, a cumbersome grant process for private sector beneficiaries (including start-ups) can be a hindrance to effective and timely responses. In the case of this project, highly centralized and slow approval processes from the public sector led to extensive delays in grant project start-up. Streamlined fiduciary processes (including delegation of responsibilities to the grantee organizations, with clearance required for only major changes) resolved the implementation bottlenecks.
- Strong collaboration between the public and private sectors, facilitated by effective partnership mechanisms, is critical to developing the STI sector. In the case of this project, public research institutions were able to provide resources (financial and knowledge) with private enterprises providing innovative ideas and market relationships. The various grant-making schemes helped to establish and institutionalize partnerships and processes between the sectors.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR was well-organized, candid and results-oriented. The theory of change was explained clearly by unpacking the broad project objective statement. The evidence was generally of good quality and allowed assessment of project achievements. The efficiency discussion would have been strengthened with project-specific evidence of expected benefits. The ICR followed guidelines.

IEG concurs with the project team's view that the PDO statement was broad, thus presenting a challenge in enabling meaningful evaluation. However, the project team was able to present more specific findings in a clear format, in order to verify achievement of outcomes.

a. Quality of ICR Rating

Substantial